MOODY MARINE LTD

Ref: 022 - 017 v3

Author(s): J Nichols, T Huntington, A Hough

Certification Report for

Hastings Fleet Pelagic Fishery

Client: Hastings Borough Council and the Hastings Fishermen's Protection Society

Certification Body:
Moody Marine Ltd
Moody International Certification
Salisbury House
Stephenson's Way
Wyvern Business Park
Derby. DE21 6LY
UK

Tel: +44 (0) 1704 834644
Fax: +44 (0) 1332 675152

Client Contact:
Mr. Paul Joy
Hastings Fishermen's Protection Society
The Fishmarket
Rock-a-Nore Road
Hastings
East Sussex
TN34 3DW

01424 722322

CONTENTS

1. INTRODUCTION

This report sets out the results of the assessment of the Hastings Fleet Pelagic Fishery against the Marine Stewardship Council Principles and Criteria for Sustainable Fishing.

1.1 The fishery proposed for certification

The MSC Guidelines to Certifiers specify that the unit of certification is "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock) and management framework."

The fishery proposed for certification is therefore defined as:

Species:	Herring (*Clupea harengus*) Mackerel *(Scomber scombrus)*
Geographical Area:	Within the Eastern English Channel (ICES Division VIId) and specifically between Beachy Head and Dungeness and offshore to the six mile limit
Method of Capture:	Fishing is undertaken by under 10m boats launched from the beach at Hastings ('Stade-launched boats'). Fishing for pelagic species (herring and mackerel) is at a relatively low level (around three to five vessels only) using drift nets.
Stock	The fishery proposed for certification is part of the overall fishing pressure on the stocks within ICES Management Area VIId (see below). **Herring** – The stock under assessment is North Sea Autumn Spawning stock in ICES Divisions IVc, and VIId (the Downs Herring Stock). **Mackerel** – The stock under assessment is the Western Component of the North East Atlantic mackerel stock. This is defined as mackerel spawning in the western area (ICES areas VI, VII, VIII a, b, d, e). **It is recognised that this fishery represents a small proportion of the total fishing pressure on these stocks and so the status of the stocks as a whole is assessed, together with fishing practices and consequences within the Hastings fleet only.**

1.2 Report Structure and Assessment Process

The aims of the assessment are to determine the degree of compliance of the fishery with the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing, as set out in Section 5. It must be stressed that this assessment is concerned **only** with the fishery defined above.

This report firstly sets out:

- the background to the fishery under assessment
- the qualifications and experience of the team undertaking the assessment
- the standard used (MSC Principles and Criteria)
- stakeholder consultation carried out. Stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and Non-Governmental Organisations (NGO's)

Section 9 of the report sets out the methodology used to assess ('score') the fishery against the MSC Standard. The scoring table then sets out the Scoring Indicators adopted by the assessment team and Scoring Guidelines which aid the team in allocating scores to the fishery. The commentary in this table then sets out the position of the fishery in relation to these Scoring Indicators.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context.

Finally, as a result of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions attached to certification.

In draft form, this report is subject to public scrutiny on the MSC website and critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and, where amendments are made to the report on the basis of Peer Review comments, these are also noted in the peer review text.

The report, containing the recommendation of the assessment team, any further stakeholder comments and the peer review comments is then considered by the Moody Marine Governing Board (a body independent of the assessment team). The Governing Board then make the final certification determination on behalf of Moody Marine.

It should be noted that, in response to comments by peer reviewers, stakeholders and the Moody Marine Governing Board, some points of clarification may be added to the final report.

Finally, the complete report, containing the Moody Marine Ltd Determination and all amendments, will be released for further stakeholder scrutiny.

1.3 Information sources used

Information used in the main assessment has been obtained from interviews and correspondence with stakeholders in the trawl fishery, notably:

I1. Hastings Fishermen's Protection Society
I2. Network Fisheries
I3. DEFRA
I4. Sussex Sea Fisheries Committee
I5. CEFAS
I6. English Nature
I7. Sussex Wildlife Trust
I8. Hastings Driftnet fisherman
I9. Sea Mammal Research Unit
I10. Hampshire and Isle of Wight Wildlife Trust
I11. Environment Agency
I12. Seafish Industry Authority

Other information sources

Published information and unpublished reports used during the assessment are:

R1. Bowers, A. B. (1969). Spawning beds of Manx autumn herrings. J. Fish Biol. 1, 355-359.
R2. Corten, A. (1986). On the causes of the recruitment failure of herring in the central and northern North
R3. Couperus, A.S. (1997). Interactions Between Dutch Midwater Trawl and Atlantic White-sided Dolphins (*Lagenorhynchus acutus*) Southwest of Ireland. Northw. Atl. Fish. Sci., Vol. 22: 209–218
R4. Daan, N. (1989). Data Base Report of the stomach sampling project 1981. ICES Coop. Res. Rep. 164.
R5. De Groot (1980). The consequences of marine gravel extraction on the spawning of herring, *Clupea harengus* Linné. J. Fish. Biol. 16, 605-611.
R6. Defra (2003). UK Small cetacean by-catch response strategy. Hansen, V. Kr. (1955). The food of the herring on the Bløden Ground (North Sea) in 1953. J. Cons. Perm. Int. Explor.

Mer 21, 61-64
R7. EC (2002). Incidental Catches of Small Cetaceans. Sub-group on Fishery and Environment (SGFEN), Scientific, Technical and Economic Committee for Fisheries (STECF). Brussels, 10-14 December 2001.
R8. ECA (2003). Regional environmental assessment for aggregate extraction in the Eastern English Channel (2003). Report by Posford Haskoning for the Eastern Channel Association.
R9. EMU (1999). Hastings Shingle Bank and South Hastings Environment Assessment for Gravel Extraction in the Eastern English Channel. Report to Hanson Aggregates Marine Ltd, United Marine Dredging Limited and South Coast Shipping Company Ltd.
R10. Harden Jones, F.R. (1968). Fish Migration. Edward Arnold, London. 325pp
R11. Hardy, A.C. (1924). The herring in relation to its animate environment. Part 1. The food and feeding habits of herring with specific reference to the east coast of England. Fishery Invest., Lond., Ser. II, 7(3), 1-53
R12. Hislop, J.; Bromley, P.J.; Daan, N.; Gislason, H.; Heessen, H.J.L.; Robb, A.P.; Skagen, D.; Sparholt, H.; Temming, A. (1997). Database Report of the Stomach Sampling Project 1991. ICES Coop. Res. Rep.
R13. Huntington, T. C. and R. Banks (2002). Fisheries Resources and Fishing Activities. Appendix C: A Regional Environmental Assessment for Aggregate Extraction. Prepared by Posford Haskoning on behalf of the East Channel Association, Southampton, UK. 125 pp
R14. Huntington, T.C. and J. Cox (2004). Assessment of the Feasibility of a Regional Approach to the Delivery of Marine Biodiversity Action Plans. Report to the Hampshire and Isle of Wight Wildlife Trust. 64 pp
R15. ICES (1969). Preliminary report of the assessment group on North Sea Herring. CM.1969/H:4. Copenhagen, 6 - 11 January 1969
R16. ICES (1993). Report of the Herring Assessment Working Group for the Area South of 62°N. ICES C.M. 1993/Assess:15. 245pp
R17. ICES (1994). Report of the Herring Assessment Working Group for the Area South of 62°N. ICES C.M. 1994/Assess:13. 249pp
R18. ICES (1996). Report of the Herring Assessment Working Group for the Area South of 62°N. ICES C.M. 1996/Assess:10.
R19. ICES (2000). Report of the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy. ICES C.M. 2000 /ACFM: 05
R20. ICES (2002). Report of the Workshop on MSVPA in the North Sea. Resource Management Committee ICES CM 2002/D:04. Charlottenlund, Denmark. 8–12 April 2002
R21. ICES (2003a). Report of the Advisory Committee on Fishery Management ICES ACFM: May 2003
R22. ICES (2003b). Report of the Study Group on Multispecies Assessments in the North Sea Bergen, Norway. 25–29 August 2003. Resource Management Committee ICES CM 2003/D:09, Copenhagen, Denmark
R23. ICES (2003c). Report of the Herring Assessment Working Group for the Area South of 62°N. ICES C.M. 2003 /Assess:17.
R24. ICES (2003d). Report of the Advisory Committee on Fishery Management ICES ACFM: October 2003.
R25. ICES (2004a). Report of the Herring Assessment Working Group for the Area South of 62°N. ICES C.M. 2004 /ACFM:18. 245pp
R26. ICES (2004b). Report of the Working Group on the Assessment of Mackerel, Horse Mackerel, Sardine and Anchovy. ICES C.M. 2004 /ACFM: 08
R27. ICES (2004c) Report of the Advisory Committee on Fishery Management ICES ACFM: May 2004.
R28. ICES (2004d). Report of the Working Group on the Assessment of the Demersal Stocks in the North Sea and Skagerrak. Part 1 to 3. ICES C.M. 2004/ACFM:07.
R29. Jennings, S. and M.J. Kaiser (1998). The effects of fishing on the marine ecosystem. Advances in Marine Biology Vol. 34 (1998) 203-302
R30. Kaiser, M.J., Rogers, S. I. and J. R. Ellis (1999). Importance of Benthic Habitat Complexity

for Demersal Fish Assemblages. American Fisheries Society Symposium 22:212-223

R31. Lockwood, S.J. (1978). Mackerel: A problem in fish stock assessment. Lab. Leafl., MAFF Direct. Fish. Res.. Lowestoft, 44, 18pp

R32. Lockwood, S.J. (1988). The Mackerel. Its biology, assessment and the management of a fishery. Fishing News Books Ltd. Farnham, Surrey, England.

R33. Molloy, J. (2004). The Irish Mackerel Fishery and the making of an industry. Killybegs Fishermens Organisation Ltd and The Marine Institute, Ireland. 245pp.

R34. Napier, I.R., A. Robb and J. Holst (2002). Investigation of Pelagic Discarding. Final Report. EU Study Contract Report 99/071. North Atlantic Fisheries College and the FRS Marine Laboratory. August 2002.

R35. Napier, I.R., A.W. Newton and R. Toreson (1999). Investigation of the Extent and Nature of Discarding from Herring and Mackerel Fisheries in ICES Sub-Areas IVa and VIa. Final Report. EU Study Contract Report 96/082. North Atlantic Fisheries College, Shetland Islands, UK. June 1999.

R36. Newell, R.C., Seiderer, L.J. & Hitchcock, D.R. (1998). The impact of dredging works in coastal waters: a review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. Oceanography and Marine Biology: an Annual Review 36: 127-178.

R37. Nichols, J.H. (2001). Management of North Sea Herring and Prospects for the New Millennium. *In* Herring Expectations for a New Millennium. University of Alaska Sea Grant, AK-SG-01-04, Fairbanks. 800pp

R38. Northridge S., di Natale A., Kinze C., Lankester K., Ortiz de Zarate V. & Sequeira M. (1991). Gill net fisheries in the European Community and their impacts on the marine environment. MRAG Ltd. A report to the European Commission's Directorate General Environment.

R39. Ogilvie, H.S. (1934). A preliminary account of the food of herring in the north-western North Sea. Rapp. P.-v Cons. Reun. Int. Explor. Mar 89, 85-92

R40. Patterson, K.R. and Melvin, G.D. (1996). Integrated catch at age analysis, Version 1.2. Scottish Fisheries Research Report No. 38. Aberdeen

R41. Pawson, M.G. (1995). Bio-geographical identification of English Channel fish and shellfish stocks. MAFF Fisheries Research Technical Report No. 99. Lowestoft.

R42. Pierce, G.J., J. Dyson, E. Kelly, J. Eggleton, P. Whomersley, I.A.G. Young, M. Begoña Santos, J. Wang and N.J. Spencer (2002). Results of a short study on by-catches and discards in pelagic fisheries in Scotland (UK). Aquat. Living. Resour. 15 (2002) 327-334

R43. Rogers, S.I., Rijnsdorp, A.D., Damm, U. & Vanhee, W. (1998) Demersal fish populations in the coastal waters of the UK and continental NW Europe from beam trawl survey data collected from 1990 to 1995. Journal of Sea Research, 39. 79-102.

R44. Savage, R.E. (1937). The food of the North Sea herring in 1930-1934. Fishery Invest., Lond., Ser. II, 15(5), 1-60

R45. SCOS (2002). Scientific advice on matter relating to the management of seal populations. Natural Environment Research Council, UK.

R46. Turnpenny, A.W.H and Riley J.D. (2000). Review of Fish and Fisheries in the Median Deep Area of the Channel. In Aggregate Production Licence Application – Median Deep (Area 461). Environmental Statement. Prepared for Volker Dredging Limited.

R47. Burd, A.C and Howlett, G.J. (1974). Fecundity studies on North Sea herring. J.Cons. int. Explor. Mer, 35(2): 107-120.

2 BACKGROUND TO THE FISHERY

2.1 Biology of the Target Species

2.1.1 Herring

The herring (Clupea harengus) is a pelagic species which is widespread in its distribution throughout the North Sea. The herring's unique habit is that it produces benthic eggs which are attached to a gravely substrate on the seabed. This points strongly to an evolutionary history in which herring spawned in rivers and at some later date re-adapted to the marine environment. The spawning grounds in the southern North Sea are in fact located in the beds of rivers which existed in geological times and some groups of spring spawning herring still spawn in very shallow inshore waters and estuaries (Nichols, 2001). Spawning typically occurs on coarse gravel (0.5-5 cm) to stone (8-15 cm) substrates and often on the crest of a ridge rather than hollows. For example, in a spawning area in the English Channel, eggs were found attached to flints 2.5-25 cm in length, where these occurred in gravel, over a 3.5 km by 400m wide strip.

As a consequence of the requirement for a very specific substrate, spawning occurs in small discrete areas in the near coastal waters of the western North Sea the Southern Bight of the North Sea and the eastern English Channel. They extend from the Shetland Isles in the north through into the English Channel in the south. Within these specific areas actual patches of spawn can be extremely difficult to find by grab surveys.

The fecundity of herring is length/weight related and over the whole of the North Sea varies generally between approximately 10,000 and 1400,000 eggs per female although values as high as 175,000 have been recorded (Burd and Howlett, 1974). There is considerable regional variation in fecundity with the Downs spawners in the southern North Sea and eastern English Channel ranging from approximately 10,000 to 60,000 eggs per female. The fecundity of herring is relatively low for teleosts, probably because, in evolutionary terms, the benthic egg is a potentially less hazardous phase of development compared with the planktonic egg of most other teleosts. The age of first maturity is 3 years old (2 winter ringers) but the proportion mature at age may vary from year to year dependent on feeding conditions and year class strength. Over the past 15 years the proportion of North Seas autumn spawners mature at age 3 years (2 winter ringers) has ranged from 47% to 86% and for 4 year old fish (3 winter ringers) from 63% to 100%. Above that age, all are considered to be mature (ICES, 2004a).

