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Certification Report for

Hastings Fleet: Dover Sole Trammel Net Fishery

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1 INTRODUCTION

This report sets out the results of the assessment of the Hastings Fleet Dover Sole Trammel Net 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:	Sole (<i>Solea solea</i> L.)
Geographical Area:	Within the Eastern English Channel (ICES Division VIIId) 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'). The fishery under certification is the trammel net fishery.
Stock	The fishery proposed for certification is part of the overall fishing pressure on the Eastern Channel stock within ICES Management Area VIIId. It is recognised that this fishery represents a small proportion of the total fishing pressure on this stock and so the status of the stock as a whole is assessed. However, fishing practices, and their consequences, are evaluated 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 panel of experts 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. Hampshire 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:

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- R3. Browning, L (2002). The marine biodiversity of South East England. Second Edition (June 2002). Hampshire and Isle of Wight Wildlife Trust. 48 pp.
- R4. de Veen, J.F. (1976). On changes in some biological parameters in the North Sea sole (*Solea solea* L.). Journal du Conseil, Conseil International pour l'Exploration de la Mer 37, 60-90.
- R5. Eastwood, P.D., Meaden, G.J. and Grioche, A (2001). Modelling spatial variations in spawning habitat suitability for the sole (*Solea solea*, L.) using regression quantiles and GIS procedures. Marine Ecology Progress Series.
- R6. EC Report on fishery infringements
- R7. EC (2002). Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries

- Policy.
- R8. 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.
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- R14. Horwood, J.W., Nichols, J.H. and Milligan, S. (1998). Evaluation of closed areas for fish stock conservation. Journal of Applied Ecology. 35, 893-903.
- R15. 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
- R16. 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
- R17. ICES (1965). Report of the working group on sole. Coop. Res. Cons. Int. Explor. Mer. 5: 1-126.
- R18. ICES (1986). Report of the ad hoc working group on the 1984 and 1985 sole (*Solea solea* L.) egg surveys. ICES C.M. 1986 / G:95.
- R19. ICES (1992). Report of the study group on the fecundity of sole and plaice in Sub-Areas IV, VII and VIII. ICES CM 1992/G:16
- R20. ICES (2002). Report of the Advisory Committee on Fishery Management. ICES ACFM October 2002 (section 3.6.2)
- R21. ICES (2003a). 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. 2003/ACFM:2.
- 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 (2003b). Report of the Advisory Committee on Fishery Management. ICES ACFM October 2003 (section 3.6.2).
- R24. ICES (2004). 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.
- R25. JNCC (1998). Chapter 7.4 Sites identified by statutory agencies. In: Coasts and Seas of the United Kingdom. Region 7: South-east England: Lowestoft to Dungeness. Eds. J.H. Barnes, C.F. Robson, S. Kaznowska, J.P. Doody, N.C. Davidson & A.L. Buck. JNCC, Peterborough (Coastal Direction Series).
- R26. Kaiser M.J., Bullimore B., Newman P., Lock K. & Gilbert S. (1996). Catches in 'ghost fishing' set nets. Marine Ecology Progress Series. 145: 11-16.
- R27. 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
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- R30. MAFF Dover sole
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- R33. Millner, R.S., J.D. Riley, M. Greer-Walker and P.R. Witthames (1991). Growth increment, condition and fecundity in sole, *Solea solea*, from the North Sea and eastern English Channel. Netherlands Journal of Sea Research, 27: 433-439.
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- R38. OSPAR (2003). Initial OSPAR List of Threatened and/or Declining Species and Habitats. Reference Number: 2003-14. Meeting of the OSPAR Commission (OSPAR), Bremen: 23-27 June 2003
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- R47. 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.
- R48. Wheeler, A.. (1969). The fishes of the British Isles and North-west Europe. MacMillan, London: 1-529.
- R49. Witthames, P.R., Greer Walker, M., Dinis, M.T. and Whiting, C.L. (1995). The geographical variation in the potential annual fecundity of Dover sole *Solea solea* (L.) from European shelf waters during 1991.

- R50. www.seasearch.org.uk
- R51. www.sussex-sfc.gov.uk/fixed%20engines.htm
- R52. www.ukbap.org.uk

2 BACKGROUND TO THE FISHERY

2.1 Biology of the Target Species

The Dover sole (*Solea solea* L.) is at the northerly limit of its distribution in the North Sea and Irish Sea but may occur in low numbers as far North as the north of Scotland. Its southerly distribution extends to the northwest African coast and into the Mediterranean (Wheeler, 1969). During summer adult soles are most abundant in waters down to about 40m depth but as temperatures fall in the autumn and winter they migrate out into deeper, warmer water. Sole produce a planktonic egg about 1.2mm in diameter with numerous oil globules. The larvae hatch after about one week at 10°C and the planktonic larval phase lasts for a further three weeks. During this time they have been subjected to the residual drift and generally will metamorphose and settle on the seabed close inshore.

Spawning begins in late winter and spring reaching a peak in the Bay of Biscay in March and peaking in the southern North Sea in late May. In the North Sea the onset of spawning is triggered by the increase in seawater temperature but further south the timing of spawning does not appear to be related to temperature changes (Koutsikopoulos & Lacroix, 1992). Extensive egg surveys carried out in 1984 and 1985 in the North Sea and English Channel showed conclusively that the sole in these areas migrate inshore to spawn from the over-wintering grounds in deeper, warmer water (ICES, 1986). The main spawning areas identified were in the German and Danish Bight of the North Sea, off Texel, the Thames estuary, off the Belgian coast, off the Bay of the Somme and off the English south coast from Dungeness to Selsey Bill. The nursery areas are also close inshore with the '0' group fish spending the first few months of their life history in very shallow water often close in to the beach in the surf zone. These nursery areas are characterised by a sandy or muddy substrate.

