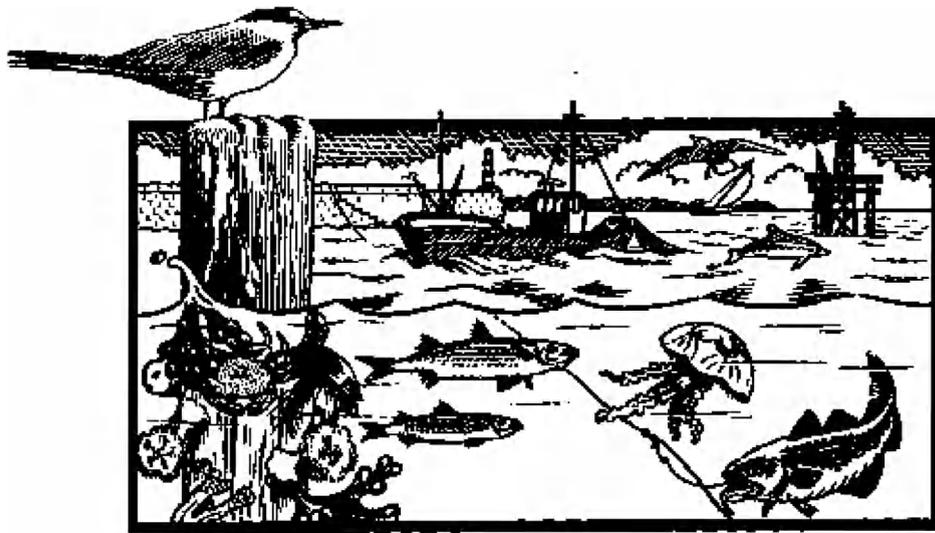


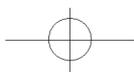
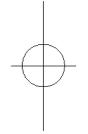
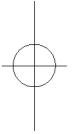
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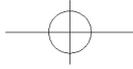
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Stephen J Lockwood  
Editor

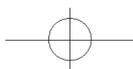
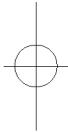
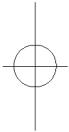


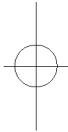
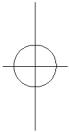




# A Glossary of Marine Nature Conservation and Fisheries

Stephen J Lockwood  
Editor



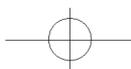


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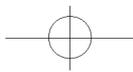
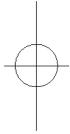
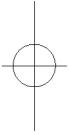
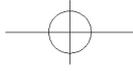


# Contents

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Foreword .....	v
Acknowledgements .....	vii
Abbreviations and Acronyms .....	1
Names of Animals in Text .....	11
Glossary	
A.....	19
B.....	23
C .....	27
D .....	32
E .....	36
F.....	40
G .....	44
H.....	45
I .....	47
J.....	50
K .....	50
L.....	51
M .....	53
N.....	57
O.....	59
P .....	60
Q.....	63
R .....	63
S .....	66
T .....	72
U .....	74
V.....	75
W.....	75
Y .....	76
Z .....	76
References .....	77







## Foreword

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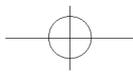
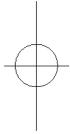
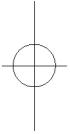
The whole field of fisheries is so beset with jargon and acronyms that for anyone wishing to understand the issue, it can be a nightmare. Add to that increasing calls to protect marine wildlife, which has led to new terminology, particularly relating to the Habitats and Species Directive.

At a time when the European Commission is pushing for consideration of the environment alongside all activities (through a process called integration), it is important to ensure that all those involved with fisheries and the environment have a common understanding of terms. This is why this glossary of terms for marine nature conservation and fisheries was commissioned. There has been wide consultation with a cross section of individuals over the definition of terms, which in itself helped increase common understanding. It is of paramount importance that integration of fisheries and the environment occurs in practice, at the grass roots level and not just in principle. We hope that this glossary will help to achieve such an aim.

A number of communications from the European Union stress the importance of disseminating scientific information in a way that is easily understood. The EC Biodiversity Strategy [COM(1998)42] calls on the Community to develop programmes for public information, education and awareness raising on conservation and sustainable use of biodiversity. This should also apply to the Commission's action plan for biodiversity in fisheries. A similar commitment applies in relation to information on the impact of fisheries on marine ecosystems.

Countryside Council for Wales  
on behalf of the UK statutory nature conservation agencies.





## Acknowledgements

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A glossary such as this cannot be wholly original work, it must either comprise the edited contributions of numerous authors or be compiled by reference to as many sources as are relevant and readily available. This glossary is very much a compilation.

In drafting the definitions we have referred to a great many publications, many of them qualifying as the 'gray literature' of national and international scientific bodies, non-governmental organizations and government reports. We are grateful to the authors, both named and anonymous, of these diverse publications for the assistance which unwittingly they have given.

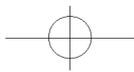
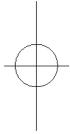
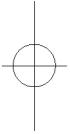
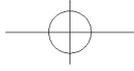
The publications that provided most help are listed in the references, including several dictionaries. Where a definition was taken more or less verbatim from a particular publication the source is cited in the text as well as including it in the references. We acknowledge our appreciation for the help these authors and publishers have given.

Many friends and colleagues in the voluntary and statutory nature conservation bodies, government fishery laboratories, universities and the fishing industry suggested terms for inclusion in the glossary. Several of them also gave generously of their time to read and comment on the draft definitions. We thank them all but shoulder the responsibility for any shortcomings the reader will feel or find.