The benthic eggs take about three weeks to hatch dependant on the temperature. The larvae on hatching are 5 mm to 9 mm long and are immediately planktonic. The winter hatching larvae in the southern North Sea and English Channel tend to be larger than those hatching further North in the late summer and autumn. Their yolk sac lasts for a few days during which time they will begin to feed on phytoplankton and small planktonic animals. Their planktonic development lasts around three to four months during which time they are passively subjected to the residual drift which takes them to various coastal nursery areas on both sides of the North Sea and into the Skagerrak and Kattegat. (Figure 1).

Herring continue to be mainly planktonic feeders throughout their life history although there are numerous records of them taking small fish, such as sprat and sandeels, on an opportunistic basis. Calanoid copepods, such as *Calanus, Pseudocalanus and Temora* and the Euphausids, *Meganyctiphanes* and *Thysanoessa* still form the major part of their diet during the spring and summer and are responsible for the very high fat content of the fish at this time.

In the past, herring age has been determined by using the annual rings on the scales. In more recent years the growth rings on the otolith have proved more reliable for age determination. Herring age is expressed as number of winter rings on the otolith rather than age in years as for most other teleost

species where a nominal 1 January birth-date is applied. Autumn spawning herring do not lay down a winter ring during their first winter and therefore remain as '0' winter ringers until the following winter. When looking at year classes, or year of hatching, it must be remembered that they were spawned in the year prior to their classification as '0' winter ringers. This is with the exception of some late spawning in January / February in the eastern English Channel.

North Sea herring comprise both spring and autumn spawning groups but the major fisheries are carried out on the offshore autumn spawning fish. The spring spawners are found mainly as small discrete coastal groups in areas such as The Wash and the Thames estuary. Juveniles of the spring spawning stocks found in the Baltic, Skagerrak and Kattegat may also be found in the North Sea as well as Norwegian coastal spring spawners.

The main autumn spawning begins in the northern North Sea in August and progresses steadily southwards through September and October in the central North Sea to November and as late as January / February in the southern North Sea and eastern English Channel. The widespread but discrete location of the herring spawning grounds throughout the western North Sea has been well known and described since the early part of the 20th Century. This led to considerable scientific debate and eventually to investigation and research on stock identity. The controversy centred on whether or not the separate spawning grounds represented discrete stocks or 'races' within the North Sea autumn spawning herring complex. Resolution of this issue became more urgent as the need for the introduction of management measures increased during the 1950's. The International Council for the Exploration of the Sea (ICES) encouraged tagging and other racial studies and a review of all the historic evidence to resolve this problem. The conclusions were reviewed by Harden Jones (1968) and formed the basis for establishing the working hypothesis that the North Sea autumn spawning herring comprise a complex of three separate stocks each with separate spawning grounds, migration routes and nursery areas, illustrated in the figure below.

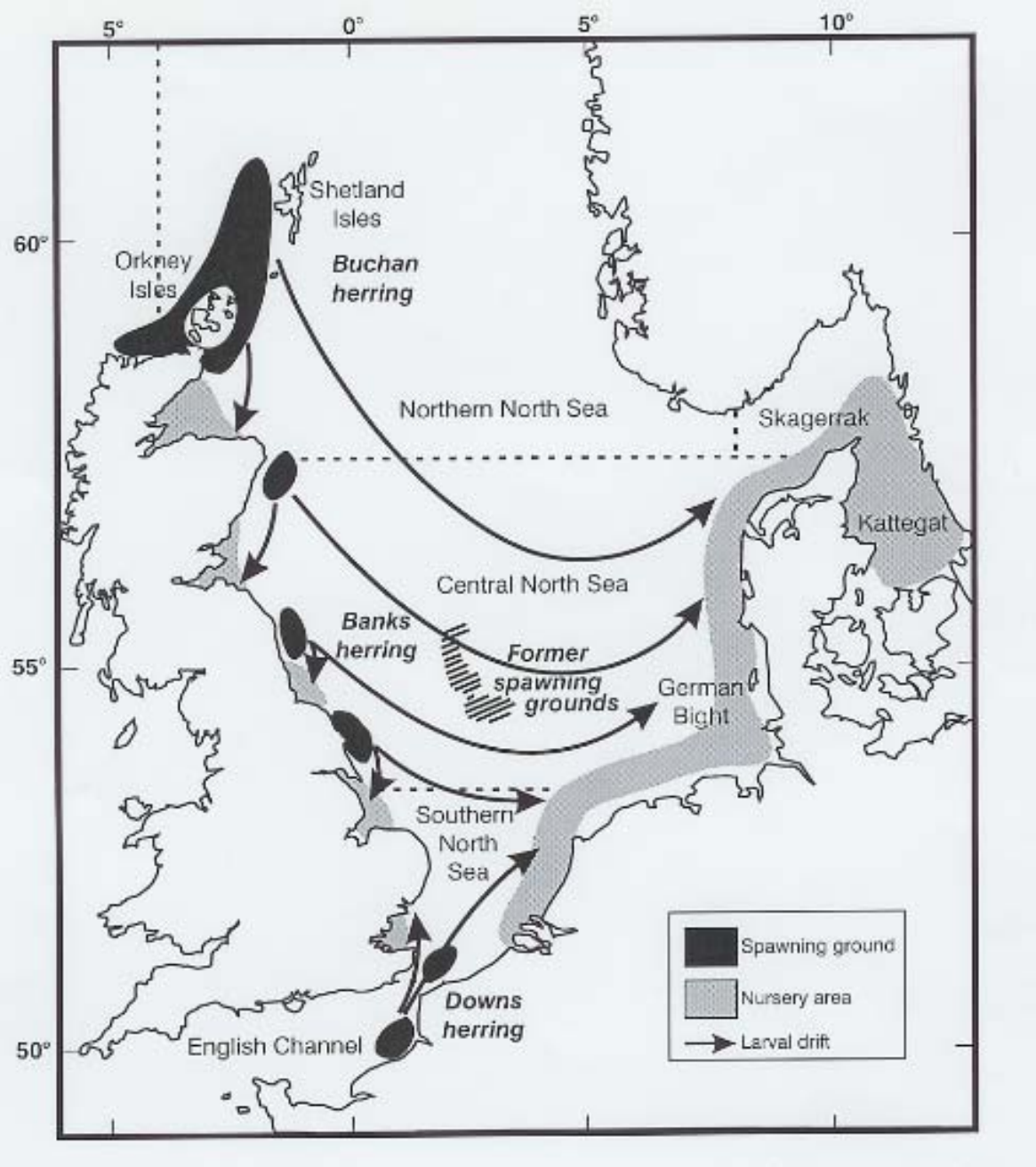
The three stock units are:

- The Buchan or Scottish group which spawn from July to early September in the Orkney Shetland area and off the Scottish east coast. Nursery areas for fish up to two years old are found along the east coast of Scotland and also across the North Sea and into the Skagerrak and Kattegat.
- The Banks or central North Sea group, which derive their name from their former spawning grounds around the western edge of the Dogger Bank. These spawning grounds have now all but disappeared and spawning is confined to small areas along the English east coast, from the Farne Islands to the Dowsing area, from August to October. The juveniles are found along the east coast of England, down to the Wash, and also off the west coast of Denmark.
- The Downs group which spawns in very late Autumn through to February in the southern Bight of the North Sea and in the eastern English Channel. The drift of their larvae takes them north-eastwards to nursery areas along the Dutch coast and into the German Bight.

At certain times of the year, individuals from the three stock units may mix and are caught together as juveniles and adults but they cannot be readily separated in the commercial catches. As a consequence, North Sea autumn spawning herring have to be managed as a single unit, although the Downs group is recognised as having different characteristics and attempts are made to give it special protection by separating the management advice.

A further management complication is that juveniles of the North Sea stocks are found, outside the North Sea, in the Skagerrak and Kattegat areas and are caught in various fisheries there. The proportions of juveniles of North Sea origin, found in these areas varies with the strength of the year class, with higher proportions in the Skagerrak and Kattegat when the year class is good.

The herring taken in the Hastings fishery are all part of the Downs group, spawning in the eastern English Channel in ICES Division VIId.



2.1.2 Mackerel

The north-east Atlantic mackerel, (*Scomber scombrus*. L) is a member of the Scombridae family, which includes a large number of species, distributed widely throughout the world. A comprehensive account of the biology of the north-east Atlantic mackerel is given by Lockwood (1988). The mackerel is an ectothermic fish, meaning that its body temperature does not remain constant, but varies between 1 and 2º C above that of the temperature of the water. The mackerel has the most northerly distribution of the family and one of its main distinguishing features is the lack of a swim bladder, which means that mackerel can change depth rapidly. It is a pelagic fish spending most of its time in mid-water travelling in large dense, shoals, often at great speed and making very long migrations. It is a voracious, opportunistic feeder and whilst feeding mainly on the rich supply of zooplankton, in spring and summer, it does also take small pelagic fish including myctophids which

migrate up to the near surface waters at night. As a result it is a very oily fish, building up high energy reserves during the spring and summer which it needs both for migration and subsequent gonad development during the following winter. During this period the oil content of a large mature mackerel may fall from 25% to 30% of the total body weight to less than 10% (Lockwood, 1988).

The north-east Atlantic mackerel may begin to mature as one year old fish and over 60% are generally mature by age two. By age four there is virtually 100% maturity. They are highly fecund producing between 200,000 and 800,000 eggs dependant on fish weight. The eggs are released in batches and the spawning of an individual female may be spread over a few weeks. There has been much research, over the past fifteen years, on the biology of spawning in mackerel. This has been targeted at the estimation of fecundity in relation to spawning stock biomass calculation from egg surveys. As a result there is now considerable knowledge on all aspects of their spawning biology including atresia in the ovaries and seasonal, annual and latitudinal variations on oocyte production.

The north-east Atlantic mackerel is widely distributed from the Iberian peninsula in the south to the Norwegian Sea and the North Sea in the north. Over this area it may be found from over the deep waters of the shelf edge right up to the coastal waters of the whole area, including the English Channel and Irish Sea.

After many years of scientific investigation and debate it is now recognised that there is one stock in the north-east Atlantic. However it is further recognised that this stock comprises three different components, a southern component, a western component and a North Sea component (Molloy, 2004).

The pattern of migration of the southern and western mackerel components is complex but basically begins in the late winter and early spring when shoals which have been overwintering in deep water begin their migration northwards to spawn and eventually to reach the rich summer feeding grounds in the North Sea. Most of these mackerel will make their way up to the west of the British Isles and Ireland but some will move into the southern and central North Sea via the English Channel. In the autumn the reverse migration occurs. However in recent years it has been observed that many of these fish remain in the northern North Sea until January or February and only then move back to the western area to spawn The North Sea component, which overwinters in the deep water of the Norwegian trench moves south to the central North Sea to spawn. It is clear from this pattern of migration that the three components may at times be found together, in particular during summer and autumn in the North Sea. Tagging results have shown that southern component fish tagged off the Iberian peninsula can be found in the northern North Sea in the summer.

Spawning occurs over a very wide area beginning off the Iberian peninsula in January, progressing northwards and ending up to the north of Scotland and in the North Sea in July. In the southern area and to the west of the British Isles and west of Ireland, spawning tends to be strongly concentrated initially along the continental shelf edge eventually spreading to the shallower waters across the shelf. In the North Sea, the spawning area is discrete and clearly separate from those of the southern and western components. There is some spawning in the southern Bight of the North Sea in June, but these are western component fish migrating up the English Channel and not part of the North Sea component.

The eggs are planktonic, about 1.2 mm in diameter and contain a single oil globule. In the early part of the season they may be distributed down to 200 meters depth, but once a strong thermocline has developed over the spawning areas, by late May, the eggs are found concentrated above the thermocline. The duration of egg development is entirely dependant on temperature. At 10^{o}C the larvae hatch in ten days, at a length of 2.5 mm to 3 mm. The larvae develop rapidly in the plankton and eventually arrive as young fish in the shallower near shore areas (Lockwood, 1988). Specific nursery areas are not clearly identified although there are areas, for an example off the south-west coast of Britain and off north-west Ireland where the concentrations of juvenile fish are greatest.

Over recent years there has also been a body of funded research targeted at improving the basic knowledge of factors affecting mackerel distribution. For an 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).

2.2 History of the Fishery

2.2.1 The Hastings Fleet

Fishing has taken place at Hastings for at least 400 years and possibly 1000 years old. Between 1042 and 1066 Hastings joined with New Romney, Hythe, Dover and Sandwich to become one of the Cinque Ports. Following the Norman invasion, William the Conqueror based himself at Hastings and by 1346 Rye and Winchelsea had joined the Cinque Ports. In return for the provision of men and ships these ports enjoyed certain privileges including the setting of taxes and administering their own law courts.

Hastings in the late 18th Century was a major fishing port noted for mackerel and herring and with its proximity to London and the relatively fast links its success was ensured. Herring at the time was the most valuable fish as it was relatively easy to preserve thereby extending scope for marketing. The mackerel and herring seasons were lengthy with vessels travelling around the coast of Britain following the catch. The mackerel and herring were caught using drift nets and trawling was used during this period for sole and plaice

Hastings changed during the early to mid 19th century from a fishing port to a seaside town. This change brought inherent conflicts such as the Council wanting to utilise the beach for visitors and attempting to displace the fishermen. The rights to the 'stonebeach' area belonged, on paper, to the Council through the Charter of 1588, however the fishermen built a case in support of their rights through the apparent loss of the earliest records relating to the Cinque Ports. During this period the more valuable catch was mackerel. Hastings should have had an enviable position however the valuable London market was receiving fish from French vessels that had targeted the English coastal fisheries. Attempts to alleviate this situation were the 1843 Sea Fisheries Act and a three-mile national limit for the British and the French which included regulations regarding gear, methods and registration of vessels. The Fishermen's Society was formed in 1832 and by the mid 19th Century there were 86 vessels operating from Hastings.

Major mackerel and herring catches in the 1850's and 1860's brought a period of great prosperity. Railway links ensured rapid transport to London with trawling now becoming more popular than drifting for herring and mackerel. Beam trawlers were targeting the sole and plaice.

During the period 1875-95 there was conflict again between the fishermen and the Council. The increased rail links and prominence of East Coast ports reduced prices at Hastings Fishmarket with landings from elsewhere pushing down the prices of local landings. The number of vessels at Hastings was large and this increased capacity to land fish further reduced prices.

The depression in the late 19th and early 20th Century was caused mainly by competition from the North Sea trawlers. However, the herring 'saved' Hastings due to the insatiable demand from Russia. The herring were barrelled in brine on the beach and exported.

Prior to and during the First World War, the internal combustion engine was taken up by increasing numbers of inshore fishermen. It brought with it increased efficiency both in terms of effectiveness of trawling, extending the area fished and not having to rely on the weather. Drift netters also benefited as they could return to port within the same working day. This increased efficiency led to a further

period of prosperity.