There is some evidence, from tagging juvenile sole, to suggest that there are separate spawning populations related to the different spawning areas (ICES, 1965). These studies have shown that each spawning population is mainly supplied by recruits from the nearby nursery area. However it has also been shown that there is some movement of mature fish from the southern North Sea and eastern English Channel to the western English Channel. The effects of closed areas and closed seasons to protect nursery areas and spawning grounds have not been considered for sole in the eastern English Channel. However, Horwood et al. (1998) did examine the potential effect in relation to the Trevoise Head spawning grounds in the Bristol Channel. They concluded that whilst gains could be achieved by closing an area, they are only significant if the total mortality on the stock is reduced. They go on to point out that for TAC species the effect of such closures would generally result in a displacement of effort to other parts of the stock.

Regional differences in fecundity were noted in a study in 1991 with the lowest values of about 500 oocytes per gram (female body weight) in the south-western areas, reaching almost twice that level in the eastern North Sea. The same study also concluded that sole is a determinate spawner throughout its geographical range (Witthames *et al* 1995). Millner *et al*, also noted significant differences in fecundity between areas and across years. These differences were explained largely by weight or a combination of length and condition index at spawning time.

Recruitment variability in the sole stocks of the northeast Atlantic has been the subject of much discussion and research. The greatest variability is in the North Sea and much of that can be linked to the production of very good year classes after exceptionally cold winters, such as those in 1963 and 1987. However the causal link with temperature *per se* is not established and winter temperatures only explain a part of the variability. Variability in the eastern English Channel is considerably less (55% CV) than in the North Sea (127% CV) and there is no strong link with very cold winters (Rijnsdorp, et al 1992). Between spawning populations, the level of recruitment is related to the surface area of the nursery grounds available. Recent research seems to suggest a link with the temperature at the beginning of the spawning period. As with many other marine species, recruitment is probably determined over the 100 day planktonic larval stage due to density-dependent mortality (Horwood,

2001), where larval mortality rates range from 10-50%. The prey of larval sole, dinoflagellates and the nauplii of small copepods, is rich in the southern North Sea and Eastern Channel but the predator: prey dynamics of sole have been little studied, although modelling approaches appear to have some potential. Sole is included in the North Sea Multispecies Virtual Population Analysis (MSVPA) that includes 10 fish species for which catch-at-age data are available.

2.2 History of the Fishery: The Hastings Fleet

Fishing has taken place at Hastings for at least 400 years and may possibly be 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 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 fish market 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 fishermen 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. 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.

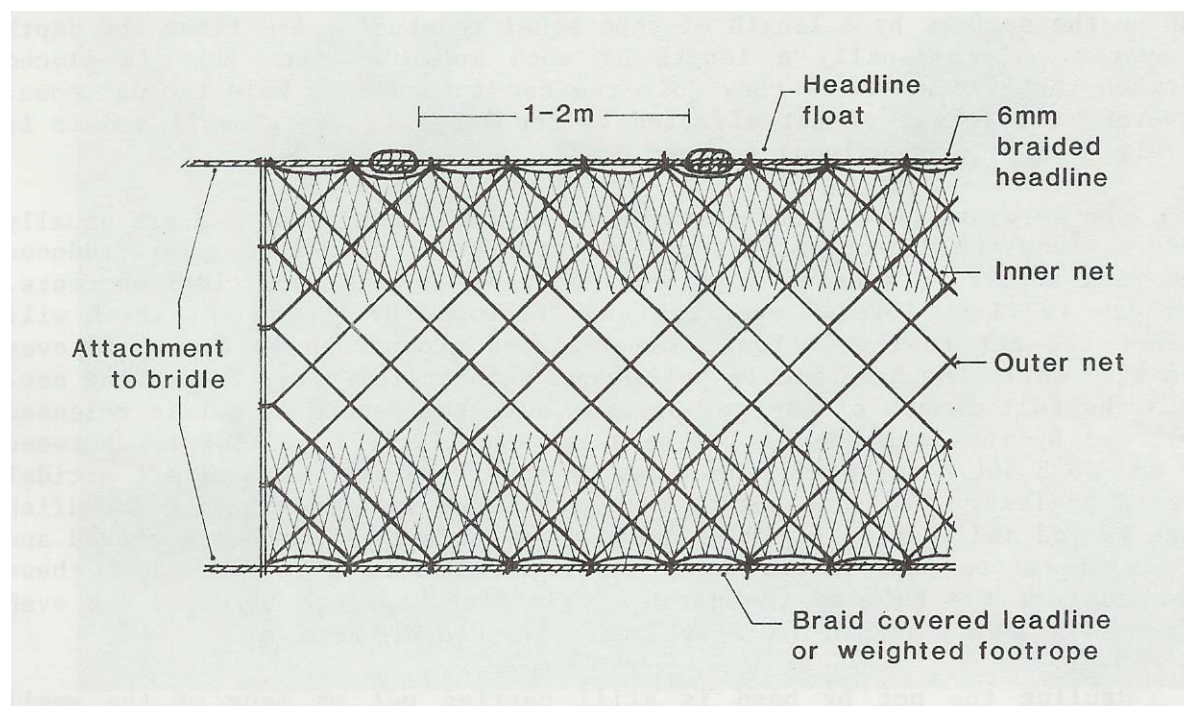
The fishermen of Hastings today are very versatile and are able to adapt their fishing methods, gear and target species to changes in condition and availability. Dover sole and plaice, caught mainly by trammel nets, are now the most valuable species and this method has replaced trawling as the most popular method in use today. There are now around 35 boats working from Hastings of which 15 participate as full time fishermen in the trammel net fishery. This is a small scale but high value fishery, generating relatively high local employment. The fishery does not target juvenile fish, there is little by-catch or discarding and it has a very low impact on the environment.