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## Abbreviations and Acronyms

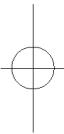
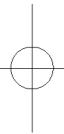
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ACFA*	Advisory Committee on Fisheries and Aquaculture (EC)
ACFM*	Advisory Committee for Fisheries Management (ICES)
ACME*	Advisory Committee for the Marine Environment (ICES)
ACOPS	Advisory Committee on Protection of the Seas
ALARA	As Low As Reasonably Achievable
AM	Assembly Member – member of the National Assembly for Wales
AnaCat*	Anadromous and Catadromous Fish
ASCOBANS*	Agreement on Small Cetaceans of the Baltic and North Sea; an Annex to the Bonn Convention*
ASFC	Association of Sea Fisheries Committees
ASMO	Assessments & Monitoring Group (of OSPAR)
ASP*	Amnesic Shellfish Poisoning
ASSG	Association of Scottish Shellfish Growers
ASSI*	Area of Special Scientific Interest (Northern Ireland)
BAP*	(UK) Biodiversity Action Plan
BATNEEC	Best Available Technology Not Entailing Excessive Cost
BIM	Bord Iascaigh Mhara / Irish Sea Fisheries Board
BioMar	Biological Diversity in Marine Systems – an EU LIFE Project
BOD	Biochemical Oxygen Demand
BODC	British Oceanographic Data Centre, Proudman Oceanographic Laboratory (NERC)
BSFO	British Sea Fisheries Officer
CA	Countryside Agency (formerly the Countryside Commission)
CBD	UN Convention on Biodiversity
CCAMLR	Convention for the Conservation of Antarctic Marine Living Resources
CCMS	Centre for Coastal & Marine Sciences (NERC)

*\* Further information is given in the main text of the Glossary*

CCW	Countryside Council for Wales
CEC*	Commission of the European Communities
CEFAS	Centre for Environment Fisheries & Aquaculture Science
CEMARE	Centre for Economics & Management of Aquatic Resources, University of Portsmouth
CEMIEP	Coastal and Estuarine Management Institute for Environmental Policy, University College London
CERCI	Centre for European Research in Coastal Issues, University College Scarborough
CFO	Chief Fisheries Officer (of Sea Fisheries Committee)
CFP*	Common Fisheries Policy of the European Union
CITES	Convention on the International Trade in Endangered Species
CORINE	Co-ordination of Information on the Classification of the Environment (EU project)
CPUE*	Catch Per Unit of Effort
CSD	Commission on Sustainable Development
CSW*	Chilled Seawater tanks – the hold on pelagic fishing vessels.
CZM*	Coastal Zone Management
DAF	Department of Agriculture & Fisheries, States of Guernsey Department of Agriculture & Fisheries, States of Jersey
DAFF	Department of Agriculture, Fisheries & Forestry, Isle of Man
DANI	Department of Agriculture for Northern Ireland – now DARD
DARD (NI)	Department of Agriculture and Rural Development (Northern Ireland) – formerly DANI.
DETR	Department of the Environment, Transport and the Regions
DG XI*	Commission of the European Communities Directorate General for the Environment – now DG Environment
DG XIV*	Commission of the European Communities Directorate General for Fisheries – now DG Fisheries
DGPS*	Differential Global Positioning System
DI	District Inspector of Fisheries
DML	Dunstaffnage Marine Laboratory
DMLC	Dove Marine Laboratory Cullercoats, University of Newcastle

*\* Further information is given in the main text of the Glossary*



DoE	Department of Environment. Now part of DETR
DoE(NI)	Department of Environment (Northern Ireland)
DoT	Department of Transport. Now part of DETR
DSP*	Diarrhoeic Shellfish Poisoning
DTI	Department of Trade and Industry
EA	Environment Agency
EAGGF	European Agriculture Guidance & Guarantee Fund (inc Fisheries)
EC*	European Commission (formally, Commission of the European Communities CEC)
ECA	European Court of Auditors
ECJ	European Court of Justice
EcoQ	Ecological Quality
EcoQO	Ecological Quality Objective
ECSA	Estuarine & Coastal Sciences Association
EEA	European Environment Agency
EEC	European Economic Community
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EHO	Environmental Health Officer
EHS	Environment & Heritage Service (Northern Ireland)
EHWST	Extreme High Water of Spring Tides
EIA	Environmental Impact Assessment
ELIFONTS	Effects of Large-Scale Industrial Fisheries on NonTarget Species (EU project)
ELOIS	European Land-Ocean Interface Study
ELWST	Extreme Low Water of Spring Tides
EMP	Estuary Management Plan
EMS*	European Marine Site
EN*	English Nature
EP	European Parliament
EQO	Environmental Quality Objective

*\* Further information is given in the main text of the Glossary*

EQS	Environmental Quality Standard
ERDF	European Regional Development Fund
ES	Environmental Statement
ESF	European Social Fund
ESUSG	European Sustainable Use Specialist Groups (of the IUCN)
EU*	European Union
EuroPêche	Umbrella body for EU national fishermen's organisations (not an acronym)
<b>F</b> *	Fishing mortality rate
FAO	Food and Agriculture Organisation of the United Nations
FCS*	Favourable conservation status (Habitats & Species Directive)
FIFG	Financial Instrument for Fisheries Guidance (EU structural fund)
FO	Fisheries Officer
FoE	Friends of the Earth
FOOCCG	Fisheries & Offshore Oil Consultation Group
FRS	Fisheries Research Services – Marine Laboratory, Aberdeen
GB	Great Britain – England, Scotland & Wales
GESAMP	Joint Group of Experts on the Scientific Aspects of Marine Pollution (UN Advisory Group)
GIS	Geographic Information System
GMO	Genetically Modified Organism
GPS	Global Positioning System
HAB*	Harmful Algal Bloom
HAP*	Habitats Action Plan (part of UKBAP)
HAT	Highest Astronomic Tide
HelCom	Helsinki Commission/ <i>Convention for the Environmental Protection of the Baltic Sea</i>
HIE	Highlands & Islands Enterprise
HIFI	Hull International Fisheries Institute, University of Hull
hp	Horse Power 0.7355 kW
HWST	High Water Spring Tides