Between 1919 and 1945 there was a shift in the pattern of fishing due to a decline in the demand for herring and the loss of overseas markets. Further disputes with the Council who attempted to remove the fishermen from the Stade and the depression brought further hard times to Hastings. During the Second World War drift netting was banned at night and since then it has not regained its popularity. Trawling and trammelling replaced the drift netting and the area fished by the Hastings fisher was reduced to the area currently under assessment between Beachy Head and Dungeness.

There have been periods of conflict between Hastings Council and the fishermen, all thoroughly documented (Peak, 1985). The conflicts centred on the Deed of Compromise signed in 1947 which in effect gave the Council scope for redevelopment of certain areas of the Stade.

By the late 1940's 75% of the Hastings fleet were trawling for plaice and there was a small scale trammel fishery targeting sole. By 1950 the trawlers experienced another poor start to the season and with all their capital tied up in trawl gear it was difficult for them to change from one method of fishing to another. During the 1950's fishers replacing their nets chose to replace gear used for herring and mackerel with trammel nets for targeting sole and plaice. Trammel nets were gradually used year round and not restricted to the spring and autumn.

The 1950's saw the modernisation of the Hastings Fleet and by the 1960's Hastings had a modern trawler fleet alongside the multi-purpose punts. Overfishing in the outer fishing grounds led to a decline in stocks. Between 1950 and the mid 1960's, the average Spawning Stock Biomass (SSB) of the North Sea herring stock was estimated at around 2.5 M tonnes with landings averaging around 650,000 t. Over this same time period, the Downs herring stock collapsed. This collapse was attributed to high mortality of juveniles in North Sea industrial fisheries and heavy fishing by bottom trawlers on spawning concentrations in the English Channel in the 1950's (bottom trawling disturbs spawning fish, destroys spawn and damages the substrate). However, in September 1964 the three-mile fishing limit was extended to twelve miles. Whilst the inner six miles was only available to British vessels the outer six miles was available to the French and Belgians who had historical rights. The Hastings fishery recovered.

The SSB decreased rapidly over the 1960's and early 1970's. Fishing mortality peaked at over 1M t in 1965 and SSB reached a minimum level in 1977 of 52,000 t. At this stage, a moratorium on directed herring fisheries was put in place (from 1977 to 1980). Up until this time, there had been no control (other than market forces) on catches of North Sea herring.

During this moratorium, larval surveys and acoustic surveys were used to monitor the state of the stocks. By 1981 the SSB had recovered to over 200,000 t and the fishery was reopened. Since this time, the fishery has been subject to a TAC.

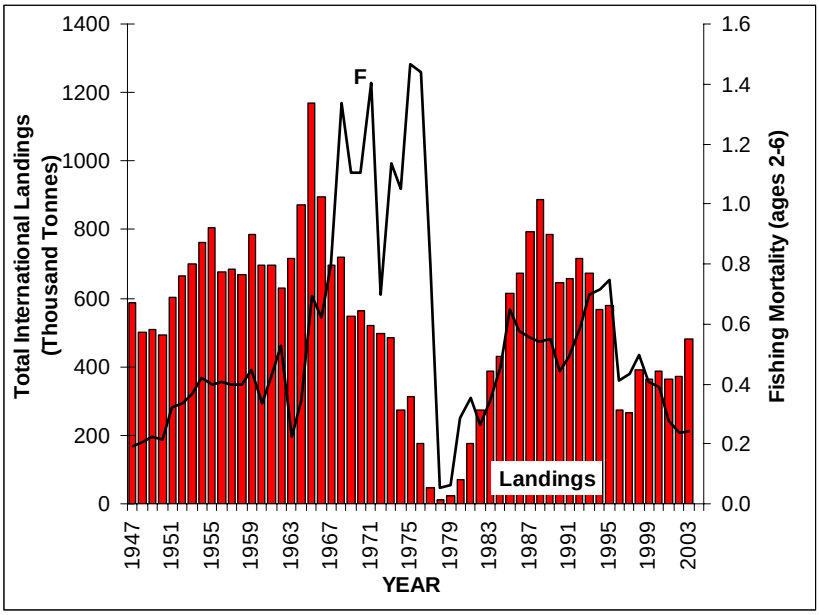
ICES reported that catches up to 1994 had continued to exceed the TAC and that the SSB had fallen below the minimum acceptable level of 800,000 t. Despite a reduced TAC, assessments in 1996 showed a further decline in SSB to less than 500,000t.
At this point, to avoid a further closure of the fishery, an agreement between the EU and Norway was put in force to limit total catches at 298,000 t and required that all catches (including the industrial fisheries) count against this figure. The implementation and maintenance of these measures have resulted in an increase in SSB.

However, at Hastings today herring and mackerel are caught by only a few fishers using drift nets with Dover sole and plaice now the most valuable catch caught mainly by trammel nets which have replaced trawling as the most popular method in use today.

2.2.2 The North Sea and Eastern Channel Herring Fishery

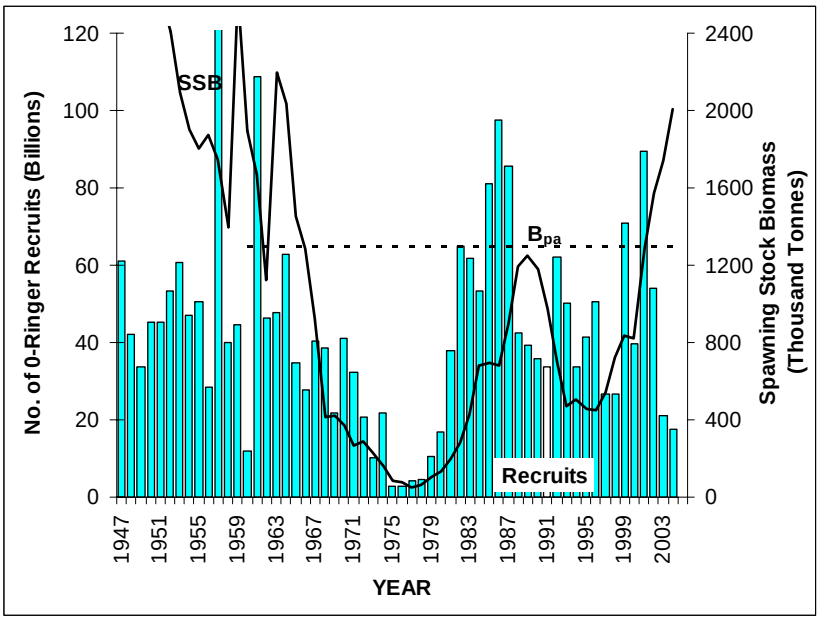
Over many centuries the North Sea herring fishery has been a cause of international conflict sometimes resulting in war, but in more recent times in bitter political argument. There have also been fundamental changes in the nature of the fisheries These have been driven both by changes in catching power and in response to changes in market requirements, particularly the demand for fish meal and oil. Most of these changes have resulted in greater exploitation pressures that increasingly led to the urgent need to ensure a more rational exploitation of North Sea herring. Such pressures really began to exert themselves for the first time during the 1950's when the spawning stock biomass of North Sea autumn spawning herring fell from 5 million tonnes in 1947 to 1.4 million tonnes by 1957. That period also witnessed the decline and eventual disappearance of a traditional autumn drift net fishery in the southern North Sea (Nichols, 2001).

Figure 1: Historical Herring Landings



Source: CEFAS Lowestoft

Figure 2: Herring Recruitment and Spawning Stock Biomass



Source: CEFAS Lowestoft

The annual landings from 1947 through to the early 1960's were high, but stable, averaging around 650,000t. Over the period 1952-62 the high fishing mortality (F 0.4 $_{\text{ages 2-6}}$) resulted in a rapid decline in the spawning stock biomass from around 5 million tonnes to 1.5 million tonnes. Recruitment over this period was reasonable, but there were fewer and fewer year classes present in the adult stock, a clear indication that the stocks were being over-fished and that they were also being impacted by the developing industrial fishery in the eastern North Sea.

This period witnessed the complete collapse of the historic East Anglian autumn drift net fishery, which was based entirely on the Downs stock moving south to the Southern Bight and eastern English Channel to spawn. The reasons for that failure have been attributed both to high mortality of the juveniles in the North Sea industrial fisheries, and to heavy fishing by bottom trawlers on the spawning concentrations, in the English Channel, during the 1950's. Such intensive trawling, on vulnerable spawning fish, not only generated a high mortality but also disturbed spawning aggregations, destroyed the spawn and damaged the substrate on which successful spawning depends.

Fishing mortality on the herring in the central and northern North Sea began to increase rapidly in the late 1960's and had increased to F1.3 $_{\text{ages 2-6}}$, or over 70% per year of those age classes, by 1968. Landings peaked at over 1 million tonnes in 1965, around 80% of which were juvenile fish. This was followed by a very rapid decline in the SSB and the total landings. By 1975 the SSB had fallen to 83,500t although the total landings were still over 300,000t. At the same time, spawning in the central North Sea had contracted to the grounds off the east coast of England whilst spawning grounds around the edge of the Dogger Bank were no longer used. This heralded the serious decline and near collapse of the North Sea autumn spawning herring stock which led to the moratorium on directed herring fishing in the North Sea from 1977 to 1981.

International larvae surveys and acoustic surveys were used to monitor the state of the stocks during the moratorium. By 1980 these surveys were indicating a modest recovery in the SSB from its 1977 low point of 52,000t. By 1981 the SSB had increased to over 200,000t. Prior to the moratorium there had been no control, other than market forces, on catches in the North Sea directed herring fishery. Once the fishery re-opened in 1981 the North Sea autumn spawning herring stock was managed by a Total Allowable Catch (TAC) constraint. It should be noted that the TAC was only applied to the directed herring fishery in the North Sea which exploited mainly adult fish for human consumption.

Targeted fishing for herring for industrial purposes was banned in the North Sea in 1976 but there was a 10% by-catch allowance in the fisheries for other species, including the small meshed fisheries for industrial purposes, mainly for sprat.

Following the re-opening of the now controlled fishery the SSB steadily increased, peaking at 1.3 million tonnes in 1989. Annual recruitment, measured as '0' group fish, was well above the long-term average over this period. The 1985 year class was the biggest recorded since 1960 and the third highest in the records dating back to 1946.

Landings also steadily increased over this period reaching a peak of 876,000 tonnes in 1988. This resulted from a steady increase in fishing mortality to $F0.6_{\text{ages 2-6}}$ (ca. 45%) in 1985 and a high by-catch of juveniles in the industrial fisheries for sprat.

Following a period of four years of below average recruitment (year classes 1987-91) SSB fell rapidly to below 500,000 tonnes in 1993. Fishing mortality increased rapidly averaging $F0.75_{\text{ages 2-6}}$ (ca. 52%) over the period 1992–95 (Figure 2) and recorded landings regularly exceeded the TAC. The North Sea industrial fishery for sprat improved rapidly over this period with the annual catch increasing from 33,000 tonnes in 1987 to 357,000 tonnes by 1995. With the 10% by-catch limit as the only control on the catch of immature herring, there was a consequent high mortality on juvenile herring which averaged 76% of the total catch in numbers of North Sea autumn spawners over this period.

During the summer of 1991 the presence of the parasitic fungus *Ichthyophonus spp* was noted in the North Sea herring stock. All the evidence suggested that the parasite was lethal to herring and that its occurrence could have a significant effect on natural mortality in the stock and ultimately on spawning stock biomass.

High levels of infection were recorded in the northern North Sea north of latitude 60^{o}N whilst infection rates in the southern North Sea and English Channel were very low. Efforts were made to estimate the prevalence of the disease in the stock through a programme of research vessel and commercial catch sampling. This led to estimates of annual mortality up to 16% (ICES, 1993) which was of the same order as the estimate of fishing mortality at the time. It was recognised that the behavioural changes and catchability of infected fish affected the reliability of the estimate of prevalence of the disease in the population. The uncertainty about the effect on stock size varied between estimates of 5% to 10% and 20%. Continued monitoring of the progress of the disease showed that by 1994 the prevalence in the northern North Sea had fallen from 5% in 1992 to below 1% and confirmed that the infection did not appear to be spreading to younger fish. Ultimately it was concluded that the disease had caused high mortality in the northern North Sea during 1991 and subsequently declined to the point where by 1995 the disease induced increase in natural mortality was insignificant (ICES, 1994).

The increased fishing pressure during the first half of the 1990's and the disease induced increase in natural mortality led to serious concerns about the possibilities of a stock collapse similar to that in the late 1970's. Reported landings continued at around 650,000 tonnes per year whilst the spawning stock began to decline again from over 1 million tonnes in 1990. The assessments at that time were providing an over optimistic perception of the size of the spawning stock and, for example, it was not until 1996 (ICES,1996) that it was realised that the SSB in 1993 had already fallen below 500,000 tonnes (see table below). This was well below the minimum biologically accepted level 0f 800,000 tonnes (MBAL) which had been set for this stock.

It was known that some of this excess herring had been taken in the North Sea and misreported into other areas. Such misreporting has traditionally been attributable to a number of countries and fishing areas with North Sea herring being variously reported from west of Scotland, as Atlanto-Scandian herring and herring from Division IIIa.

The above scenario led to very speedy and unprecedented management action during 1996 to address the potential crisis. The TAC was halved mid way through the year and since then further strict management measures have been enforced. These have been targeted at increasing the SSB to a newly defined safe level of 1.3 million tonnes, reducing the mortality on juvenile herring and eliminating the misreporting of catches into other areas. These measures have resulted in a rapid reduction in fishing mortality since 1996 and are slowly beginning to manifest themselves in greater stability in the catch potential for North Sea herring.

In order to severely reduce juvenile fishing mortality, a by-catch limit was set for fleet B, the small mesh fisheries in the North Sea. This measure has been very effective with juvenile mortality below the target level of F_{juv} <0.1 since 1996. However, overshooting of the TAC has continued to be a problem which has slowed down the recovery of the spawning stock biomass to above the target level. The resultant fishing mortality on the adults, although considerably reduced since 1995, has remained above the target level of F_{adult} 0.2. On the positive side, the stock recovery has been helped considerably by above average year classes of 1998, 2000 and 2001 entering the fishery.

It is still a cause for considerable concern that the TAC's for the human consumption fishery continue to be exceeded. For 2003, the Working Group estimate of catch at 450,000t against a TAC of 400,000t which had been increased from 266,000 t in 2002. Once again much of that overshoot is almost certainly attributable to area misreporting (ICES, 2003a, 2004a, 2004c).