2.3 The Hastings Fishery

2.3.1 Gears

The Hastings-based fleet uses a number of different gears (see overleaf) but the gear covered by this certification is the trammel net. Trammel netting is a very old method of fishing and at Hastings the records of its use go back many centuries. However it is only relatively recently that it has become the main method in use by the fleet. They can be used at the surface, in mid-water and on the bottom depending on the target species. The nets are 1.2m to 1.5m deep and 45m to 55m long and consist of three walls of nets in which a monofilament or multi-mono filament fine-mesh net is sandwiched in between two outer walls of large-meshed netting. Fish pass through the outer mesh and become tangled in the inner mesh. Trammel nets are fished in groups (or 'fleets') of around eight nets. These are anchored either end and are placed in the direction of the tide. The mesh sizes used for the sole trammel net fishery are usually around 4" (102 mm) mesh¹, which have been shown to be highly size selective (see Section 2.6 for more details). The nets are usually left to fish for 24 – 48 hours but occasionally might be retrieved after a single 6 hour tidal cycle, but this is unusual for flatfish such as sole.

¹ The Sussex SFC minimum legal size for trammel nets is 90 mm, see http://www.sussex-sfc.gov.uk/fishing_instruments.htm and the General Fisheries Technical Conservation Rules. DEFRA July 200, Admail 6000, London.



Section of Trammel Net showing inner and facing outer net

When fishing for sole the Hastings fleet use an inner mesh size of 100 mm, which is good practice and is 10mm above the legal requirement. Studies have shown that an inner mesh size of 114mm retains less than 1% of soles below the legal minimum size of 24cms. Hastings fishermen report very few undersized sole in their catches and the few that are taken are returned to the sea alive.

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, around 15 regularly use trammel nets.

Table 1: 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

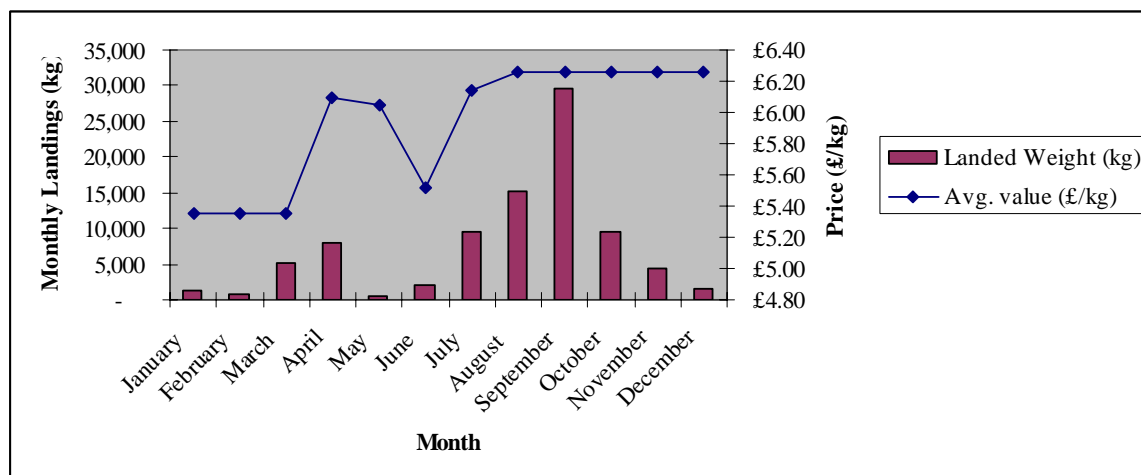
The table below provides the quotas for 2002 and 2003 showing the increase in quota for sole and herring and a decrease for plaice and mackerel. The table also shows the proportion landed by the Hastings Fishing Fleet. There are approximately 35 vessels, all under 10m operating from Hastings with a maximum 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 - 2004 for the stocks under assessment together with Hastings landings are as follows:

Stock	2002 UK Quota EC Reg 2555/2001 (tonnes)	2003 UK Quota EC Reg 2341/2002 (tonnes)	2004 UK Quota (tonnes)	Hasting Landings For 2003 (DEFRA) (tonnes)
Sole VIIId	1,000	1,038	1,135	87.6

Sole up-take limits for the Hastings fishery are from ICES Area VIIId and are currently limited to 402.6 t per annum for the under 10m sector (Iain Glasgow, DEFRA, pers. comm.). A monthly catch limit of 500 kg per vessel per month for <10m vessels landing North Sea sole was introduced from 1 August 2004 but this only affects ports to the east of Hastings, such as Folkestone and Ramsgate, and does not apply to Hastings where the fleet is considered 'non-migratory'.

The trammel net fishery for sole usually starts as the fish move inshore during February / March and continues through to mid June when the movement of spider crabs inshore make the operation of trammel nets impracticable. In recent years a profitable trap fishery for cuttlefish has developed in the area and many vessels turn to this fishery in May. There is a return to the sole trammel net fishery for a few months from July through to November.