\* Further information is given in the main text of the Glossary

IACMST	InterAgency Committee for Marine Science & Technology
IBSFC	International Baltic Sea Fisheries Commission
ICCAT	International Convention for the Conservation of Atlantic Tunas
ICES*	International Council for the Exploration of the Sea
ICZM*	Integrated Coastal Zone Management
IDBNI	Industrial Development Board for Northern Ireland
IECS	Institute of Estuarine & Coastal Studies, University of Hull
IEEP	Institute for European Environmental Policy
IFOMA	International Fish Oil & Meal Association
IMM*	Intermediate Ministerial Meeting of the North Sea Conference
IMO	International Maritime Organisation of the United Nations
IOC	International Oceanographic Committee of the United Nations
IOE	Institute of Offshore Engineering, Heriot-Watt University
ISF	Irish Sea Forum
ITQ*	Individual Transferable Quota
IUCN	International Union for the Conservation of Nature & Natural Resources – also known as the World Conservation Union
IWC	International Whaling Commission
JAMP	Joint Assessment and Monitoring Programme (OSPAR)
JNCC	Joint Nature Conservation Committee
kW	Kilowatts
LAT	Lowest Astronomic Tides
LEAP	Local Environment Agency Plan
LGA	Local Government Association
LIFE	L'Instrument Financier pour l'Environnement (EU funding package)
LNR	Local Nature Reserve
LOIS	Land-Ocean Interface Study
LPUE*	Landings Per Unit of Effort
LWST	Low Water of Spring Tides
<b>M*</b>	Natural mortality rate of fish
MAFF	Ministry of Agriculture, Fisheries and Food

*\* Further information is given in the main text of the Glossary*

MAGP*	Multi-Annual Guidance Programme
MarLIN	Marine Life Information Network (marine element of National Biodiversity Network)
MarPol	International Convention for the Prevention of Pollution of the Sea from Shipping
MBA	Marine Biological Association of the United Kingdom, Plymouth
MBAL*	Minimum Biologically Acceptable Limit
MCA	Maritime & Coastguard Agency
MCA*	Marine Consultation Area (Scotland)
MCS	Marine Conservation Society
MEHRA*	Marine Environmental High Risk Area
MEP	Member of the European Parliament
MEY*	Maximum Economic Yield
MHW	Mean High Water
MHWNT	Mean High Water of Neap Tides
MHWOT	Mean High Water of Ordinary Tides
MHWST	Mean High Water of Spring Tides
MIFOS	Modelling the Impact of Fisheries On Seabirds (EU project)
MLS*	Minimum Landing Size
MLW	Mean Low Water
MLWNT	Mean Low Water of Neap Tides
MLWOT	Mean Low Water of Ordinary Tides (the seaward limit of 'land' in England & Wales)
MLWST	Mean Low Water of Spring Tides (the seaward limit of 'land', in Scotland)
MMS*	Minimum Mesh Size
MNCR	Marine Nature Conservation Review (JNCC project)
MNR*	Marine Nature Reserve
MoD	Ministry of Defence
MPA*	Marine Protected Area
MPCU	Marine Pollution Control Unit (now Counter-pollution branch of the Maritime & Coastguard Agency)

*\* Further information is given in the main text of the Glossary*

MSC*	Marine Stewardship Council
MSP	Member of Scottish Parliament
MSVPA*	Multi-species Virtual Population Analysis
MSY*	Maximum Sustainable Yield
NAFO*	North Atlantic Fisheries Organisation
NAO	North Atlantic Oscillation
NASCO	North Atlantic Salmon Conservation Organisation
NAWAD	National Assembly for Wales Agriculture Department (previously WOAD), the Department covers fisheries
NBD	National Biodiversity Network
NCEAG	National Coasts & Estuaries Advisory Group (now a SIGSOG)
NEAFC	North East Atlantic Fisheries Commission
NERC	Natural Environment Research Council
NEUT	Working group on Nutrients and Eutrophication (OSPAR)
NFFO	National Federation of Fishermen's Organisations
NGO	Non-Governmental Organisation
NI	Northern Ireland
NMMP	National Marine Monitoring Plan (UK)
NMBAQC	National Marine Biological Analytical Quality Control Scheme
NMPMMG	National Marine Pollution Monitoring Management Group
NNR	National Nature Reserve
NRPB	National Radiological Protection Board
NSTF	North Sea Task Force
NTZ*	No Take Zone
OECD	Organisation for Economic Cooperation & Development
OPRU	Oil Pollution Research Unit
ORNIS	Scientific Advisory Committee of EC Birds Directive
OSPAR*	Oslo and Paris Commission / Convention
PDA	Potentially Damaging Activity (in MPA)
PDO	Potentially Damaging Operation (in SSSI)

*\* Further information is given in the main text of the Glossary*

PEML	Port Erin Marine Laboratory, University of Liverpool, Isle of Man
PESCA	The name (not abbreviation) of an EU fisheries funding package
PML	Plymouth Marine Laboratory
PO*	Producer Organisation
POL	Proudman Oceanographic Laboratory, Bidston (NERC)
PRIMER	Plymouth Routines In Multivariate Ecological Research
PSP*	Paralytic Shellfish Poisoning
PSSA	Particularly Sensitive Sea Area
psu	Practical Salinity Units ( replaces parts per thousand, ‰)
QSR	Quality Status Report, eg North Sea QSR
QUASIMEME	Quality Assurance of Information for Marine Environment Monitoring in Europe
RA*	Relevant Authority (Habitats (Conservation) Regulations
Ramsar*	Town in Iran after which the Ramsar Convention is named
RN	Royal Navy
RSPB	Royal Society for the Protection of Birds
RSW*	Refrigerated Seawater tanks – the hold on (pelagic) fishing vessels
SAC*	Special Area of Conservation
SAGB	Shellfish Association of Great Britain
SAHFOS	Sir Alister Hardy Foundation for Oceanographic Science
SAMS	Scottish Association for Marine Science, Dunstaffnage, Oban (previously SMBA)
SAP*	Species Action Plan (part of UKBAP)
SBL*	Safe Biological Limits
SCANS	Small Cetacean Abundance in the North Sea (EU project)
SCI*	Site of Community Importance
SCOPAC	Standing Conference on Problems Associated with the Coastline
SCOR	Scientific Committee on Oceanic Research (IOC)
SEPA	Scottish Environment Protection Agency
SERAD	Scottish Executive for Rural Affairs Department (previously SOAEFD)