Table 1: Herring TAC, By-catch Limits and Landings (1981 – 2004)

Year	Agreed TAC ('000t)	By-catch limit ('000t)	Landings N. Sea & E Channel ('000t)	Total Landings Autumn spawners ('000t)
1981	20*		52	174
1982	72*		116	275
1983	145		148	387
1984	55*		320	429
1985	90*		536	614
1986	570		547	671
1987	600		625	773
1988	530		698	888
1989	514		696	788
1990	415		569	645
1991	420		580	654
1992	430		564	717
1993	430		539	671
1994	440		485	563
1995	440		559	641
1996	313/156	44	265	307
1997	159	24	233	272
1998	254	22	320	380
1999	265	30	331	370
2000	265	36	322	372
2001	265	36	308	364
2002	266	36	346	372
2003	400	52	450	480
2004	460	38		

* Southern North Sea and Eastern English Channel only (IVc/ VIId)

Area misreporting and consistent over-harvesting is a particular cause for concern in the Downs stock component which has always shown independent trends in exploitation and recruitment but cannot be assessed separately. A separate Downs area TAC constraint has been ineffective in controlling the fishing mortality on this stock with the agreed sub-TAC being exceeded in every year since 1987. From 1991 to 1996 the area TAC was set at 50,000 tonnes but this was reduced to 25,000 tonnes mid way through the 1996 season in line with the emergency action taken for the rest of the North Sea stock complex. At the same time, the recommendation from ICES was that no directed fishery for herring should take place in this area. The Downs stock by that time was considered to be outside safe biological limits and at its lowest level since 1980. An annual sub-area TAC of 25,000 tonnes was set in 1997 but the recorded catches have been around 50,000 tonnes per year. In spite of an increase in the area sub-TAC for IVc/VIId from 25,000t in 2001 to 42,700t in 2002 and to 59,500t in 2003, against the scientific advice from ICES (ICES, 2002), the misreporting of catches from IVc/VIId into IVb continued to increase. This practice has continued and in 2003 the sub-TAC was exceeded by 14% (8,200t) (ICES, 2003a, 2004a, 2004c) This situation is not good for this component of the North Sea stock, which has never shown the same signs of recovery and development as the rest of the North Sea complex. The sub-TAC for 2004 has been increased to 66,100t and it seems likely that there will be a further increase in the sub-TAC for 2005.

In 2002, the total spawning stock biomass of North Sea autumn spawning herring was estimated at 1.6 million tonnes at spawning time and was predicted to increase to 2.2 million tonnes in 2003. With a steady increase in the number and size of year classes present in the stock the fluctuating affects of recruitment variability, such as the poor year classes of 1999 and 2002, should be cushioned. The assessment in 2004 showed that the SSB for 2003 was 1.74 million tonnes which is lower than the predicted value (ICES, 2004a, 2004c). The reason for the discrepancy is because the very large 2000 year class, the third highest on record, is slow growing, resulting in a lower % mature at age. Had the maturity been normal, as predicted, then the SSB would have been 2.2 mt at spawning time in 2003.

The continued recovery and the harvest strategy of the North Sea herring stock is now firmly based on the 2001 EU / Norway agreement to keep F adult at 0.25 and F juv. at no greater than 0.12. If SSB falls below the B_{pa} of 1.3 mt then these fishing mortality rates will be adjusted based on scientific advice to ensure rapid recovery to above B_{pa}. ICES, ACFM continues to advise against any reduction in the B_{lim} from the well established level of 800,000t (ICES, 2003b). The North Sea TAC for 2004 has been increased by 15% to 460,000t.

2.2.3 The North-East Atlantic Mackerel Fishery

The history of the mackerel fisheries in north-west European waters is well documented by Lockwood (1978 and 1988 and more recently by Molloy (2004).

In north-west European waters there have always been two distinct mackerel fisheries, one in the North Sea and the other to the west of the of Britain including the English Channel. Prior to the early 1960's these fisheries were both relatively small and stable with the combined annual landings, from 1945, from both areas, averaging less than 100,000t. The North Sea fishery was always the more important with landings about three times those from the west. The fishery in the west and English Channel gradually changed from mainly drift netting up to the mid-1950's to hand-liners.

The stable picture began to change dramatically after 1964 when annual North Sea landings began to increase very rapidly from 200,000t in 1965 to nearly one million tonnes in 1967. This was attributable to the development and expansion of the Norwegian purse seiner fleet which took mackerel mainly for fish meal and oil. The huge increase in effort could not be sustained by the stock and landings fell rapidly to around 200,000t by 1972. In spite of the introduction of strict management measures by the Norwegian Government to restrict the industrial fishery, catch rates continued to decline. This led to a collapse of the fishery in the late 1970's and a consequent collapse of the North Sea spawning component to around 50,000t. To date this stock component has shown few signs of

recovery although an egg survey in 2002 did indicate an SSB of around 200,000t. but with no corroborative data.

Whilst the dramatic rise and fall of the North Sea fishery was taking place there were signs of an increase in the fishery in the western area. This coincided with the appearance of vessels (over 100) from the then eastern bloc countries in the late 1960's. Their catches of mackerel from the western area rose rapidly to over 300,000t in 1975. At about the same time the traditional summer handline fishery for mackerel in the south-west of Britain began to extend through the autumn and into the winter. This coincided with the appearance of large over-wintering shoals of mackerel off the Cornish Peninsula. Quite clearly both offshore and near shore, there were environmental changes taking place which were affecting the distribution and abundance of mackerel in the western area. The reasons for, and complexity of these changes remain largely unexplained.

In 1977 the eastern bloc fleet was excluded from fishing in the area under new EEC regulations. However by this time they had been joined in the fishery by both local and Scottish midwater trawlers and the annual catch continued to increase and to over 500,000t by 1978.

The fishery in the south-west then developed into a 'Klondike' fishery with UK vessels taking their catches to the eastern bloc factory vessels for processing. A similar fishery developed in the summer off the west coast of Scotland, based around Ullapool.

Unlike the North Sea fishery the western area fishery has shown no substantial signs of over-exploitation or collapse and has continued to yield annual catches of around 600,000t. They reached a peak of over 800,000t in 1993 but fell to 530,000t in 1996 and 1997. Catches have since stabilised at around 600,000t per year, following a series of reasonable year classes.

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.

Since 1977 the assessment of the state of this stock has benefited from a triennial mackerel egg survey which has provided a fishery independent estimate of the SSB which has remained relatively stable.

The egg survey method relies on plankton and trawl surveys to provide an estimate of both the total of number of eggs spawned in a season and the average number of eggs produced by one female This was begun because of concerns about the developing fishery and a serious lack of knowledge of the stock. There were no reliable long-term series of catch and biological statistics for the fishery and it was recognised that catch rates alone of shoaling pelagic fish may not reflect their true abundance.

The spawning stock biomass has been subject to some fluctuation and decreased from over 3 million tonnes in 1977 to 2.2 million tonnes by 1994. It has since recovered to 2.7 million tonnes in 1999 and continues to remain above the biomass precautionary approach level of 2.3 million tonnes for the whole north-east Atlantic stock. However the stock is still considered to be harvested outside safe biological limits because the fishing mortality remains above the recommended precautionary level.

The apparent resilience of the western stock owes as much to the high number of good recruiting year classes over the past twenty five years as it does to a firm management and enforcement strategy based on TAC's. Furthermore the young mackerel are protected by the restriction on fishing inside a designated "mackerel box" around the south-west of England and by the complete ban on fishing in

the southern and central North Sea, where the young of the western stock may also be found.

2.3 The Hastings Fishery

2.3.1 Gears

The Hastings-based fleet uses a number of different gears (see Table 2 below) but the gear covered by this certification is the drift net. This gear is used to catch a number of different species that are selected through the use of different mesh sizes and fishing practises, including sprat (mesh size *c.* 55 mm) and bass (mesh size 90 – 100 mm), although the herring and mackerel drift nets used are monofilament drift nets of 55 mm (2"). A local by-law (Sussex Sea Fisheries Committee) prevents the use of drift nets with mesh sizes between 65 and 89 mm as these have been found to intercept sea trout. These are usually set around 4 m below the surface, with a total net depth of around 10 m. They are designed to fish the water column, although the weighted bottom line might occasionally touch the sea bed, although this is avoided where possible to avoid catching crabs. The drift nets are often fished overnight and are accompanied by the fishing vessel.

2.3.2 Vessels

There are currently 24 boats fishing from Hastings Beach at present (June 2004), all under 10 metres in length. Of the 21 active boats, only one is formally recognised as drift netting, although currently around three vessels fish regularly for herring and mackerel with this gear.

Table 2: Fishing Vessels Based in Hastings Beach

Vessel Name	Length (m)	Fishing method	Status
My Lass	9.10	Demersal trawl	Not fishing
Four Brothers	9.96	Demersal trawl / Dredging	Active
My Sara	9.95	Demersal trawl / Dredging	Active
Jack Henry	9.95	Demersal trawl / Trammel net / Dredging	Active
Bethan Louis	9.95	Demersal trawl / Dredging	Active
Our lady	9.75	Demersal trawl / Trammel net	Active
Bloodaxe	6.75	Drift netting	Active
Patricia	7.77	Trammel net	Active
Jackelly	9.20	Trammel net	Active
Conqueror II	7.50	Trammel net	Active
Saint Richard	9.20	Trammel net	Active
Sandra	8.73	Trammel net	Active
Lucy Ann	9.95	Trammel net	Active
Moonshine	6.28	Trammel net	Active
Nicola	6.58	Trammel net	Active
Jamie	5.88	Trammel net	Active
Rose Haze	8.66	Trammel net	Active
Midnight Sun	5.80	Trammel net	Active
P.G.K	8.50	Trammel net	Active
Alexandra	8.23	Trammel net / Demersal trawl	Active
Roy's Boys	9.90	Trammel net / Demersal trawl	Active
Frederick Rose	8.40	Trammel net / Whelk pots	Active
Young Flying Fish	8.10	Trammel net	Not fishing
Mona Lisa	6.00	Trammel net	Not fishing

Source: Defra Sea Fisheries Inspectorate (pers comm.), June 2004

2.3.3 Quotas

The table below provides the quotas for 2002 and 2003 showing the increase in quota for sole and herring and a decrease for mackerel. The table also shows the proportion landed by the Hastings Fishing Fleet. There are approximately 40 vessels, all under 10m operating from Hastings with a maximum number of 43 allowed in the fleet at any one time. Approximately 100 people are employed directly on the boats or as shore hands and another 250 in the local fish market and other associated service activities. The UK quotas for comparative quotas for 2002 and 2003 for the stocks under assessment together with Hastings landings are as follows:

Stock	UK Quota (tonnes)			Hasting Landings in 2003 (tonnes)
	2002	2003	2004	
Herring for Area IVc, VIId	4,094	5,950	6,662	2.9
Mackerel - Area IIa (non EC), Vb, VI, VII, VIIIa, b, d, e, XII, XIV	202,397	182,331	173,848	4.4

Source: DEFRA

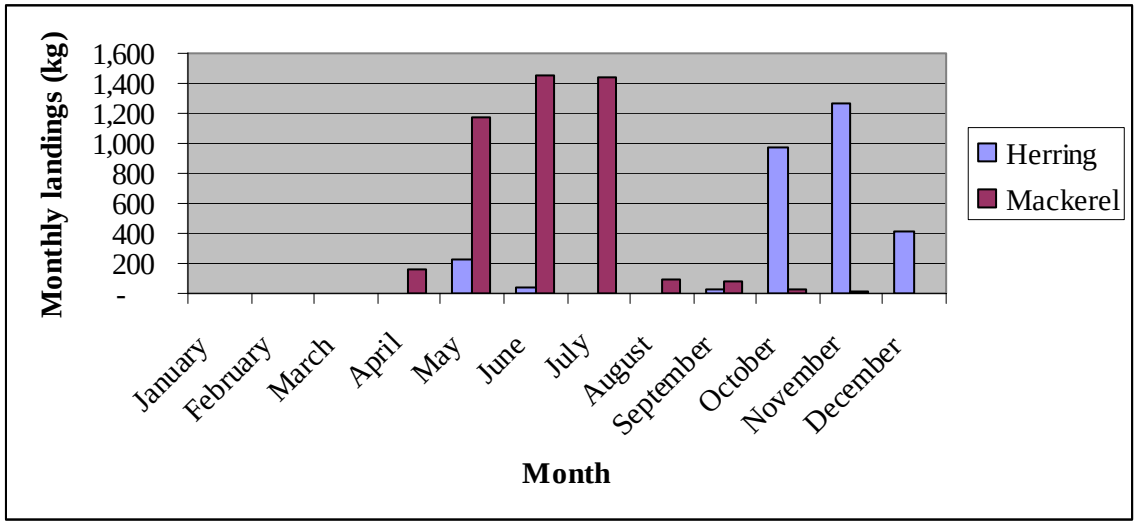
The Non-Sector Quota Restrictions for September 2004 under 10m Quota Allocation is as follows:

Area	Under 10m Allocation (tonnes)
Herring for Area IVc, VIId	186.8
Mackerel - Area IIa (non EC), Vb, VI, VII, VIIIa, b, d, e, XII, XIV	81.0

The scale of activity has increased by as much as ten times as a result of the use of hydraulically operated net haulers and the number of nets used per vessel.

It is recognised that the directed pelagic drift net fishery for herring is very small (*c*. 3 mt in 2003) and operated on an opportunistic basis. The fishery occurs in late autumn and winter when herring of the Downs stock component are in the area to spawn. Most of the spawning occurs well outside the operational area of the Hastings fleet and the fishery is not directed at spawning concentrations.

Figure 3: Landings of Herring and Mackerel in Hastings (all gears) in 2003



Source: DEFRA, pers. comm., 2004

The mackerel catch (around 4.45 t in 2003) Also includes that taken as a by-catch in the trammel net fishery, which does not constitute a directed fishery in itself. The fish passing through this area are western and southern component mackerel heading into the southern North Sea to spawn or to the summer feeding grounds of the central North Sea.