Figure 1: Landings of Sole (All Gears) by the Hastings-based Fleet over 2003

Source: DEFRA, pers. comm., 2004

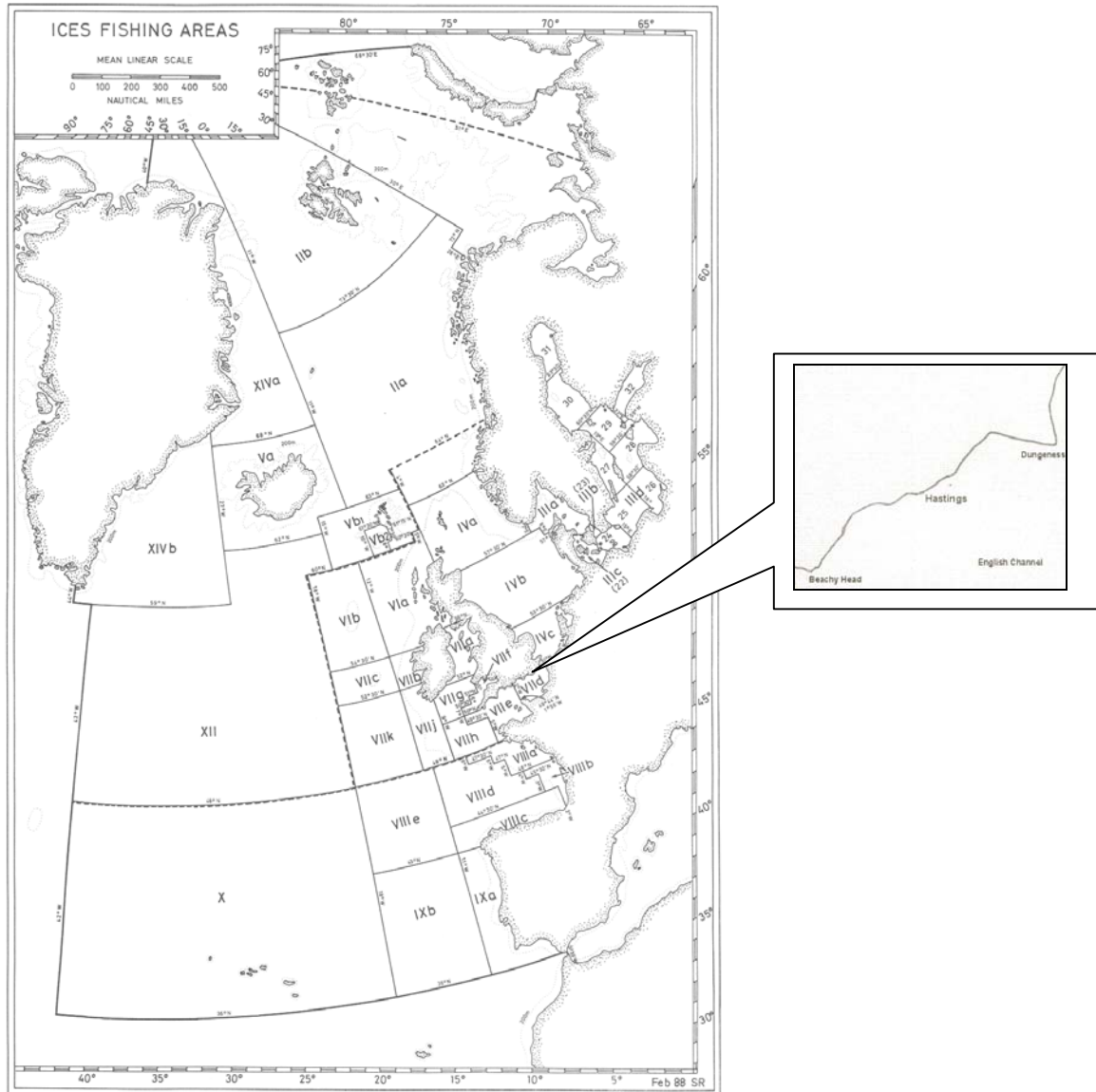
The scale of activity has increased by as much as ten times as a result of the use of hydraulically operated net haulers and the number of nets used per vessel.

The total landings of sole from ICES division VIIId, in 2002, as used by the assessment Working Group, was 4730t. (ICES, 2004). This was 9% below the agreed TAC of 5200t and close to the figure predicted at status quo fishing mortality for 2002 (4860t). The proportion of the TAC taken by each country was 51%, 30%, and 18% by France, Belgium and the UK, respectively.

2.4 Fishing Locations and Administrative Boundaries

The Hastings Fishing Fleet operates entirely within ICES Division VIIId between Beachy Head and Dungeness. The area is shown in the Figure 2 below. For administrative purposes ICES Division VIIId represents the TAC area relevant to eastern English Channel sole.

Figure 2: ICES Fishing Areas and Hastings Fishing Area



Source: Reproduced from ICES web site

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 IVc and VIIId. The Channel has a maximum depth of 100 m at its western mouth (5°W), 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.

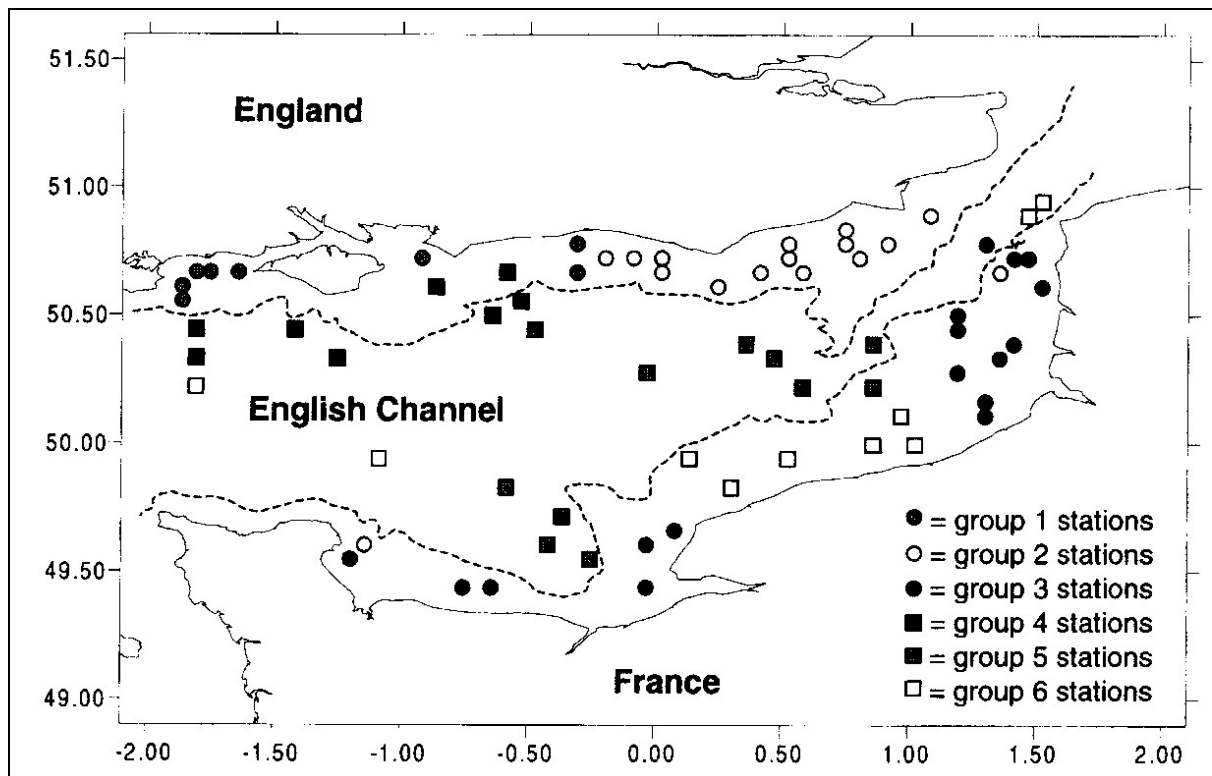
Phytoplankton is an important component of the ecosystem in the frontal and mixed regions, where the zooplankton biomass considerably exceeds that of the well-stratified water. In the Channel, as in other temperate shelf waters, the distribution of plankton is determined directly by water movement and 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 below) to determine the relationship between benthic fauna and associated fish assemblages.