\* Further information is given in the main text of the Glossary

SFC*	Sea Fisheries Committee
SFF	Scottish Fishermen's Federation
SFI*	Sea Fisheries Inspectorate
SFIA	Sea Fish Industry Authority now known as Seafish
SFPA	Scottish Fisheries Protection Agency
SIGSOG	Special Interest Group of Senior Officers Group (of LGA)
SMA*	Sensitive Marine Areas (England)
SMBA	Scottish Marine Biological Association (now SAMS)
SMP	Shoreline Management Plan (flood defence & coastal protection)
SMRU	Sea Mammal Research Unit, University of St Andrews
SNH	Scottish Natural Heritage
SNIFFER	Scotland & Northern Ireland Forum for Environment Research
SOAEFD	Scottish Office Agriculture, Environment and Fisheries Department (now SERAD)
SOC	Southampton Oceanographic Centre, University of Southampton
sp.; spp.	Species; singular and plural
SPA*	Special Protection Area
SPFA	Scottish Pelagic Fishermen's Association
SSB*	Spawning Stock Biomass
SSFA	Shetland Salmon Farmers Association
SSGA	Scottish Salmon Growers Association
SSMG	Scottish Shellfish Marketing Group
SSSI*	Site of Special Scientific Interest
STECF*	Scientific, Technical & Economic Committee on Fisheries (EC)
STQ	Single Transferable Quota
SVPA*	Separable Virtual Population Analysis
SWFPA	Scottish White Fish Producers Association
SWFPO	South West Fish Producers Organisation
TAC*	Total Allowable Catch
TBT	Tri-Butyl Tin – antifouling component in marine paint

*\* Further information is given in the main text of the Glossary*

UK	The United Kingdom of Great Britain & Northern Ireland
UKBAP*	UK Biodiversity Action Plan
UKBG	UK Biodiversity Group
UKDMAP	United Kingdom Digital Marine Atlas Project
UKOOA	UK Offshore Operators' Association
UN	United Nations
UNCED	United Nations Conference on Environment & Development the 'World Summit' or Rio Conference, 1992
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Cultural & Scientific Organisation
VCO	Voluntary Conservation Organisation
VCU*	Vessel Capacity Units [length (m) x breadth (m)] + 0.45 engine power (kW)
VMNR	Voluntary Marine Nature Reserve
VNR	Voluntary Nature Reserve
VPA*	Virtual Population Analysis
WDA	Welsh Development Agency
WDCS	Whale & Dolphin Conservation Society
WOAD	Welsh Office Agriculture Department (now NAWAD)
WWF	World-Wide Fund for Nature (previously World Wildlife Fund)
WWT	Wildfowl and Wetlands Trust
Y/R	Yield Per Recruit
YPR	Yield Per Recruit
<b>Z*</b>	Total mortality rate

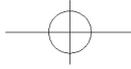
## Animals Named in Glossary

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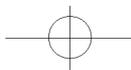
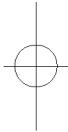
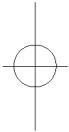
Common Name	Scientific Name
Barnacle .....	<i>Balanus spp</i> <i>Elminius modestus</i> <i>Semibalanus balanoides</i>
Bass .....	<i>Dicentrachus labrax</i>
Black fish .....	<i>Centrolophus niger</i>
Blue ling .....	<i>Molva dypterigia</i>
Blue whiting .....	<i>Micromesistius poutassou</i>
Cockles .....	<i>Cerastoderma edule</i>
Cod .....	<i>Gadus morhua</i>
Cold water coral .....	<i>Lophelia pertusa</i>
Crab, edible/brown .....	<i>Cancer pagurus</i>
spider .....	<i>Maia squinado</i>
velvet/swimming .....	<i>Necora (Liocarcinus) puber</i>
Cuttlefish .....	<i>Sepia officinalis</i>
Dogfish, lesser spotted.....	<i>Scylliorhinuscanicula</i>
greater spotted .....	<i>Scylliorhinus stellaris</i>
Dolphin, bottle-nose .....	<i>Tursiops truncatus</i>
common .....	<i>Delphinus delphis</i>
Dover sole .....	<i>Solea solea</i>
Eel, European .....	<i>Anguilla anguilla</i>
Flounder .....	<i>Platichthys flesus</i>
Fulmar .....	<i>Fulmarus glacialis</i>
Haddock .....	<i>Melanogrammus aeglefinus</i>
Hake .....	<i>Merluccius merluccius</i>
Herring .....	<i>Clupea harengus</i>
Horse mussel .....	<i>Modiolus modiolus</i>
Lamprey .....	<i>Petromyzon marinus</i>
Limpet .....	<i>Patella vulgata</i>

Lobster .....	<i>Homarus gammarus</i>
Lophelia – a deep water coral .....	<i>Lophelia pertusa</i>
Lugworm .....	<i>Arenicola</i> spp.
Mackerel .....	<i>Scomber scombrus</i>
Maerl or calcified seaweed .....	<i>Lithothamnion</i> spp. <i>Phymotolithon calcareum</i>
Megrim .....	<i>Lepidorhombus whiffiagonis</i>
Monkfish (anglerfish), white .....	<i>Lophius piscatorius</i>
black .....	<i>L. budegassa</i>
Mullet, red .....	<i>Mullus surmuletus</i>
golden .....	<i>Liza aurata</i>
thin lipped .....	<i>Liza ramada</i>
thick lipped .....	<i>Chelon labrosus</i>
Mussel .....	<i>Mytilus edulis</i>
Nephrops – Dublin Bay Prawn .....	<i>Nephrops norvegicus</i>
– Langoustine	
– Norway Lobster	
– 'Prawns'	
– Scampi	
Norway pout .....	<i>Trisopterus esmarkii</i>
Octopus, lesser (northerly sp.) .....	<i>Eledone cirrhosa</i>
common (southerly sp.) .....	<i>Octopus vulgaris</i>
Orange roughy .....	<i>Hoplostethus atlanticus</i>
Otter .....	<i>Lutra lutra</i>
Oyster, native/European .....	<i>Ostrea edulis</i>
Petrels .....	<i>Hydrobatidae</i>
Pilchard .....	<i>Sardina pilchardus</i>
Plaice .....	<i>Pleuronectes platessa</i>
Pollack .....	<i>Pollachius pollachius</i>
Porpoise, common/harbour .....	<i>Phocoena phocoena</i>
Pout whiting or bib .....	<i>Trisopterus luscus</i>
Ray, blonde .....	<i>Raja brachyura</i>
cuckoo .....	<i>Raja naevus</i>
Ray, thornback (roker) .....	<i>Raja clavata</i>