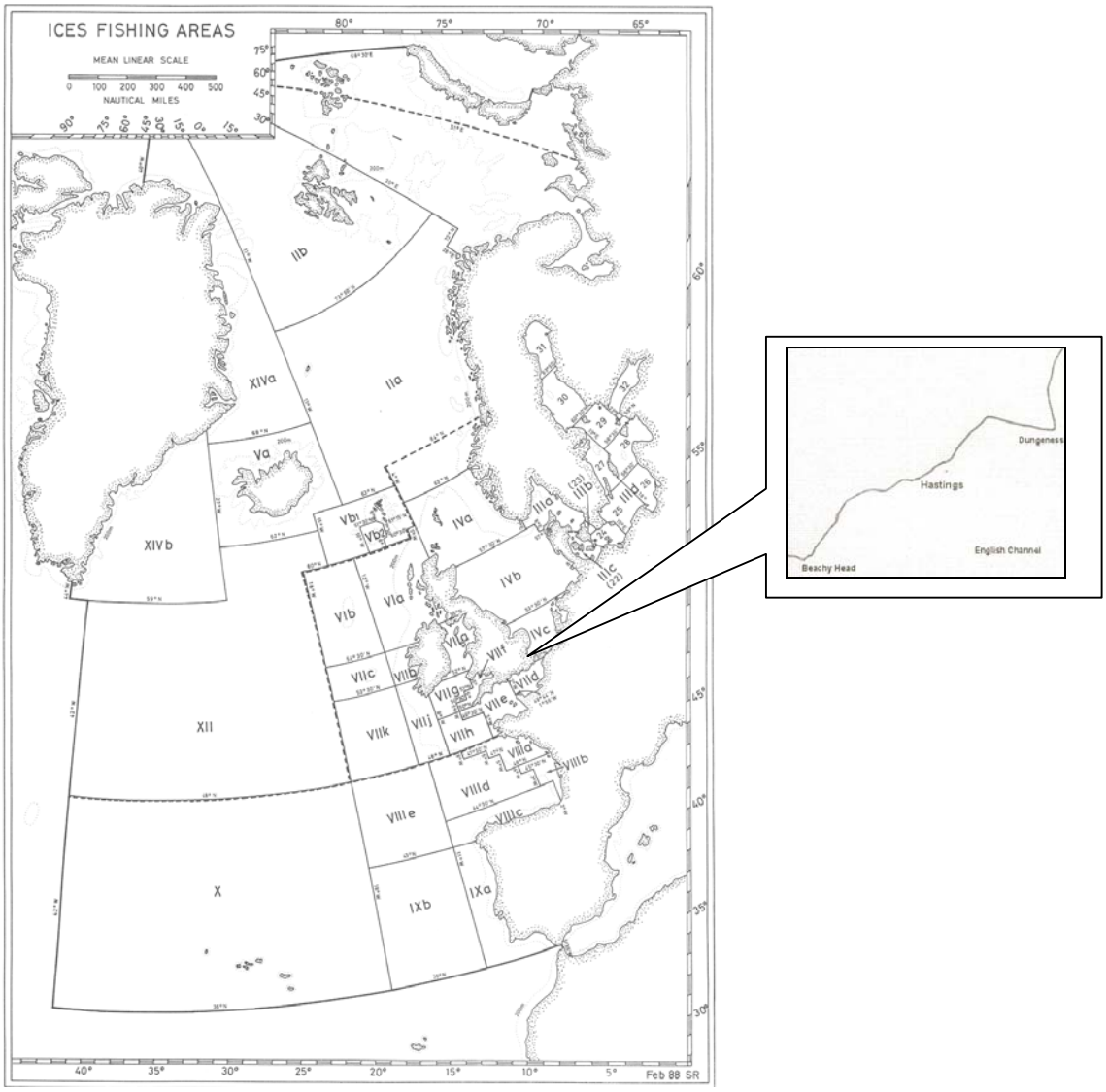
2.4 Fishing Locations and Administrative Boundaries

The Hastings Fishing Fleet operates entirely within ICES Division VIId between Beachy Head and Dungeness. The area is shown in the Figure 1 below.

For herring the area forms a small part of the administrative area for the North Sea stock. Within the larger area the Downs component of that stock is subject to a sub-area TAC which covers the fishery in ICES Division IVc and VIId.

For mackerel the area falls within the administrative area for the western component of the north-east Atlantic stock. Catches are set against the TAC for the whole area which comprises ICES Divisions VI, VII and VIII a,b,d,e.

Figure 4: ICES Fishing Areas and Hastings Fishing Area



2.5 Ecosystem Characteristics

Ecosystem here means the general ecosystem characteristics of the Eastern English Channel and its transition into the southern North Sea, considered in relation to fishing boundaries of ICES Areas IVa, IVb, IVc and VIId. The Channel has a maximum depth of 100 m at its western mouth (5ºW), shallowing to 40 m in the central Dover Strait. The bottom is relatively flat, except near the coast and around the Hurd Deep. The Channel is a shallow part of the Atlantic Ocean's continental shelf, and has strong tidal currents that are superimposed on long-term water movements called tidal residuals.

Although the currents in the Channel are mainly the result of tide, they are also influenced by wind and pressure gradients and, to a lesser extent, by density gradients and temperature differences induced by freshwater (from rivers) mixing with marine waters. The vertical hydrodynamic structure of this area depends mainly on depth and the effect of bottom topography on tidal currents. It varies from a stratified structure (weak currents, deep water) in the west, where a thermocline develops from March to September, to an eastern zone which remains relatively homogeneous, due mainly to bottom turbulence (strong currents, shallow waters). The transitional areas have characteristics of both regimes: a slightly stratified profile which becomes homogeneous at depth, dependent on the benthic turbulence, and where there are large horizontal surface water temperature discontinuities called

thermal fronts. Salinity gradients have their greatest effect on the physical structure in estuaries, where vertical stratifications can develop due to freshwater input (e.g. in the Baie de Seine).

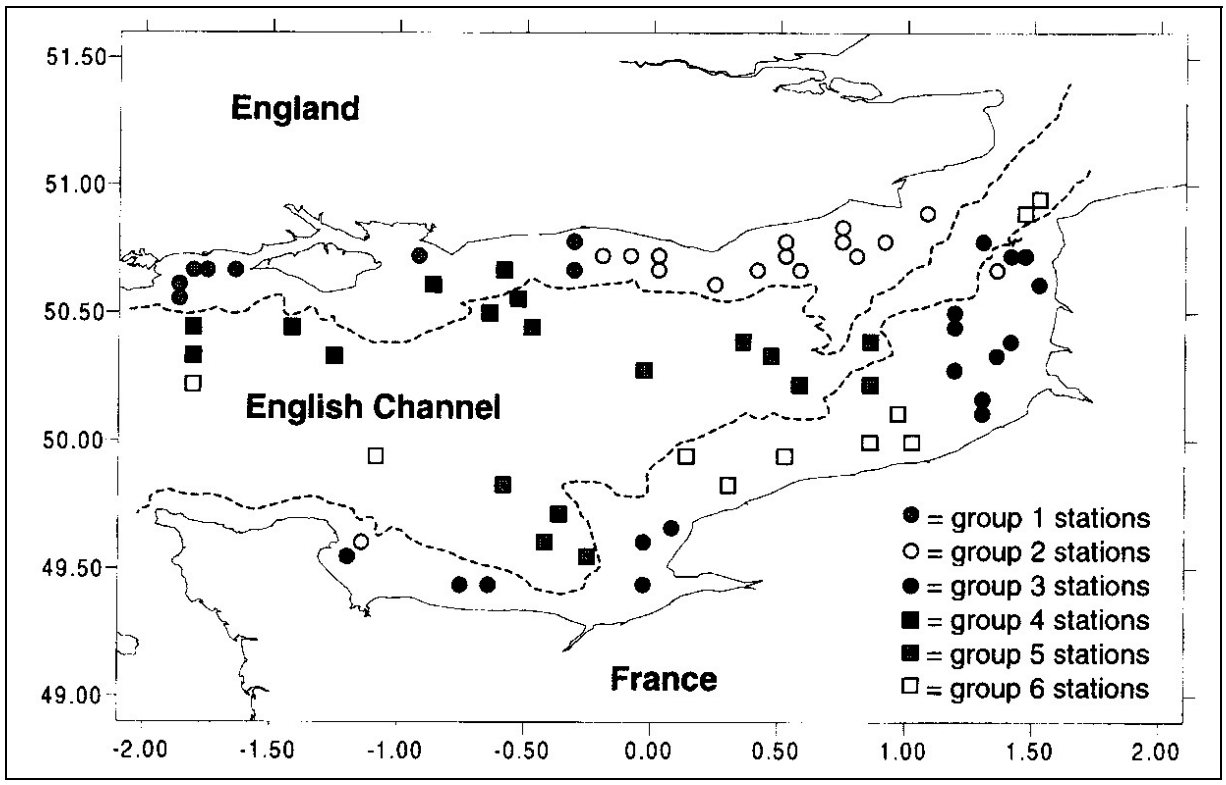
The general flow of water through the Celtic Sea and the English Channel has been established by direct and indirect measurements with the aid of numerical models. It appears that the circulation pattern is composed of a 'river' between the Atlantic and the North Sea, which carries a water flux of about 17 000 cubic metres per second, for an average tide. Eddies associated with tidal flow around headlands, within basins or over sand ridges have been confirmed from direct observations. Examination of residual circulation also reveals confined areas, closed gyres (eddies) and boundaries, which must play a role in containing fish eggs and limiting the dispersion of larvae in the plankton. Tidal flow also has a significant effect on the transport of solids within the Channel and thus the distribution of sediments. Alluvial deposits and the associated organic material have an important influence on the development and structure of biological ecosystems. It has been estimated that the drainage area of freshwater into the Channel is 13,000 km², of which the Seine basin represents two-thirds.

Phytoplankton is an important component of the ecosystem in the frontal and mixed regions, where the zooplankton biomass considerably exceeds that of the well-stratified water. In the Channel, as in other temperate shelf waters, the distribution of plankton is determined directly by water movement and indirectly by the effects of tidal mixing, and seasonal stratification has an important effect on species' succession and survival.

Key to characterising the fish resources is an understanding of the habitats provided by the eastern Channel. There is increasing understanding that other biotic habitat features are also important, such as the resident prey assemblage and organisms that increase the topographic complexity of the environment. The biotic character of deeper area of the eastern Channel is largely made up of larger, less abundant and slower growing organisms such as sponges, which tend to be more sensitive to disturbance than the relatively fast growing sessile epifauna in shallower waters (Kaiser *et al*, 1999).

Climate and sedimentary texture determine the distribution of benthic organisms. Due to their ecological requirement or tolerance many species are restricted largely to the western Channel whereas other species, fewer in number, have a strictly eastern distribution. Thus there is a net decrease in the diversity of benthic organisms from west to east. The persistent west to east movement of water through the Channel makes north-south connections difficult, and may cause a separate development of colonies of particular species on both sides of the Channel. It is likely that these vertical and horizontal gradients in water properties, and the distribution of substrates in the Channel and its adjacent seas, have a strong influence on the recruitment, survival, migrations and integrity of fish stocks that are found in this area. Kaiser *et al* (1999) conducted cluster analysis on community data sampled with a 4 m beam trawl in the Channel (see Figure 5 below) to determine the relationship between benthic fauna and associated fish assemblages.

Figure 5: Benthic Group Distribution in the Channel



Source: Kaiser *et al* (1999)

This revealed two major groupings (Inshore 1-3 and Offshore 4-6), within which there were three further groupings (see Table 3 overleaf). The highest biomass of both commercial and non-target flatfishes occurred in groups 2 and 3 whilst commercial demersal (non-flatfish) were uniformly distributed among all the stations, although there was a tendency for the highest biomass of non-target demersal (non-flatfish) to occur in Group 3.

Table 3: Habitat Groups for Inshore and Offshore Waters of the Channel

Substrate Type		**Fish Fauna**	
Inshore (15-30 m)	Group 1: Few rocks, low biomass of soft corals and bryzoans.	Flatfish spp. (*P. platessa* and *S. solea;*	*L. limanda*
	Group 2: Few rocks, low biomass of hydroids, soft corals, bryzoans and crabs		*L. limanda*
	Group 3: Few rocks, low biomass of hydroids, soft corals, crabs, starfish and urchins		Dragonets
Offshore (31-40 m)	Group 4: Occasional rocks, hydroids, some sponges	Pogges, dragonets & gurnards	Small gadoids and gurnards
	Group 5: Few rocks, wide selection of soft corals, hydroids, bryzoans and sponges		Dogfish and gurnards
	Group 6: Few rocks, sediments with high constant of broken shell, typical queen scallop habitat		Small gadoids and gurnards

The North Sea is semi-enclosed and situated on the continental shelf of North-western Europe and is bounded by England, Scotland, Norway, Sweden, Denmark, Germany, the Netherlands, Belgium and France. The North Sea covers an area of 745,950 km² of which the greater part is shallower than 200 m. It is one of the most diverse coastal regions in the world, with a variety of coastal habitats (fjords, estuaries, deltas, banks, beaches, sandbanks and mudflats, marshes, rocks and islands), and four ecological seasons. It is a highly productive (>300 gC/m^2-yr) ecosystem but with primary productivity

varying considerably across the sea. The highest values of primary productivity occur in the coastal regions, influenced by terrestrial inputs of nutrients, and in areas such as the Dogger Bank and tidal fronts. Changes observed in trophic structure are indicative of a trend towards a decreasing resilience of this ecosystem. This trend is partially a response to inter-annual changes in the physical oceanography of the North Atlantic.

Herring are an integral and important part of the pelagic ecosystem in the North Sea and Eastern Channel. As plankton feeders they form an important part of the food chain up to the higher trophic levels. 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 *Calanus* spp. and *Temora* spp. with Euphausiacea and the post-larval stages of *Ammodytes* spp. and clupeids contributing to a large percentage by weight. Fish eggs are also eaten, especially those of plaice *Pleuronectes platessa*, but not in large numbers. The consumption of larvae and post—larvae of other fish have not been found, indicating selective feeding by herring. Herring are also an important prey item, - both as juveniles and as adults they are an important source of food for some demersal fish and for sea mammals. Over the past century the top predator, man, has exerted the greatest influence on the abundance and distribution of herring in the North Sea. 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.

Spawning stock biomass has fluctuated from estimated highs of around 4.5 million tonnes in the late 1940s to a lows of less than 100,000 tonnes in the late 1970s. The species has demonstrated a robustness in relation to recovery from such low levels once fishing mortality is curtailed in spite of recruitment levels being adversely affected. Their spawning and nursery areas, being near coastal, are particularly sensitive and vulnerable to anthropogenic influences. The most serious of these is the ever increasing pressure for marine sand and gravel extraction. This has the potential to seriously damage and destroy the spawning habitat and disturb spawning shoals and destroy spawn if carried out during the spawning season. The sensitivity of herring spawning habitats to aggregate extraction featured heavily in the fisheries assessment as part of the Eastern Channel Association's Cumulative Assessment of aggregate dredging (Banks and Huntington, 2003). Similarly, trawling or scallop dredging at or close to the bottom in known spawning areas can have the same detrimental effects.

In more recent years the oil and gas exploration in the North Sea has represented a potential threat to herring spawning although great care has been taken by the industry to restrict their activities in areas and at times of known herring spawning.

Mackerel. The prey of mackerel has also 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, 2003c). 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.

2.6 By-catch and Discard

By-catch consists of the retained 'incidental' catch of non-target species and discard is a deliberately (or accidentally) abandoned part of the catch returned to the sea as a result of economic, legal, or personal considerations. This section also looks at the impact of the fishery on sea mammal, seabird and other threatened, rare and iconic species which may form part of a by-catch.

2.6.1 Incidental Catch

The level of incidental catch from the coastal drift nets as used by this fishery is deemed to be very low. 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. There may be some entanglement of dogfish, although the majority (*c.* 90%) escape or are released unharmed (Rod Knight, pers. comm.). Supporting this, observer programmes on pelagic fisheries and information from other inshore herring drift-net fisheries have also indicated that by-catch of non-target pelagic fish is very low.