Figure 3: 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 2 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. The eastern Channel Application Areas generally lie in water deeper than 30 metres and therefore fall primarily into Group 4-6, with the majority Group 5. This infers that gadoid species, dogfish and gurnards are likely to be more prevalent in catches than flatfishes (Turnpenny and Riley, 2000).

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/m²-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.

Table 2: 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 & bryzoans.	Flatfish spp. (<i>P. platessa</i> & <i>S. solea</i> ;	<i>L. limanda</i>
	Group 2: Few rocks, low biomass of hydroids, soft corals, bryzoans and crabs		<i>L. limanda</i>
	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 & gurnards
	Group 5: Few rocks, wide selection of soft corals, hydroids, bryzoans and sponges		Dogfish & gurnards
	Group 6: Few rocks, sediments with high constant of broken shell, typical queen scallop habitat		Small gadoids & gurnards

Source: Habitat groups as recognised by Kaiser *et al.* (1999)

Sole is included in the multi-species virtual population analysis (MSVPA) for the North Sea which provides some quantitative information on ecosystem relations and impacts. This MSVPA has been constantly updated and subjected to sensitivity analyses as well as other tests to refine the model. The model is considered to represent a reasonable tool for predicting trends in stock levels and includes key prey species of sole.

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 typical 4" (102 mm) mesh trammel nets² tend to be highly size selective and have been shown to demonstrate like catchability for undersize (i.e. <24 cm) sole (Arkley and Swarbrick, 1990). A study of Hastings multimonomofilament sole trammel nets in 1992 showed that undersize fish represented 3% or less of caught fish (AIR, 1993) and that they have a much higher relative retention rate when compared to slackly hung gill nets.

Table 3: Selectivity of Sole Multimonomofilament Trammel Nets off Hastings

Mesh size	3¾"	4"	4¼"	4½"	5"
	95 mm	100 mm	108 mm	114 mm	126 mm
Total number caught	754	504	341	219	127
Number <MLS	29	16	5	4	2
Proportion < MLS	4%	3%	1%	2%	2%
Mean length (cm)	29.3	30.4	31.0	32.2	33.5
Ideal fish length (cm)	30.2	31.8	34.1	38.3	39.7

Source: AIR, 1993

² Sussex SFC min. legal mesh size for trammel nets is 90 mm (http://www.sussex-sfc.gov.uk/fishing_instruments.htm)

The main by-catch from trammel nets is mackerel – these are retained and form subject of a separate MSC fisheries assessment. In terms of other species caught, it is understood that various rays (mostly blonde *Raja brackeyra* and thornback *Raja clavata*, commonly known as ‘roker’) rays. The 676 kg by-catch of rays was landed and marketed by the Hastings fleet over 2003 (DEFRA, pers. comm.). There is also a small bycatch of plaice, whiting, cod, turbot, the odd bass and various small dogfish. All these are retained and marketed, although the dogfish may be discarded or used as bait.

Interactions with salmonids (sea trout) may occur but has not been recorded – restrictions on the depth of the nets during times of migration (May-Sep) makes this unlikely.

2.6.2 Discards

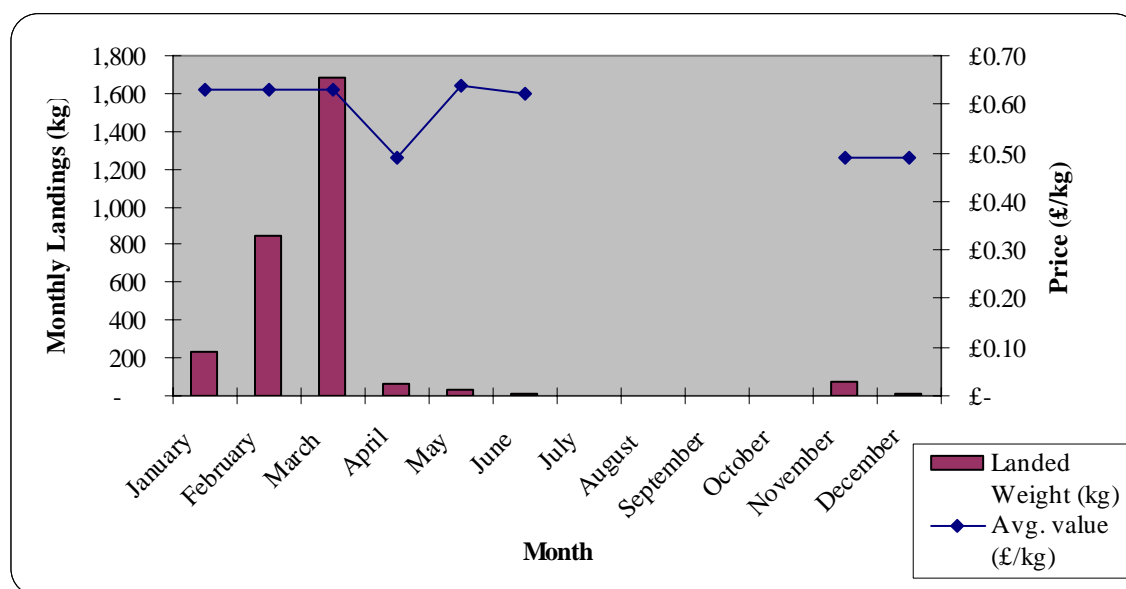
Very little is discarded other than spider crabs. The spider crabs which are taken in May /June are all crushed and discarded. Other non-marketable fish (i.e. dogfish, see above) are retained for bait for the potters. Trammel nets might also accumulate other biogenic material such as starfish, small crabs (i.e. *Corystes* spp.), whelks and weed. No detailed figures are available on this, although it appears the multifilament meshes used attract higher debris levels than mono or monomultifilament gears.