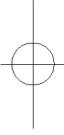
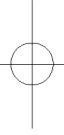
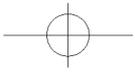
Razorfish .....	<i>Solenacea</i> eg <i>Solen</i> spp. & <i>Ensis</i> spp.
Red fish .....	<i>Sebastes marinus</i>
Reef-building tube worms .....	<i>Sabellaria alveolata</i> <i>Sabellaria spinulosa</i>
Roundnose grenadier .....	<i>Coryphaenoides rupestris</i>
Sailfish .....	<i>Istiphorus albicans</i>
Saithe (coley) .....	<i>Pollachius virens</i>
Salmon, Atlantic .....	<i>Salmo salar</i>
Sandeels .....	<i>Ammodytidae</i>
Scallops, king .....	<i>Pecten maximus</i>
Scallops, queen .....	<i>Chlamys</i> spp.
Sea urchin, edible .....	<i>Echinus esculentus</i>
Seal, common .....	<i>Phoca vitulina</i>
grey .....	<i>Halichoerus grypus</i>
Shad, allis .....	<i>Alosa alosa</i>
twaite .....	<i>Alosa fallax</i>
Shark, basking .....	<i>Cetorhinus maximus</i>
blue .....	<i>Prionace glauca</i>
porbeagle .....	<i>Lamna nasus</i>
Shrimp, brown .....	<i>Crangon crangon</i>
pink .....	<i>Pandalus montagui</i>
Skate, common .....	<i>Raja batis</i>
long-nose .....	<i>Raja oxyrinchus</i>
Spur dog .....	<i>Squalus acanthias</i>
Sprat .....	<i>Sprattus sprattus</i>
Squid .....	<i>Loligo</i> spp. <i>Alloteuthis</i> spp.
Sturgeon, European .....	<i>Acipenser sturio</i>
Swordfish .....	<i>Xiphias gladius</i>
Trout, sea, migratory or brown .....	<i>Salmo trutta</i>
Turbot .....	<i>Scophthalmus rhombus</i>
Turtles .....	<i>Testudinata</i>



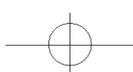
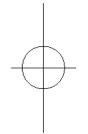
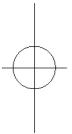
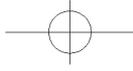
Tuna ..... *Thunnus* spp.  
Walrus ..... *Odobenus rosmarus*  
Whales, baleen ..... eg *Balaenoptera* spp.  
toothed, killer ..... eg *Orcinus orca*  
sperm ..... *Physeter catodon*  
Whelk ..... *Buccinum undatum*  
Whiting ..... *Merlangius merlangus*  
Winkle ..... *Littorina* spp.