The drift nets used have a mesh size of around 55 mm, well below the locally prohibited 65-89 mm mesh band (SFC Byelaw) that has been implemented to reduce salmonid by-catch. There may be a small-bycatch of salmonids (there is no directed salmonid fishery in Hastings) over the summer period but this is not recorded (Tim Dapling, Sussex SFC, pers. comm.).

2.6.2 Discards

The level of discards from the drift net fishery have not been recorded in detail but are considered to be very low as all catches of the target species (herring and mackerel) are retained.

2.6.3 Catch of Threatened, Rare and Iconic Species

The relatively small mesh used by this fishery has resulted in a highly selective fishery. Whilst the larger mesh (90-100mm) bass drift nets might result in some incidental catch of the two UK Biodiversity Action Plan (BAP) species Allis shad (*Alosa alosa*) and Twaite shad (*Alosa fallax*), this is unknown in the smaller mesh (55 mm) herring and mackerels drift nets. Shad catches are almost entirely (93%) in the first quarter when herring and mackerel landings are negligible. Some by-catch of seabirds has been reported (Rod Knight, pers. comm.) but only when fishing near rocks and mortality rates low.

2.7 Other Fisheries Relevant to this Assessment

2.7.1 Herring fisheries

The very small catches of herring by the Hastings fleet are from the Downs component of the North Sea autumn spawning stock. The North Sea Autumn-spawning stock is targeted by four discrete fleets:

- Fleet A: Directed herring fisheries with purse-seiners and trawlers in the North Sea
- Fleet B: All other vessels which take herring as by-catch in the North Sea
- Fleet C: Directed fisheries with purse-seiners and trawlers in Division IIIa
- Fleet D: Vessels fishing in Division IIIa for herring and sprat and other vessels participating in fisheries where herring is taken as by-catch in Division IIIa

These Fleets are all taken into consideration in estimating total fishing pressure on the North Sea herring stock.

Most of the catch of North Sea autumn spawners is taken by fleet A which comprises mainly, pelagic fishing vessels from Germany, France, The Netherlands, Scotland, Norway, Denmark and England Most of the catches of The Netherlands, France, Germany and England are taken by vessels comprising a Pelagic Freezer Association fleet. They operate over the whole area including ICES Division VIId. Their combined landings for 2003 were 175,000t of which 59,000t were taken in ICES Division VIId. The Scottish fleet participating in this fishery comprises pelagic trawlers and purse seiners landing mainly fresh herring to onshore processing facilities. The fleet operates mainly around

the Shetland area with the major fishery occurring in the third and fourth quarters of the year. In 2003, the Scottish fleet caught 40,000t of herring taken mainly in the western part of ICES Division IVa. The Norwegian pelagic fleet took a total of 112,000t of North Sea herring in 2003 half of which came from the eastern part of ICES Division IVa. This figure includes by-catches of herring in the Norwegian industrial fishery (ca. 9,000t) which is included in the fleet A quota. The 12,000t by-catch of herring in the Danish industrial fishery is included as fleet B. This accounts for about half of their catch of 23,000t of herring which they took in ICES Division IVb in 2003. Denmark also took a total of 56,000t of herring in ICES Division IVa in 2003, only a small proportion of which was fleet B by-catch in their other North Sea fisheries.

2.7.2 Mackerel fisheries

The targeted mackerel drift-net fishery, and a small by-catch of mackerel in the trammel-net fishery is from the western component of the north-east Atlantic mackerel stock. The areas where the major fisheries on this stock occur are controlled by temporal closure legislation designed to protect the severely depleted North Sea stock component and also juvenile western mackerel which are numerous in Division IVbc during the second half of the year. They are:

- No fishing for mackerel in ICES Divisions IIIa, IVbc at any time of the year.
- No fishing for mackerel in ICES Division IVa from 15 February to 31 July
- A 30cm minimum landing size throughout ICES Sub-area IV

More than half of the catch of north-east Atlantic mackerel is taken in the North Sea (Division IVa) during the last four months of the year. Of the 369,000t taken in that area in 2002 almost half was taken by Norwegian vessels whilst most of the remainder was shared between vessels from EU countries. A further 74,000t was taken in 2002 by Norwegian and Russian vessels fishing in the Norwegian Sea and around the Faeroes (ICES Divisions IIa and Vb). In ICES Sub-areas VI, VII and Division VIII a,b,d,e a total of 225,000t was taken in 2002. More than half of these were taken by UK vessels whilst Ireland took 50,000t with France, Germany and The Netherlands each taking around 20,000t (ICES, 2004b)

3 ADMINISTRATIVE CONTEXT

3.1 Legislation

3.1.1 General

3.1.2 Herring Specific

The North Sea herring fishery is managed under a specific International Agreement, the EU-Norway Agreement of December 1997. Key elements of the agreement are:

1. Every effort shall be made to maintain a level of Spawning Stock Biomass (SSB) greater than the Minimum Biological Acceptable level (MBAL) of 800,000 tonnes.

2. A medium-term management strategy, by which annual quotas shall be set for the directed fishery and for by-catches in other fisheries as defined by ICES, reflecting a fishing mortality rate of 0.25 for 2-ringers and older and 0.12 for 0-1-ringers, shall be implemented.

3. Should the SSB fall below a reference point of 1.3 million tonnes, the fishing mortality rates referred to under paragraph 2, will be adapted in the light of scientific estimates of precise conditions then prevailing to ensure rapid recovery of SSB to levels in excess of 1.3 million tonnes.

The recovery plan referred to above may, *inter alia*, include additional limitations on effort in the form of special licensing of vessels, restrictions on fishing days, closing of areas and/or seasons, special reporting requirements or other appropriate control measures.

4. By catches of herring may only be landed in ports where adequate sampling schemes to effectively monitor the landings have been set up. All catches landed shall be deducted from the respective quotas set, and the fisheries shall be stopped immediately in the event that the quotas are exhausted.

5. The allocation of the TAC for the directed fishery for herring shall be 29% to Norway and 71% to the Community. The by-catch quota for herring shall be allocated to the Community.

6. The parties shall, if appropriate, consult and adjust management measures and strategies on the basis of any new advice provided by ICES including that from the assessment of the abundance of the most recent year class.

7. This arrangement entered into force on 1 January 2002. A review of this arrangement shall take place no later than 31 December 2004.

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

As a consequence the Hastings herring fishery falls within the general remit of UK fisheries policy. In common with all other Member States, UK fisheries are managed through the EU Common Fisheries Policy (CFP). This policy came into being in the form we recognise to-day in 1983. It was reviewed thoroughly in 2002 and the current basic fisheries regulation (No.2731/2002) was adopted by the Council of Ministers on 20 December 2002.

This regulation is a 'chapeau' regulation setting out the strategic aims of the CFP and enabling the Council of Ministers, or in certain cases the Commission, to make more detailed Regulations. These include ones dealing with control requirements, fleet structure, technical conservation, marketing and annual total allowable catches (TAC) etc. The European Commission relies extensively on advice from the International Council for the Exploration of the Seas (ICES) in preparing the TAC regulation. Outside the CFP framework other EU legislation dealing with habitats and species protection and is also relevant to fisheries management and to fishermen.

In order to protect spawning concentrations of herring from disturbance by fishing there are spawning ground closures off the east coast of the United Kingdom. The controlling regulation is as follows:

"Fishing for herring shall be prohibited in the zone extending from 6 to 12 miles off the east coats of the United Kingdom as measured from the baselines between latitudes 54°10'N and 54°45'N for the period 15 August to 30 September and between latitudes 55°30'N and 55°45'N for the period 15 August to 15 September."

There is also a closed area off the west coast of Denmark from 1 July to 31 October where fishing for herring is prohibited in order to protect juveniles. The area is bounded by the following coordinates:

- the west coast of Denmark at latitude 55°30'N
- latitude 55°30'N; longitude 7°00'E
- latitude 57°00'N; longitude 7°00'E
- the west coast of Denmark at latitude57°00'N

This area is also closed to sprat fishing at the same time, which is an additional safeguard for juvenile herring. There is a minimum landing size of 20 cm in the North Sea and Eastern Channel

The EC Regulations made to manage fisheries are directly applicable in each Member State. In the United Kingdom, for example, Statutory Instruments are made as necessary to specify offences and prescribe penalties. These Statutory Instruments in effect provide the authority for the UK British Sea Fisheries Officers to take enforcement action.

3.1.3 Mackerel Specific

The main countries involved in the exploitation of north-east Atlantic mackerel are either EU, Norway or the Faeroe Islands. Northeast Atlantic mackerel are also taken by Russian vessels fishing in International waters under the jurisdiction of NEAFC. In 1999 the EU, Norway and the Faeroe Islands agreed on a legal framework in line with scientific advice on the state of the stock.
The agreed record of negotiations between them, states:

"For 2000 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality in the range of 0.15 - 0.20 for appropriate age groups as defined by ICES, unless future scientific advice requires modification of the fishing mortality rate."
"Should the SSB fall below a reference point of 2 300 000 tonnes (Bpa), the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions prevailing. Such adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2 300 000 tonnes."
"The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES."

- There is also an agreement between the three parties in relation to area closures and minimum landing size, put in place in order to protect the severely depleted North Sea stock. Those regulations state: No fishing for mackerel in ICES Divisions IIIa, IVbc at any time of the year.

- No fishing for mackerel in ICES Division IVa from 15 February to 31 July
- A 30cm minimum landing size throughout ICES Sub-area IV and Divisions VIIIc and IXa

.
An EU regulation has been in force since 1984 to protect juvenile mackerel in an area described as "the mackerel box" off the south-west peninsula of the UK. This bans targeted fishing by purse seiners or trawlers within the designated area.

ICES recognizes that there are other areas where juvenile mackerel sometimes occur in large numbers within the distribution area of the north-east Atlantic mackerel. The situation is kept under constant review and appropriate measures will be recommended if necessary.
Various national measures such as closed seasons and boat quotas are also in operation in most of the major mackerel catching countries

Landings are also made by non-EU/Norway countries, e.g. from Russian vessels in International waters. However, in February 1999 the North East Atlantic Fisheries Commission (NEAFC) agreed on safeguards aimed at sustaining stocks of mackerel and deep-water species. NEAFC has responsibility for managing fish stocks in international waters beyond 200 miles, in the North East Atlantic and includes Denmark on behalf of the Faeroe Islands and Greenland, the European Union, Iceland, Norway and Russia. In 1999 a regulation was implemented to set a catch limit of 44,000 tonnes for mackerel in NEAFC waters (DEFRA). Catches are reported to ICES but there are concerns, expressed by ICES, that these may be under reported.

The internationally agreed TAC's have covered the total distribution area of the Northeast Atlantic mackerel stock since 2001. The different agreements cover the total distribution area of Northeast Atlantic mackerel, while each agreement in some cases covers different parts of the same ICES Divisions and Sub-areas. The agreements also provide flexibility of where the catches can be taken. The various agreements for dividing and managing the TAC's are:

- A coastal states agreement (EU, Norway and Faeroes)
- NEAFC agreement
- EU / Norway agreement
- EU Autonomous TAC's

3.1.4 Local Byelaws

Fisheries regulations within the UK's six nautical mile inshore zone are subject to byelaws under the Sea Fisheries Regulation Act (1988) and subsequent amendments. Under the current byelaws only drift nets or "*nets with a mesh size of not more than 65 millimeters and not less than 89 millimeters when measured in accordance with Commission Regulation (EEC) 2108/84 between directly opposite mesh knots*" are permitted in waters under the jurisdiction of the Sussex Sea Fisheries Committee.

3.2 Management Responsibilities and Interactions

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

Implementation of the CFP (and implementation of Habitats Directive etc) at a national level is carried out through the individual Member States. Member States Fisheries enforcement authorities co-operate in policing the fishery (e.g. satellite monitoring, landing recording etc). The European Commission's fisheries inspectorate monitors the national enforcement process and its results. The Commission can also request fishery related data from member states.

Within EU member states, Fisheries Departments divide the Total Allowable Catch agreed each year in the Council of Ministers in Brussels between their various fleets. It is up to these fleets, usually operating within a Producer Organisation, to allocate their quota share to individual vessels. In turn, fishers have to report landings to the National Authorities who in turn report aggregate national information to the European Commission. For the Hastings fleet, DEFRA obtain that information directly from the Hastings Fishermen's Protection Society through whom all the landings are processed.

If the stage is reached when the aggregate Total Allowable Catch is near to being taken the Commission will make a Regulation to close the fishery. and this is then enforced through national legislation.

At the national level, there are a number of organisations responsible for management of the fishery:

Defra: the Fisheries Directorate of the Department for Environment, Food and Rural Affairs (Defra) is responsible for managing sea fisheries in England and Wales. In particular, Defra's Sea Fisheries Inspectorate (SFI) ensures that effort and regulatory compliance remains within those limits agreed under the Common Fisheries Policy. A branch of Defra's SFI is based in Hastings with two full time fisheries inspectors.

CEFAS: the Centre for Environment, Fisheries and Aquaculture Science is an Executive Agency of Defra. CEFAS provides the UK Government with scientific research on fish stocks and populations as well as wider environmental and oceanographic information.

Sussex Sea Fisheries Committee: The Sussex Sea Fisheries Committee (SFC) provides a regulatory framework for fishing effort within the six nautical mile limit and is thus particularly relevant to the Hastings fleet. Based in Shoreham, the Sussex SFC has a patrol boat based in Brighton and ensures that the local byelaws, stipulating vessel length restrictions, fishing instrument regulations and various other input controls are complied with.

Environment Agency: the Environment Agency is responsible for establishing and maintaining environmental standards in England and Wales. Their activities range from influencing Government policy and regulating major industries nationally, right through to day-to-day monitoring and clean up operations at a local level. In particular, the Environment Agency is responsible for migratory freshwater fish such as salmon and sea trout but not shad, which are covered by English Nature (Marc Thain, Environment Agency, pers. comm.).
English Nature: like CEFAS, English Nature is a Government agency set up by the Environment

Protection Act 1990 and are funded by the Defra. In particular, English Nature is responsible for enforcing the Wildlife and Countryside Act (1981), which is the major legal instrument for wildlife protection in the UK. This includes

Other, non-statutory agencies also have an influence on the management and conservation of fish stocks and their marine habitat. In the Sussex area, the Sussex Wildlife Trust is involved in marine conservation initiatives, although this is largely conducted under the South East Marine Programme.

Hastings Fishermen's Protection Society: Commercial fishermen operating from the Hastings Stade are members of the society. The society is the client for this certification. The key objective of the society is to represent, protect and promote the interests of commercial fishermen.