2.6.3 Catch of Threatened, Rare and Iconic Species

Fish: Some by-catch of shad (*Alosa* spp.), an anadromous clupeid, is known to occur. Both shad species (Allis and Twaite) are known to be present in the catch but with Twaite shad being more abundant (David Fraser, English Nature, pers. comm.). Different levels of protection are afforded, with the Allis shad having full protection and Twaite protected only in spawning areas and migration routes.

The exact contribution of the sole trammel net fishery to the 2, 929 kg shad landed in Hastings over 2003 (see Figure 4 below) is unknown but is likely to be relatively minor compared to the trawl fishery. Anecdotal evidence to this effect is supported by the fact that 93% of the shad landings are made over the first quarter of the year, combined with only 8% of sole landings, which are mainly during the months of July to October. However, given the fact that there is some shad by-catch in the trammel net fishery and the delicate conservation status of the Allis shad, this issue needs further clarification.

Figure 4: Landings of Shad (*Alosa* spp.) by All Gears in Hastings over 2003



Sea mammals: the incidental catch of cetaceans by trammel nets in the Eastern Channel is low (Simon Northridge, pers. comm.) but this largely reflects the low populations found here, although there are signs of recovery, especially for the harbour porpoise (*Phocoena phocoena*). As a result this area of the Channel will be exempt from the proposed cetacean by-catch regulations. Swarbrick (1994) reported one harbour porpoise caught in a trammel net in area VIIe. Hastings trammel net fishermen have not recorded any cetacean by-catch. However, with the possible increase in porpoise numbers, there is potential for increased levels of interaction and appropriate studies may need to be instigated.

Sea birds: The occasional incidental catch of seabirds has been found in the Hastings trammel net fishery, mainly diving birds such as guillemots. There are no figures available on the numbers involved, but it is thought to be very low and of no consequence to overall populations. Although not reported in respect to the Hastings fishery, the incidental capture of shags (*Phalacrocorax aristotelis*) has also been found (Northridge et al, 1991).

2.7 Other Fisheries Relevant to this Assessment

The main feature of the flatfish fisheries in ICES division VIIId are their importance to the small (<10 m) vessel fleets. Approximately 500 vessels fish for sole and plaice at some time during the year in the eastern English Channel and are heavily dependent on sole. There is a directed fishery for sole by small inshore vessels, using trammel nets and trawls, operating from ports other than Hastings in the area between Beachy Head and Dungeness. Similarly there is a fleet of inshore vessels targeting sole on the French coast, although they may be exploiting different coastal populations. Together these inshore fleets take more than 50% of the reported landings from ICES division VIIId (ICES, 2003a).

There is also a directed fishery on sole by English and Belgian beam trawlers operating offshore within division VIIId. They tend to target sole when they are in deep water, during the winter months, before they move inshore to become available to the inshore fleets (ICES, 2003a). During very cold winters sole are particularly vulnerable to these fleets of offshore beamers because the fish tend to aggregate in localised areas of deeper, relatively warmer water. The operation of this fleet can be unpredictable as it has the capacity to move to, and fish in, other areas and on other species such as scallops and cuttlefish.

Sole are also taken in the eastern English Channel as a by-catch by the fleet of offshore French trawlers fishing for mixed demersal species.

Effort by English and Belgian beam trawlers and large French otter trawlers has increased by a factor of 7 between the 1980s and the 1990s. In spite of satellite monitoring there is still a serious problem of misreporting of sole caught by beam trawlers in the adjacent areas, ICES divisions VIIe and IVc, into division VIIId. This is carefully monitored and taken account of in the catch statistics used by the assessment working group (ICES, 2004).

3 ADMINISTRATIVE CONTEXT

3.1 Legislation

3.1.1 European

The sole fishery in ICES division VIIId comes entirely under the jurisdiction of the EU and there are no third party agreements related to this fishery. The annual quota agreed at the Council of Ministers meeting in December each year is divided between the UK, France and Belgium. The total TAC of 5,900t for 2004 was allocated 54% to France, 27% to Belgium and 19% to UK.

There is a minimum mesh size of 90mm for fixed gear (EU Council regulation 850/98 Annex VI) which is a derogation for this area. The minimum landing size for sole in ICES division VIIId is 24cm.

Since 2002 an EU regulation (1639/2001) has been endorsed which affects the market sampling procedures. Firstly each country is obliged to sample all fleet segments, including foreign vessels, landing in their country. Secondly, a minimum number of market samples per tonne of landings is required. The national market sampling programmes have been adjusted accordingly.

For the UK inshore fishery there are some local Sussex Sea Fisheries bye-laws in operation which affect the fishery. These are minor area restrictions on the use of fixed nets and drift nets at certain times of the year to protect salmon.

3.1.2 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. Current byelaws affect the Hastings trammel net fishery in the following manner:

1. Static gears are prohibited in certain defined areas over the period May to September;
2. Static gears shall not be used in any other area within the jurisdiction of the Sussex Sea Fisheries Committee unless the headline is at least 1.5 metres below the surface of the water at any state of the tide
3. Trammel net or nets (and all fixed enmeshing nets) must have a mesh of minimum size of 90 millimeters when measured in accordance with Commission Regulation (EEC) 2108/84 between directly opposite mesh knots"

3.2 Management Responsibilities and Interactions

At a 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. Commission proposals, inform the annual EU Council of Ministers regulation establishing management measures, in particular TAC's and quotas. TACs and quotas for this fishery are set in this regulation for EC member states. 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 including their compliance with the scientific sampling targets.