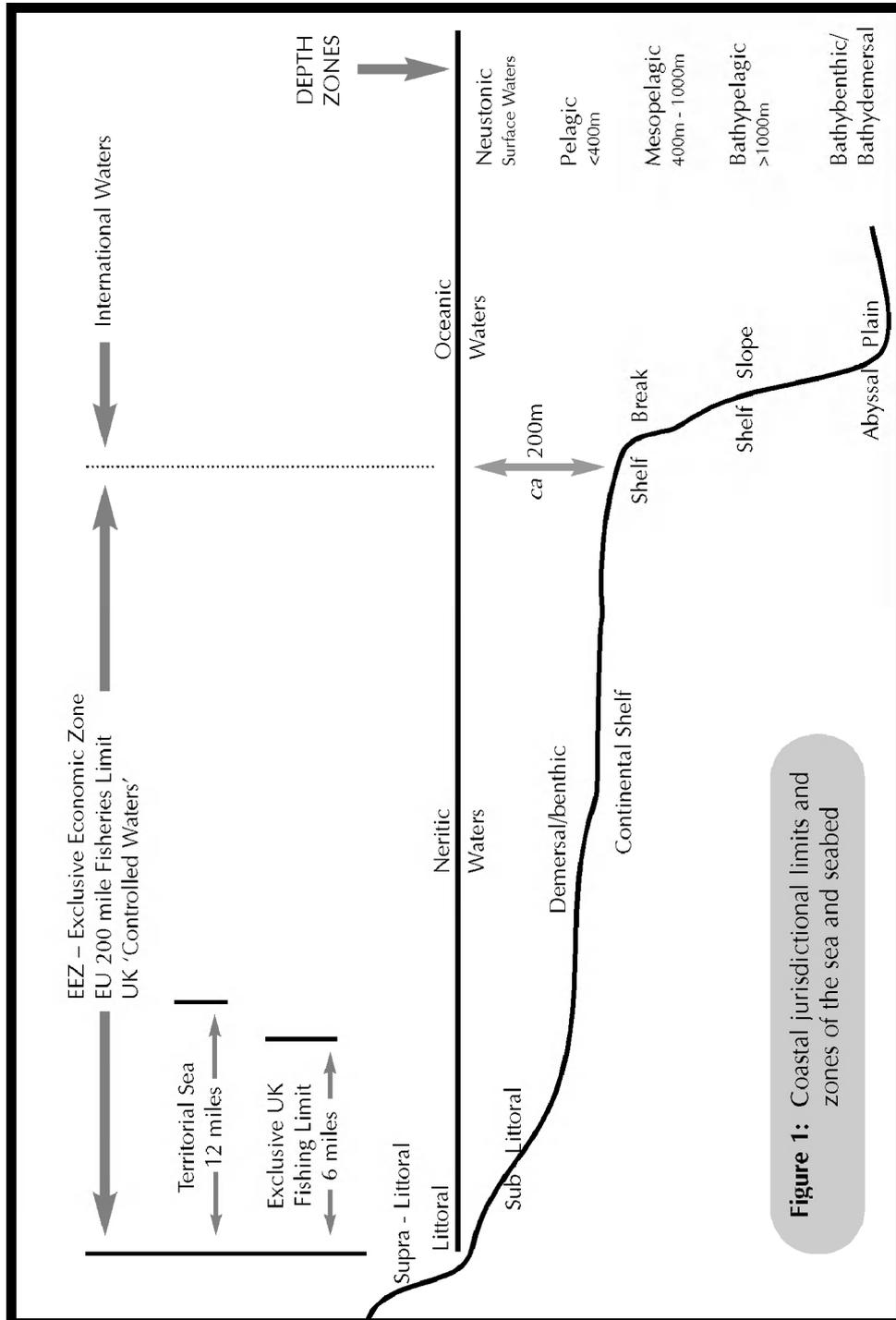


Scientific Name	Common Name
<i>Arenicola spp.</i> .....	Lugworm
<i>Cancer pagurus</i> .....	Crab, edible, brown
<i>Centrolophus niger</i> .....	Black Fish
<i>Cerastoderma</i> .....	Cockles
<i>Cetorhinus maximus</i> .....	Basking shark
<i>Chlamys spp.</i> .....	Queen Scallop
<i>Clupea harengus</i> .....	Herring
<i>Coryphaenoides rupestris</i> .....	Roundnose grenadier
<i>Fulmarus glacialis</i> .....	Fulmar
<i>Gadus morhua</i> .....	Cod
<i>Halichoerus grypus</i> .....	Grey seal
<i>Homarus gammarus</i> .....	Lobster
<i>Hoplostethus atlanticus</i> .....	Orange roughy
<i>Lepidorhombus whiffiagonis</i> .....	Megrim
<i>Lithothamnion spp.</i> .....	Maerl or calcified seaweed
<i>Phymotolithon calcareum</i>	
<i>Lophelia pertusa</i> .....	Cold water coral
<i>Lophius piscatorius</i> .....	Anglerfish or
<i>L. budegassa</i> .....	Monkfish
<i>Melanogrammus aeglefinus</i> .....	Haddock
<i>Merluccius merluccius</i> .....	Hake
<i>Micromesistius poutassou</i> .....	Blue whiting
<i>Modiolus modiolus</i> .....	Horse mussel
<i>Molva dypterygia</i> .....	Blue ling
<i>Mytilus edulis</i> .....	Mussel
<i>Nephrops norvegicus</i> .....	Dublin Bay prawn Langoustines Nephrops Norway Lobster Scampi
<i>Odobenus rosmarus</i> .....	Walrus



<i>Ostrea edulis</i> .....	Native oyster
<i>Patella vulgata</i> .....	Limpets
<i>Pecten maximus</i> .....	King scallop
<i>Phoca vitulina</i> .....	Common seal
<i>Phocoena phocoena</i> .....	Common or harbour porpoise
<i>Pleuronectes platessa</i> .....	Plaice
<i>Raja brachyura</i> .....	Blonde ray
<i>Raja clavata</i> .....	Thornback ray or roker
<i>Raja naevus</i> .....	Cuckoo ray
<i>Sabellaria alveolata</i> .....	Reef building tube worms
<i>Sabellaria spinulosa</i>	
<i>Salmo salar</i> .....	Salmon
<i>Salmo trutta</i> .....	Sea trout
<i>Sardina pilchardus</i> .....	Pilchard
<i>Scomber scombrus</i> .....	Mackerel
<i>Squalus acanthias</i> .....	Spur dog
<i>Scylliorhinus canicula</i> .....	Lesser spotted dogfish
<i>Scylliorhinus stellaris</i> .....	Greater spotted dogfish
<i>Sebastes marinus</i> .....	Red fish
<i>Solea solea</i> .....	Dover sole
<i>Trisopterus esmarkii</i> .....	Norway pout
<i>Trisopterus luscus</i> .....	Pout whiting or bib





**Figure 1:** Coastal jurisdictional limits and zones of the sea and seabed

# Glossary

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## A

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**abiotic** – anything that is non-living.

**abyss** – great depth; typically taken to be depths greater than 2000 m (Fig. 1).

**access rights** – authorisation granted by the coastal state for others to fish within the coastal state's fishery limits. Access may be granted free of charge or licensing fees can be levied by the competent authority. The EU negotiates with third countries allowing them access to fish between 12 and 200 miles of EU coastal state baselines and *vice versa*. Some states have the 'historic right' to fish within specified sections of the UK 6-12 mile fishery limits.

**accessibility** – the condition where fish occupy a position that enables fishermen to approach and capture them with the appropriate gear.

**ACFA** – *the Advisory Committee on Fisheries and Aquaculture*: a committee of (EC) DG Fisheries that includes representatives from the fishing and aquaculture industries as well as non-governmental organisations with interests in development and the environment (Fig. 2).

**ACFM** – *the ICES Advisory Committee on Fisheries Management* responsible for reviewing stock assessments undertaken by ICES

working groups and formulating ICES advice to the fisheries commissions (Fig. 3).

**ACME** – *the ICES Advisory Committee on the Marine Environment* responsible for reviewing scientific aspects of marine environmental management other than fishery management (see ACFM). Advice is formulated for various international commissions, eg OSPAR and HelCom (Fig. 3).