4 STOCK ASSESSMENT

4.1 Management Unit

4.1.1 Herring

As described in section 2.1 and reviewed by Nichols (2001),the North Sea Autumn spawning herring comprise a complex of three separate stocks, the Buchan or Scottish group, the Banks or Central North Sea group and the Downs group, which spawns in the southern North Sea and the eastern English Channel. Individuals from the three stock units may mix and can be caught together as juveniles and adults but they cannot be separately identified in the catches. As a consequence North Sea autumn spawning herring have to be managed as a single unit because the catches cannot be apportioned to the separate stocks. The management area comprises ICES Divisions IVa,b,c and VIId. The herring taken in the Hastings fishery are all part of the Downs group, spawning in the southern North Sea and eastern English Channel. Stock assessment and management is complicated by the fact that four separate fisheries exploit North Sea autumn spawning herring. Only two of these fisheries are in the North Sea the others are in ICES Division IIIa (Skagerrak and Kattegat).

Those four fisheries are:

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

It should be noted that the TAC constraint, which has been operating since 1981, is only applied to fleet A the North Sea directed fisheries. There is however a by-catch limit for herring set for the fleet B, small mesh fisheries in the North Sea.

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

4.1.2 Mackerel

Assessments are now performed for mackerel *(Scomber scombrus)* over the whole distribution area. Stock components are separated on the basis of catch distribution, which reflects management considerations and different historical information for the components, rather than on any biological evidence. This conclusion came after many years of scientific investigation and debate and it is now recognised that there is but a single management unit of mackerel in the north-east Atlantic. However it is further recognised that this Northeast Atlantic stock unit comprises three different components, a southern component, a western component and a North Sea component (Molloy, 2004).

The north-east Atlantic mackerel is widely distributed from the Iberian peninsula in the south to the Norwegian Sea and the North Sea in the north. Over this area it may be found from over the deep waters of the shelf edge right up to the coastal waters of the whole area, including the English Channel and Irish Sea. Because of the migratory nature of the species the three components may be found together in the North Sea during the summer and autumn.

By far the largest component of the stock is the western component which when last assessed separately in 1999 (ICES, 2000) had a spawning stock biomass (SSB) of 2,700,000t. This compares with an estimated SSB of for the southern component of 450,000t at the same time. The current combined estimate of SSB is 3,147,000t in 2002, predicted to decrease slightly to 3,091,000t in 2003 (ICES, 2004b). The North Sea component has been severely depleted since the late 1970's and is no longer fully assessed. There is no targeted fishing on this component and a nominal annual by-catch of 10,000t is allocated to this part of the stock.

Management of the NEA stock is complicated by the fact that more than half of the western component TAC is taken in the North Sea during the last four months of the year
The distribution and spawning areas of the three components are listed in the table below:

North-East Atlantic Mackerel **Distributed and fished in ICES sub-areas and Divisions IIa, IIIa, IV, Vb, VI, VII, VIII and IXa**			
Spawning component	Western	Southern	North Sea
Spawning Areas	VI, VII, VIII abde	VIII c, IXa	IV, IIIa

4.2 Monitoring of Stock Status

4.2.1 Herring

The ICES Herring Assessment Working Group monitors the status of the stock annually. The working group comprises a team of fisheries scientists drawn mainly but not exclusively from the member states with an interest in the fishery. The working group uses data, both from the fishery and survey data independent of the fishery. The most recent working group report provides an excellent insight into the whole process (ICES, 2004a)

The data from the fishery consists of the total weight of catches of North Sea autumn spawning herring taken in the North Sea and outside the North Sea, in the eastern English Channel, the Skagerrak and Kattegat. The biological composition of the catches are sampled to provide data on the age composition, catch in numbers at age, maturity and weight. The sampling also provides the proportion of spring spawning herring in the catches. Biological sampling has deteriorated in recent years to the point where in 2000 four countries were not sampling their landings at all. In an attempt to improve sampling, target levels for each country participating in the fishery were set by the European Commission in 2002. In general sampling of commercial catches has improved since the implementation of the EU sampling regime with 80% of the catch sampled in 2002 compared with 71% in 2001. However some countries are still falling well short of the targets set. There is also a

need to improve the spread of sampling by area and by fleet, an issue which is not satisfactorily addressed in the EU sampling regime (ICES, 2004a).

The fishery independent data consist of a series of surveys which provide various indices of abundance, which are either age aggregated, or age disaggregated. In this context there are three types of survey, the acoustic surveys, bottom trawl surveys and plankton surveys for herring larvae.

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

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

The plankton surveys for herring larvae, which have been carried out in the North Sea since 1972, have generated a long time series of larval production estimates. These estimates, combined with retrospective estimates of SSB, have provided a valuable age aggregated index of abundance of the three separate spawning components. The larval surveys were the only indication of the recovery of the spawning stock during the period of the moratorium on fishing for North Sea herring from 1977 to 1981. Unfortunately there has been a substantial decline in ship time and international sampling effort on these surveys since the late 1980's. The effort was halved in 1990 and has further decreased since then. By 1993 the temporal and spatial coverage of the larvae surveys had reduced to such an extent that the larvae production estimate could no longer be calculated. Since 1994 the production estimate has been replaced by a multiplicative larval abundance index (MLAI) which can be calculated on the now severely limited data set. This MLAI produces a good SSB index and the surveys continue to provide a valuable insight into herring spawning abundance. For example in 2002, in spite of poor coverage in the central North Sea, the one survey in October resulted in the highest estimate of abundance ever found there at that time. The surveys also continue to provide the only fishery independent estimate of the state of the Downs stock component. It is of some concern that in 2002 the index was half that of the previous year and more comparable with the lower abundances found in 1998 and 1999.

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

4.2.2 Mackerel

The ICES Mackerel, Horse mackerel, Sardine and Anchovy Assessment Working Group monitors the status of the stock annually. This large working group comprises a team of fisheries scientists drawn mainly but not exclusively from the member states with an interest in the various fisheries. For the North-east Atlantic mackerel the working group uses data, both from the fisheries and survey data independent of the fishery. The most recent working group report provides an excellent insight into the whole process (ICES, 2004b)

Catch data - Estimation of catches (i.e. fishery dependent data) is based on official landings of mackerel with additional national reporting of information on discards and misreporting. This was considered to be under-estimated, as discard levels had not been explicitly reported for any fleet. The working group reported that discarding of small mackerel had been a problem in the past and that the discarding of small mackerel might again be a problem in all areas if a strong year class enters the fishery. The UK landings for Western Mackerel Stock are recorded in Table 1 above.

Fishery independent data is currently obtained through a triennial egg and larvae survey which has been conducted since 1977. The survey area currently extends from ICES Division IXa in the south, through Biscay, the Celtic Sea, west of Ireland to north of Scotland in the north. The whole spawning time, for both mackerel and horse mackerel, over that area is covered from January in the south through to July in the north.
A separate and less extensive mackerel egg survey has been carried out in the North Sea on an irregular basis since 1980. This is the only indication of any recovery of this spawning component. The last survey was carried out in 2002.

Other surveys - There is a Russian aerial survey and there has been a Norwegian acoustic survey, however these data are not currently considered sufficiently reliable to be used in the assessment.

Age, size and sex-structure - Information is provided by national sampling programmes and biological samples from commercial and research vessels. National compliance with sampling requirements has been variable in the past. This has now been addressed by an EU Directive scheme which stipulates the numbers of fish to be sampled per tonne of fish landed.

Tagging information - This is used to indicate the mixing of Southern and Western components and to estimate mortality, including natural mortality.

Fishery information - The working group reports that the assessment includes the involvement of scientists familiar with the fishery. It also states that observers have been placed on many of the fishing vessels and information they provide may contribute to the assessment.

4.3 Modelling

4.3.1 Herring

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

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

As a consequence of the uncertainty of the SSB estimate, the working group agreed to explore alternative models for the assessment of North Sea herring. In 1995 the working group decided to change to an integrated catch analysis method (ICA) (Patterson and Melvin, 1996). This method was adopted for the 1994 assessment and has been used since then. The method has the advantage of being able to use age aggregated indices of stock size and also to incorporate assumptions about errors, both in the survey indices and also in the catch at age data set. This model affords an improved estimate of uncertainty in the assessment and in the forward projections of stock size.

In the 2003 assessment of the stock in 2002 (ICES, 2004a) the working group compared the performance of the ICA model with another regularly used assessment model, XSA. They concluded, that whilst both gave similar perceptions of the state of the stock, it was appropriate to continue to use the ICA model. This would maintain consistency of the assessment with previous years.

4.3.2 Mackerel

The current assessment model is Integrated Catch Analysis (ICA) (Patterson and Melvin, 1996). Key model parameters are natural mortality and fishing mortality. Historic uncertainty analysis is based on the Monte-Carlo evaluation of the parameter distributions. Two other models were tested against the ICA model in 2003 and all showed similar flat F-patterns in the recent years and all indicated 2000 as a weak year class and 2001 as a strong one. The WG decided to use ICA for the assessment, to use the SSB values from the egg surveys as an absolute index with a weighting of 5 and with a period of separable constraint of 11 years.

Prediction models - The short term prediction model used is age-structured, by fleet and area fished. Key model considerations are stock weight at age, natural mortality at age, maturity at age, catch weight at age by fleet (all these are averages from the last three years), proportion of male and females before spawning, fishing mortality by age, numbers at age and fishing mortalities by area (and age). Uncertainty model parameters are not incorporated though it is stated that sometimes a limited number of sensitivity analyses are performed, usually regarding recruitment level. The medium term prediction model is age structured with key model parameters the same as for the short-term prediction model.

The assessment model is considered as unreliable at estimating the most recent year classes prior to their appearance in the fishery. Given this, and the over-sensitivity of the model to the most recent egg survey SSB estimate leading to fluctuations in the stock assessment, a management regime is needed which is capable of incorporating this uncertainty in their advice. Specifically the regime should consider the possibility that poor year classes are not recognised until several years later, and that the recent perceptions of the stock is subject to variability and allow for this uncertainty in the advice. See Section 2.9.2 for a detailed discussion of the reliability of the assessment and its implications for management.

The working group reported that in 2002 87% of the total mackerel catch was covered by sampling programmes and the overall sampling level had been consistent and at a satisfactory level in recent years. However there are big national differences and England and the Faeroes sampled less than 15% of their commercial catches in 2002. There were also area differences with the Celtic Sea, southern North Sea, English Channel and parts of North Biscay not adequately sampled. It also emphasised that the fishing mortalities derived from studies of predictions and simulations apply to the total exploitation of the stock, including areas where no quota regulations apply.

4.4 Management Advice

All the advice is provided by ICES through their Advisory Committee on Fisheries Management (ACFM) and is now firmly based on the principle of the precautionary approach. The state of the stock is always described in terms related to both a precautionary level biomass and fishing mortality rate (see ICES, 2003b, 2003d).

4.4.1 Herring

For herring, a biomass limit level below which the SSB must not be allowed to fall, has also been set. The fishing mortality rate related to this has not been defined. The precautionary principle and the related biomass and fishing mortality rates for adults and juveniles are now firmly embedded in the

2001 EU / Norway agreement.

This agreement sets adult fishing mortality rates of F_{2-6} 0.25 and for juveniles F_{0-1} 0.12 whilst the SSB remains above the biomass precautionary level of 1.3 million tonnes. Below that biomass level fishing mortality rates will be reduced to F_{2-6} 0.2 for adults and for juveniles F_{0-1} 0.1. If the stock falls below the biomass limit level of 800,000 tonnes then fishing mortality must be further reduced.

Assessment of the North Sea autumn spawning herring stock is normally carried out by the ICES working group in March each year. It is subsequently reviewed by the ICES Advisory Committee for Fisheries Management (ACFM) in the following May (see ICES, 2003b). During the review, changes may be made to the assessment before ACFM go on to provide advice on the state of the stocks to the EU. The ICES advice always includes a series of options for fishery managers to consider in setting the TAC's for the following year. Providing catch options for North Sea herring is complicated, not only by the existence of the separate stocks but also by the different fleets exploiting North Sea autumn spawning herring. As a consequence the options and advice have to be formulated by the four separate fleets, each exerting different fishing mortalities on the autumn spawning stocks.

The annual advice of the ACFM to the EU is subsequently considered at joint meetings between officials of Norway and the European Commission (for the member states of the EU) when the available TAC is divided between the two parties. Using the options table catch levels for the four fleets can be decided and a TAC set for the fleet A, North Sea directed fishery. Since 1996 a by-catch limit has also been set for fleet B in the North Sea.

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

4.4.2 Mackerel

As stated in 4.1.2 above, assessments are now performed for mackerel over the whole distribution area. Stock components are separated on the basis of catch distribution, which reflects management considerations and different historical information for the components rather than on any biological evidence. The three stock components are the southern, western and North Sea. Their areas of distribution, fishing and spawning are given in a table in section 4.1.2

Assessment of the Northeast Atlantic mackerel stock is normally carried out by the ICES working group in September each year. It is subsequently reviewed by the ICES Advisory Committee for Fisheries Management (ACFM) in the October (see ICES, 2003c). During the review, changes may be made to the assessment before ACFM go on to provide advice on the state of the stocks to the EU. The ICES advice always includes a series of options for fishery managers to consider in setting the TAC's for the following year. For mackerel those options are based on a range of fishing mortality values (F) from the lower level of the agreement between EU, Norway and the Faroese and F *status quo* which represents the upper level of that agreement. The options give a catch forecast for the following year together with a prediction of SSB at spawning time for the following and subsequent year. Stochastic medium term predictions are also provided to indicate the future risk of SSB falling below the Precautionary biomass limit.

The annual advice of the ACFM to the EU is subsequently considered at joint meetings between officials of Norway and the European Commission (for the member states of the EU) and the Faeroe Islands and also with NEAFC. As a result the available TAC is divided between the various parties.

In 2003 the ACFM considered the Northeast Atlantic mackerel as a suitable candidate to be managed by multi-annual TAC's. However this has been deferred until the results of the 2004 egg survey are available because this will provide a more precise starting point for multi-annual advice.

5 FISHERY MANAGEMENT

5.1 Management Objectives

5.1.1 Herring

Long term objectives for the North Sea herring fishery have been agreed between Norway and the EU. These are stated in the 2001 Agreement between these two North Sea fisheries managers in terms of two reference levels. These are B_{lim} of 800,000 tonnes and B_{pa} of 1.3 million tonnes. The EU/Norway agreement aims to maintain fishing mortality on adults at 0.25 and on juveniles at 0.12. (see ICES, 2003b)

In the short term an annual Total Allowable Catch is agreed between Norway and the EU following ICES' advice.

In the context of the North Sea herring fishery other (by-catch) species are protected by the setting of appropriate TAC's, including a nil TAC for North Sea mackerel (noting that mackerel taken as by-catch in the herring fishery in the northern North Sea are from the western mackerel stock).

5.1.2 Mackerel

Based on the most recent estimates of fishing mortality and SSB, ICES classifies the Northeast Atlantic mackerel stock as being harvested outside safe biological limits. The spawning stock biomass in 2003 is estimated to be well above the biomass precautionary approach level (**B**pa), but the fishing mortality in 2002 is above the fishing mortality precautionary level (**F**pa). The North Sea component remains severely depleted since the 1970s (see ICES, 2003c).