Within EU member states, Fisheries Departments divide the total allowable catch (TAC), as 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 (PO), 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 TAC 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 and monitoring 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 is funded primarily by 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

The management unit applicable is for all sole caught in ICES division VIIId. The stock in this area is considered to be a discrete unit for management purposes although it is recognised that there is some migration and mixing with stocks in the southern North Sea (ICES division IVc) and the western English Channel (ICES division VIIe). This mainly applies to juvenile fish.

4.2 Monitoring of Stock Status

Assessment of this stock is carried out by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak. The Working Group meets annually, in September each year, and their assessments are then reviewed at the ICES ACFM meeting in October. The Working Group does not carry out a full assessment of all the thirteen stocks in its portfolio every year. Instead, and where applicable, it has a rolling programme of a 'Benchmark' assessment followed by a series of 'Update' assessments. Since 2002 the assessment of sole in ICES division VIIId is on such a rolling programme with an update assessment carried out in 2003 (ICES, 2004). The next benchmark assessment will be carried out in 2005.

A benchmark assessment includes data preparation, review of fishery information, data screening, trial assessments, final assessment, catch forecast and medium-term projections. Assessments in this category can be initially approached on a full basis, but may be subsequently considered unsuitable for medium-term projections, due to data series length, quality, or forecast concerns. In some cases, the stock perception is so similar that repeated medium term projections were considered unnecessary.

In an update assessment, all data sets are updated and reviewed. A standard XSA assessment is carried out and short-term forecast made according to the Stock Annex protocol. The subsequent report contains a short text on the updated data and results of the assessment. No trial runs, stock-recruitment relationship fitting or medium-term projections are carried out. This assessment could be upgraded to a full, benchmark, assessment in any year in which there were concerns over data or the state of the stock or if there were specific requests from customers to do so.

The assessment uses landing data as reported to ICES together with the total landings estimated by the Working Group. There is misreporting by beam trawlers fishing from adjacent areas, in particular from division VIIe into VIIId and this was taken into account for the year 2002 and a correction for a longer time series will be made at the next working group meeting in 2004.

There is also a considerable under-reporting by small vessels, which take up to 60% of the landings in the eastern English Channel. However, it has not been possible to quantify the level of these for inclusion in the assessment. Until recently the Hastings fleet could well have been included as part of this misreporting problem. Recent anecdotal evidence strongly suggests that this is no longer the case and indeed in 2002 the Hastings fleet did not take all the sole TAC allocated to them (Millner, pers. comm., Whiting, pers comm.)

There are no discards included in the assessment, but in general discards for sole are considered to be a minor issue.

Natural mortality for the assessment is assumed to be constant over the ages and years at 0.1. Maturity at age is knife edged and assumes that all fish at three years and older are mature.

All three countries participating in the fishery provide quarterly age data from samples of their own landings.

Fleet tuning data for CPUE is used from the three national offshore fleets and the assessment also uses tuning data from three research vessel surveys; the UK beam trawl and young fish surveys and the French young fish survey.

Under-reporting from the inshore fleets and misreporting by the offshore beam trawlers fishing in adjacent areas and reporting into division VIIId is thought to be significant. The lack of information on this phenomenon contributes to the uncertainty of the stock assessment and forecasts. ACFM have concluded that the historical performance of the assessment, for estimating stock size, has been poor and has been substantially influenced by these two factors. As an example of the problem, the fishing mortality in 2001 has been revised upwards by 31% and the resultant SSB revised downwards by 17%.

The last assessment, carried out in 2003, (ICES, 2004) was an update assessment, using the same parameters as for the previous year. The year classes 1998 to 2000 were estimated to be above average and explain the increase in SSB from 8,884t in 2001 to 11,260t in 2002. It is predicted to have further increased to 13,300t at spawning time in 2003.

There is a tendency to underestimate fishing mortality and overestimate SSB. There is a discrepancy between the XSA estimate and the RCT3 estimate of the 2001 year class which is partly caused by F shrinkage pulling up the XSA estimate. The historical performance of this assessment is very noisy and has been poor in estimating this stock. Fishing mortality in 2001 was revised upwards by 31% and SSB downwards by 17%. Uncertainties in the most recent assessment are the under-reporting by important segments of the inshore fleet, since this fleet takes a major part of the landings of sole in division VIIId. The misreporting of beam trawl fleets fishing in adjacent areas is a cause for a major uncertainty in the estimation of fishing mortality in this area. It is expected that this source of potential error will be taken into account for the next assessment in September 2004.

In spite of the documented difficulties, the assessment process is considered by ICES to be robust, the stock is inside safe biological limits and fishing mortality is below F_{pa} . There is a good long age structure present in the stock helped by recent large recruitments.

4.3 Modelling

The assessment model used for this stock is the extended survivors analysis (XSA) model, which has been used as an important tool for catch-at-age analysis for all demersal stocks. Two implementations are in use: version 3.1 of the Lowestoft VPA package is the one used for all flatfish stocks. In the 2002 WG report (ICES, 2003a), the general approach to tuning the XSA had been to use a full tuning window with a tricubic 20-year time taper. This option was not retained in 2003 for sole and the no-down-weighting option was used instead. For the benchmark assessments the F-shrinkage is explored with the aim to reduce the effects of shrinkage on the terminal population estimates.

The general approach to carrying out the explorations leading to the final assessment was as follows. A separable analysis was carried out to explore the internal consistency of the catch-at-age data and also to judge whether the plus group was appropriately chosen. For all available tuning series, single fleet runs were carried out using Laurec-Shepherd *ad hoc* tuning or XSA with light shrinkage. These runs were used to explore the consistency of the surveys with the catch-at age data. In previous assessments, results were used to determine the fleet year and age ranges to be used for the final assessment. In the 2003 assessment, greater attention was paid to *a priori* reasons for removing

surveys, since residual trends in single-fleet Laurec-Shepherd runs can indicate problems with catch-at-age data as well as survey data.