***acquis communautaire*** – all European Union (EU) legislation that is adopted by states as part of their accession to the EU.

**age group or class** – all the fish in a species' population that are of the same age; eg 0-group, I-group, II-group etc. The ICES convention is to allocate all marine fish a notional birth date of 1 January.

**Agenda 21** – an environmental management programme for the 21<sup>st</sup> century developed at the UN *Conference on Environment and Development* (UNCED), the 'Earth Summit', in Rio de Janeiro, 1992. Many organisations and UK councils are developing and participating in 'Local Agenda 21' programmes.

**air lift** – a system for lifting material, eg benthos, from the seabed. A flexible

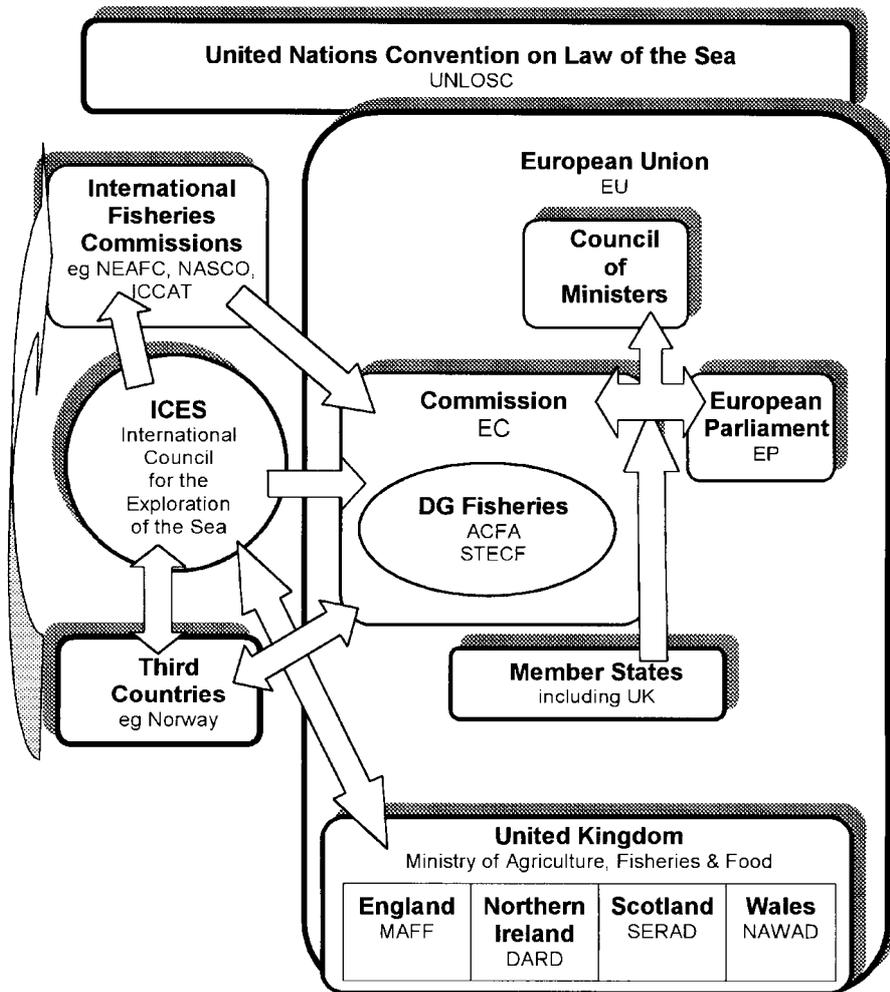


Figure 2: The fisheries management framework in Europe and the north-east Atlantic. ICES and STEFC are advisory only.

pipe passes from the surface to a 'dredge head' on the seabed. Compressed air is released into the dredge head. As the air rises and expands it forces water from the top of the pipe and is replaced by water moving rapidly into the dredge head. This disturbs the seabed sand and mud, and the associated benthos are then lifted up the pipe to the surface.

**algae** – marine plants that include the macro-algae, commonly known as seaweed, and the microscopic algae known as phytoplankton and phytobenthos.

**algal blooms** – all phytoplankton goes through an annual cycle of abundance. The spring bloom is the normal increase in abundance associated with increasing day length. Abnormal increases in abundance that may be associated with nutrient enrichment (eutrophication), and their subsequent collapse, can result in significant depletion of oxygen content in the water and suffocation of many species. Some algal species are associated with 'harmful algal blooms' (HAB).

**alien species** – a non-established, introduced species that is incapable of establishing a self-sustaining or self-propagating population in the new area without human interference. (See also introduced species and non-native species.)

**amnesic shellfish poisoning** – see ASP.

**anacat** – fish that live part of their life in freshwater and the remainder in

seawater, and *vice versa*; from anadromous (eg salmon) and catadromous (eg eels).

**anadromous** – fish that spawn in freshwater but spend a part of their life at sea, eg salmon, eels and shads. See also catadromous and diadromous.

**anoxia** – the lack of oxygen in an environment. It is caused by either abnormally high production rates relative to the oxygen supply (eg see algal blooms) or where there are high concentrations of decaying biological material resulting in a high biochemical oxygen demand. Anoxia occurs most frequently in static water bodies or ones that have very low circulation rates.

**aquaculture** – the artificial rearing and husbandry of aquatic organisms; fish, shellfish and seaweed.

**artificial reef** – any man-made structure that is submerged, or partially submerged, at any stage of the tidal cycle. It may be placed by design for a multitude of purposes, eg piers, jetties, coastal defence, fishery enhancement, or by chance, eg shipwrecks.

**artisanal fisheries** – typically, fisheries undertaken in inshore waters from small boats using traditional or basic methods with relatively few technical aids.

**ASCOBANS** – the international *Agreement on Small Cetaceans of the Baltic and North Sea*; an annex of the Bonn Convention focusing on the conservation of small Cetacea.