The agreed record of negotiations between Norway, Faeroe Islands, and EU in1999, states:

1. "For 2000 and subsequent years, the Parties agreed to restrict their fishing on the basis of a TAC consistent with a fishing mortality in the range of 0.15 - 0.20 for appropriate age groups as defined by ICES, unless future scientific advice requires modification of the fishing mortality rate."
2. "Should the SSB fall below a reference point of 2 300 000 tonnes (**B**pa), the fishing mortality rate, referred to under paragraph 1, shall be adapted in the light of scientific estimates of the conditions prevailing. Such adaptation shall ensure a safe and rapid recovery of the SSB to a level in excess of 2 300 000 tonnes."
3. "The Parties shall, as appropriate, review and revise these management measures and strategies on the basis of any new advice provided by ICES."
4. The rationale for ICES proposing **F**pa = 0.17 is to have a high probability of avoiding exploiting the stock above **F**lim. In addition, projections indicate that F =0.17 will optimise long-term yield and at the same time result in a low risk for the stock to decrease below B_{pa}. If F on average is kept below 0.17, ICES regards the management plan as meeting precautionary criteria.

5.2 Consultative Process

At local level, the Hastings Fishermen's Protection Society provides a forum for fishermen representation. Society membership costs £5 per boat per week. The Society has a Committee of 8

persons plus three officers and represents the majority of Hastings fishermen. It is a member of the UK's National Federation of Fishermen's Organisations (NFFO) although tends to take its concerns directly to DEFRA. The Society also provides a feedback mechanism to the fishermen, for instance by posting information on changes in fishing regulations, but there is no formal system. The Society is considered close-knit and cohesive.

There are mechanisms at National level for issues to be raised by industry and other bodies with National Governments and resolved where possible by them.

The European Commission is also accessible to interested parties to make direct representations. The Commission may well decide to ask the Member State concerned for its opinion before taking the matter forward. Consideration by the Commission may range from a meeting between D G Fish and the complainant to formal discussion in the Commission's Fisheries Advisory Committee. Any necessary legislative action would be on the basis of a proposal by the Commission to the Council of Ministers.

Disputes between the Member States and the Commission are resolved in the Council of Ministers if bilateral discussions have not been able to resolve the issue. Both the Commission and the Council of Ministers can be called to account through the normal political process in the European Parliament. 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.

The 2001 / 2002 review of the CFP included 'roadshows' led by the Commission and other Consultation processes with all relevant stakeholders including industry and NGO groups. These were designed to provide maximum transparency and feedback about the shape the post 2002 CFP should take.

6 STANDARD USED

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles. Principle 1 addresses the need to maintain the target stock at a sustainable level; Principle 2 addresses the need to maintain the ecosystem in which the target stock exists, and Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations. The Principles and their supporting Criteria are presented below.

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. [1]**:**

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

Criteria:

[1] The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations

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

Principle 2

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

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

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.

2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

Principle 3

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

Intent:

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

A. Management System Criteria:

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

The management system shall:

2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to

consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process.

3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.

4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.

5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system[2].

6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.

7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.

8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.

9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.

10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:

    a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
    b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
    c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
    d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
    e) establishing no-take zones where appropriate.

11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Fishing operation shall:

[2] Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

12. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive.

13. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.

14. Not use destructive fishing practices such as fishing with poisons or explosives;

15. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch etc.

16. Be conducted in compliance with the fishery management system and all legal and administrative requirements.

17. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

7 BACKGROUND TO THE EVALUATION

7.1 Evaluation Team

Evaluation leader: Dr Andrew Hough: Moody Marine Limited. Dr Hough has a Ph.D. in marine ecology from the University of Wales, Bangor and eleven years post-doctoral experience in commercial marine and coastal environmental management projects. He is manager of Moody Marine operations within Moody International Certification with particular responsibility for the implementation of MSC Certification procedures and development of MSC methodologies. Dr. Hough has acted as lead assessor on a number of MSC pre assessments and six main assessments.

Expert advisor: John Nichols. John Nichols is a retired UK government fisheries biologist with 42 years research experience in plankton ecosystems, including ichthyoplankton, in the North Atlantic. From 1977 he was involved in plankton surveys for stock assessment. From 1994 to 2000 he was involved in the assessment of pelagic and western demersal fish stocks, including North Sea herring and Thames Estuary herring, running a team of six permanent staff. He has been a member of ICES working groups on herring, mackerel, horse mackerel, sardine and anchovy assessments; and mackerel and horse mackerel egg surveys. He was also a member of ICES study groups on herring larval surveys and plankton sampling. John provided management advice in relation to the MSC certification of the Thames Estuary Driftnet herring fishery.

John Nichols led the assessment against Principles 1 and 3, but also contributed on Principle 2.

Expert advisor: Tim Huntington. Tim Huntington is Founder and Director of the *Poseidon Aquatic Resources Management Ltd*, a UK-based international consultancy specialising in fisheries, aquaculture and aquatic environment. He has over twenty years experience in aquaculture and fisheries as a fisheries biologist. He has designed, managed and directed coastal, marine and freshwater resource management projects in Europe and many other countries worldwide and is an environmental impact assessment specialist with wide-ranging experience of fisheries and aquaculture development world-wide. He has recent experience in fisheries, aquaculture and 'chain of custody' certification.

Recent or ongoing projects he has taken part in include assessment of World Fisheries By-catch Issues for FAO; Feasibility Study for the Environmental Certification of Aquaculture for MSC; Assessment of Environmental Variables for Inclusion in the Common Fisheries Policy (EU); Evaluation of the NAFO Fisheries Observer Programme (EU) and Valuation of Biodiversity Damage for Environmental

Liability (EU)

Tim Huntington led the assessment against Principle 2, but also contributed on Principles 3 and 1.

7.2 Previous certification evaluations

No previous certification evaluations have been carried out for the Hastings Fleet Fishery. The Pelagic Freezer-Trawler Association North Sea herring fishery is also undergoing assessment against the MSC standard and targets the same stock in the Eastern Channel, but uses different fishing methods (pelagic trawls). The Thames Herring Fishery has been certified but although this fishery targets the same species, *Clupea harengus* within the North Sea, the Thames/Blackwater stock is a localised spring-spawning stock and is subject to a separate UK (not EC) TAC.

The South West (England) mackerel handline fishery has been certified and, although targeting the same stock of the Hastings fishers, uses different gear and in a different area.

7.3 Inspections of the Fishery

Inspection of the fishery focused on the practicalities of fishing operations at Hastings, the mechanisms and effectiveness of management agencies (DEFRA and the SSFC) and the operation of the Hastings Fishermen's Protection Society. The landing and subsequent handling of fish was also investigated to determine the suitability of fish landed to enter into a subsequent chain of custody.

Meetings were held as follows. The key issues discussed have been identified for each meeting.

Name	Affiliation	Date	Key Issues
Paul Joy Graham Coglan	Hastings Fishermen's Protection Society	15 June 2004	Fishing operations HFPS constitution and operation
Matthew Gandy	Network Fisheries	15 June 2004	Landing and marketing of fish at Hastings
Angus Radford Paul Johnstone Ian Glasgow	DEFRA	16 June 2004	Fishery management practices and regulation Landing data.
Tim Dapling	Sussex Sea Fisheries Committee	16 June 2004	Fishery management Fishery bye-laws Inspections and compliance Survey and monitoring
Richard Millner John Dann Colin Whiting Jim Ellis	CEFAS	7 and 12 July 2004	Stock assessment By-catch and gear use Local (Hastings) fishery knowledge
David Fraser Audrey Jones	English Nature	Contacted by phone	Nature conservation Protected species
Kate Cole	Hampshire Wildlife Trust	Contacted by phone	Nature conservation Protected species Survey and monitoring
Rod Knight	Hastings Driftnet fisherman	Contacted by phone	Fishing operations
Simon Northridge	Sea Mammal Research Unit	Contacted by phone	Protected species
Lisa Browning	Hampshire and Isle of Wight Wildlife Trust	Contacted by phone	Nature conservation Protected species

Marc Thain	Environment Agency	Contacted by phone	Nature conservation Protected species Survey and monitoring
Ken Arkley Gary Dunlin	Seafish Industry Authority	Contacted by phone	By-catch and gear use

8 STAKEHOLDER CONSULTATION

8.1 Stakeholder Consultation

An eventual total of 18 stakeholders were identified and consulted specifically by Moody Marine. Information was also made publicly available at the following stages of the assessment:

Table 4: Stakeholder Consultations Held

Date	Purpose	Media
30 Sep 2003	Notification of confirmation of assessment	Direct E-mail/letter Notification on MSC website Advertisement in press
5 Dec 2003	Notification of Assessment Team nominees	Direct E-mail Notification on MSC website
14 Jan 2004	Confirmation of Assessment Team	Direct E-mail Notification on MSC website
11 Mar 2004	Consultation on draft Scoring Indicators and Guideposts	Direct E-mail Notification on MSC website
8 Jun 2004	Notification of assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
15 Jun – 12 Jul	Assessment visit	Meetings
14 Feb 2005	Notification of Proposed Peer Reviewers	Direct E-mail Notification on MSC website
27 May 2005	Notification of Draft Report	Direct E-mail Notification on MSC website
	Notification of Final Report	Direct E-mail Notification on MSC website

8.2 Stakeholder Issues

Feedback from stakeholders has helped greatly in the identification and final selection of the assessment team. Feedback was also received on the scoring indicators and guideposts. Although no specific issues were identified by stakeholders, the assessment team have consulted specifically on the issue of shad by-catch with relevant stakeholders (notably English Nature, Environment Agency, and DEFRA).

9 OBSERVATIONS AND SCORING

9.1 Introduction to scoring methodology

The MSC Principles and Criteria set out the requirements of certified fishery. The certification methodology adopted by the MSC involves the interpretation of these Principles and Criteria into specific Scoring Criteria against which the performance of Fishery can be measured. Performance is determined on the basis of compliance with each Scoring Criterion.

The Scoring Criteria developed by the Moody Marine assessment team have been identified on the MSC website (Certification Performance Criteria and Scoring Guidelines). In order to make the assessment process as clear and transparent as possible, these identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Indicator.

These generic Scoring Indicators and Guideposts have been the subject of stakeholder consultation and have been confirmed or modified following this process based on the judgement of the assessment team. Prior to scoring, the Indicators are also 'weighted' in relative importance according to the nature of the fishery undergoing certification.

At the top level, no weightings are assigned in terms of each MSC Principle; a fishery must 'pass' each of Principles 1, 2 and 3 in order to achieve certification and these are of equal importance.

Within each Principle, Scoring Indicators are grouped in a hierarchy. Each level represents separate areas of important information (e.g. Indicator 1.1 requires a sufficient level of information on the target species and stock, 1.2 requires information on the effects of the fishery on the stock and so on).

At the level of Scoring Indicators, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall score of 80 is considered necessary for each of the three Principles and no Indicator should score less than 60. Accordingly, 100 represents surpassing of the performance necessary and 60 a measurable shortfall. As it is not considered possible to allocate precise scores, a scoring interval of five is therefore used in evaluations. As this represents a relatively crude level of scoring, weighted average scores are rounded to the nearest whole number.

Weights and scores for the Hastings Fleet Pelagic Fishery are presented in the scoring table. Weights for criteria, sub-criteria and sub-sub criteria add to a total of 100 for each Principle or Scoring Indicator, Scores are allocated relative to the Scoring Guidelines.

9.2 Evaluation results

Observations are presented in the scoring table, together with any weighting applied to the Fishery and the scores allocated.

10 LIMIT OF IDENTIFICATION OF LANDINGS FROM THE HASTINGS FLEET PELAGIC FISHERY

The extent of the fishery certification is the landing of herring and mackerel by vessels with Hastings Stade licences at the beach in Hastings. To be eligible to carry the MSC logo, these fish must then enter into separate Chain of Custody certifications.

11 CERTIFICATION RECOMMENDATION

11.1 Certification recommendation

The Performance of the Hastings Fleet Pelagic Fishery in relation to MSC Principles 1, 2 and 3 is summarised below:

MSC Principle	Fishery Performance
Principle 1: Sustainability of Exploited Stock	Overall : 89 PASS
Principle 2: Maintenance of Ecosystem	Overall : 85 PASS
Principle 3: Effective Management System	Overall : 89 PASS

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any MSC Criteria. It is therefore recommended that the Hastings Fleet Pelagic Fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

11.2 Scope of Certification

This assessment relates only to the fishery defined in Section 1.1 up to the point of landing as defined in Section 10.

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

11.3 Pre-conditions, Conditions or Recommendations Associated with Certification

11.3.1 Pre-Conditions

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

11.3.2 Conditions

The fishery attained a score below 80 against a number of Scoring Indicators. The assessment team has therefore set a condition for continuing certification that the client is required to address. The condition is applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

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

The condition is associated with one key area of performance of the fishery, which addresses a number of Scoring Indicators. Condition, associated timescale and relevant Scoring Indicators are set out below.

Condition 1. Recording of by-catches and discard

Action required: It is acknowledged that levels of by-catch and discard are expected to be very low in this fishery. However, no quantitative information is available on this issue. Records of fish by-catch and discard should be maintained by species and approximate numbers or weight, and any other incidental catch (such as seabirds etc) should include numbers caught. Records should be kept on a regular basis e.g. monthly/quarterly. These records should be made available to relevant agencies on request.

Timescale: Recording should begin immediately after certification.

Relevant Scoring Indicators: 2.1.2.1, 2.1.2.2

11.3.3 Recommendations

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

The recommendations are as follows.

1. **Improved communication**. Whilst fishermen are aware of general regulatory requirements, more efficient and comprehensive dissemination of information to the whole fleet appears desirable. The Hastings Fishermen's Protection Society and DEFRA may wish to consider more effective means of communicating information on regulations and other fishery-related matters to fishermen, such as through regular meetings, informative notice boards etc. Such communication should include the outcome of this certification and associated conditions.

2. **Waste management**. As this is a day fishery, waste production, particularly at sea, is low. However, this could be further improved by the provision of better waste disposal facilities on shore together with raising of awareness on this issue within the fishing community. The HFPS should consider working with the local authority to address this issue.

12 AGREEMENT

12.1 Applicant's Agreement to meet Specified Conditions.

On behalf of the Hastings Fishermen's Protection Society I accept all of the conditions associated with certification and agree to action the areas identified requiring management review within the timeframe specified. The terms expressed in the document Moody Marine Ltd Rules and Regulations: Marine Stewardship Council Certification will apply.

Signed: …… Position: ……..…… Date: …..……..

APPENDICES

Appendix A: Peer Review Reports

1. Peer Reviewer Biographies
2. Peer Review Report A
3. Peer Review Report B