Given a largely predetermined selection of fleets and ages, a run was carried out with all selected fleets combined, with the time period of tuning as selected for the final run, but with catchability set to be independent of year class strength for all ages (that is, no power model for recruits). From this analysis, graphs of log catchability residuals were plotted against log stock numbers to judge whether the slope of the regression was consistently different from zero for the most important fleets. If so, a power model of catchability would be used for those ages. The contribution of shrinkage to survivors estimates at older ages from these exploratory XSA runs was used to facilitate decisions on the plus-group to be used (and consequently whether then mean F range needed to be changed). These contributions were also used along with retrospective analyses to determine the correct value of F -shrinkage. Then the final run was carried out. Plots of log CPUE against log stock numbers were generated to visually inspect the quality of the regressions (or alternatively the residuals were plotted). A poor performance of a fleet at this stage was no longer considered a decisive argument against the use of that fleet (or age), if it had performed acceptably in the single fleet runs.

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. (ICES, 2003b)

The B_{pa} is set at 8,000t, F_{pa} is 0.4 and F_{lim} is 0.55. The TAC for division VIIId sole was set at 5200t for 2002 and 5400 t for 2003 based on fishing mortalities below F_{pa} .

The ACFM catch forecast for 2003 and advice for 2004 was as follows:

Basis: $F(\text{status quo}) = F(00-02)$, scaled = 0.34

Landings (2003) = 4,900t; :SSB (2004) = 15,300t

F (2003 onwards)	Basis	Landings (2004) t	SSB (2005) t
0.20	$0.6 * F(\text{sq})$	3,300	16,800
0.27	$0.8 * F(\text{sq})$	4,300	15,700
0.34	$F(\text{sq})$	5,200	14,700
0.40	$F_{pa} = 1.8 * F(\text{sq})$	5,900	13,900
0.41	1.	6,000	13,800

As a result of the advice above the TAC for 2004 was set at 5,900t (3,177t) to France, 1,588t to Belgium and 1,135t to UK. (Council Regulations (EC) No. 2287/2003).

5 FISHERY MANAGEMENT

5.1 Management Objectives

In their advice for 2003 and 2004 (ICES, 2002, 2003b), ACFM state quite clearly that no explicit management objectives are set for this stock. Since 2001 ACFM has considered the sole stock in division VIIId to be within safe biological limits. The fishing mortality is estimated to be below F_{pa} . The SSB is well above B_{pa} (8000t) following improved recruitment in recent years particularly of the year classes 1998 to 2000.

SSB in the short term is predicted to continue to increase to 13,300t at spawning time in 2003 and to over 15,000 t in 2004 at F status quo. ACFM has recommended that fishing mortality should be maintained below the proposed F_{pa} (0.4), corresponding to landings of less than 5400t in 2003 and 5,900t in 2004. Historically the assessment has shown a tendency to underestimate F and overestimate SSB. This factor has to be carefully considered and regularly reviewed in the context of management advice for this stock. A major problem in the assessment is underreporting and misreporting generating considerable uncertainty in the estimates of fishing mortality.

5.2 Consultative Process

At local level, the Hastings Fishermen's Protection Society (HFPS) 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 mechanisms 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.³

Intent:

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

Criteria:

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

Principle 2

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

Intent:

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

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.

³ 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

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 system⁴.
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.

⁴ Outstanding disputes of substantial magnitude involving a significant number of interests will normally disqualify a fishery from certification.

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:

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 nor for an Eastern Channel Dover sole fishery.

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 Cogan	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 knowledge of Hastings fleet Allis /Twate shad biology and ecology.
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:

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 2004	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, 100 represents surpassing of the performance necessary and 60 a measurable shortfall. A fishery cannot be certified if a score below 60 is recorded. 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 Sole 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 SOLE FISHERY

The extent of the fishery certification is the landing of Dover sole by vessels using trammel-nets and holding 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 Sole 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 : 90 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 Dover Sole Trammel Net 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 number of conditions for continuing certification that the client is required to address. The conditions are applied to improve performance to at least the 80 level within a period set by the certification body but no longer than the term of the certification.

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

The conditions are associated with two key areas of performance of the fishery, each of which addresses a number of Scoring Indicators. Conditions, associated timescales and relevant Scoring Indicators are set out below.

Condition 1. Recording of catches

Action required: Misreporting in the offshore fishery and under-reporting in the inshore fisheries has been identified as a significant potential source of uncertainty in the stock assessment and in forecasts for this stock. Whilst it is recognised that the Hastings fishery does not now appear to contribute to such under-reporting, it is important that accurate reporting of all catches (including by-catch), discards and landings take place to the relevant scientific agency, in this case CEFAS.

Accordingly, the data requirements of the relevant scientific agency (CEFAS) should be determined and these requirements should be met from within the fishery.

Timescale: Contact with CEFAS should be initiated within three months of certification and data collection underway within 3 months of specification by CEFAS. This would then be an ongoing condition of certification.

Relevant Scoring Indicators: 1.1.2.1, 1.1.2.5, 1.1.5.6

Condition 2. Interactions with endangered, threatened or protected species

Action required: Interactions of the fishery with endangered, threatened or protected species appear limited but are not formally quantified. Such interactions may be with groups such as seabirds, sea mammals and shad (*Alosa* spp).

Records of incidental catches (of sea birds, sea mammals etc) should be maintained and made available through an appropriate body such as the Sea Fisheries Committee.

Shad are currently caught and landed and this **may** include both Allis and Twaite shad. This should be raised with the relevant agency (DEFRA and/or English Nature) with a view to establishing the conservation significance of such catches. If necessary, any required modifications to fishing practices should be implemented as soon as practically possible.

Timescale: This issue should be raised immediately upon certification.

Relevant Scoring Indicators: 2.2.1.2, 2.2.1.3

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