**ASP** – amnesic shellfish poisoning, the

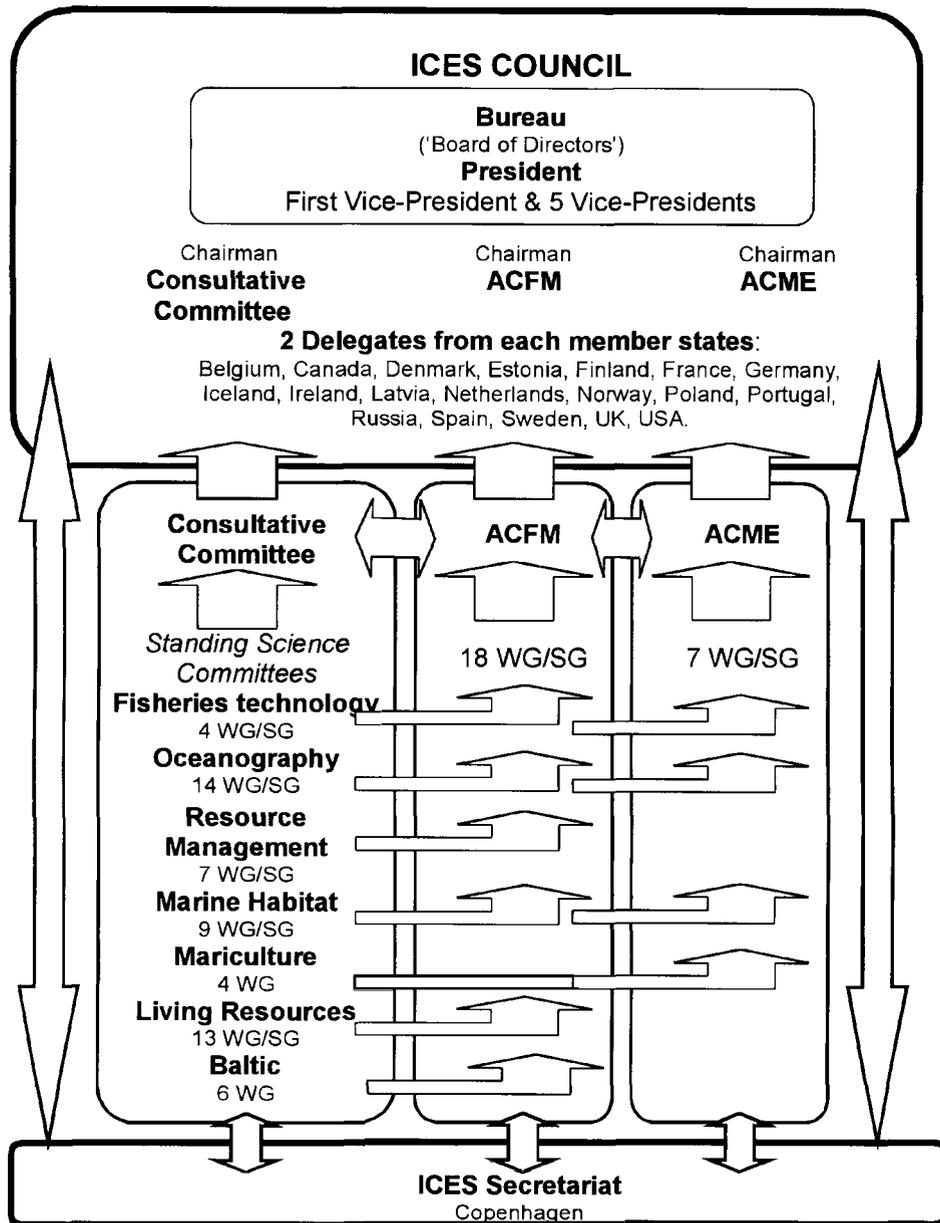


Figure 3: An outline of ICES structure and the distribution (1999) of working (WG) and study groups (SG) that contribute to the formulation of ICES advice.

loss of short-term memory resulting from eating bivalve molluscan shellfish that have accumulated toxins (domoic acid) from certain diatoms in the phytoplankton, eg *Pseudonitzschia* sp. When toxins are detected above 20 mg/100 g shellfish flesh commercial harvesting and sale is prohibited.

**assemblage** – a mixed grouping of animals and/or plants that are associated with a particular environment and can be used as an identifying characteristic of that environment.

**assessment** – 1) the evaluation of importance through the orderly gathering of information about biotopes and species in an area and

comparing their attributes by standardised procedures. 2) The evaluation of the likely impact of a development on the environment (as in environmental impact assessment. (See also stock assessment.)

**ASSI** – see SSSI.

**attachments** – modifications of, or additions to a trawl, usually on the outside. Some are legal, eg chafers attached to the underside of the cod-end to reduce wear but top-side chafers are illegal as they inhibit mesh selection. Similarly, weights must not be attached to a cod-end as they serve to close the cod-end meshes and prevent the escape of undersize fish.

## B

**bait** – any organism, but usually animal in origin, that is attached to fishing gear to attract fish; crab pots are baited with fish, long-lines are baited with fish or molluscs, anglers also use worms and soft-shelled ('peeler') crabs.

**bait boat** – boats that fish primarily to gather bait for use in other fisheries.

**baitpump** – a suction system for gathering benthic species buried deeply in sand or mud.

**ballast water** – water carried in bilges, tanks or the holds of cargo vessels to enhance stability when they are not fully laden with normal cargo.

**BAP** – see UKBAP.

**baselines** – the point from which the Territorial Sea, fishery limits (3, 6, 12 and 200 nautical miles) and the exclusive economic zone (EEZ – 200 nautical miles) are measured. The baseline is normally mean low water but it can be measured from a 'bay closing line' where the bay's headlands are separated by less than 24 nautical miles (2 x 12 nautical miles of Territorial Sea).

**bass nursery area** – 37 designated coastal and estuary sites around the coast of England and Wales in which fishing for bass from boats is either prohibited or restricted. Some areas are restricted throughout the year but the majority are subject to a closed season, eg May – December inclusive.

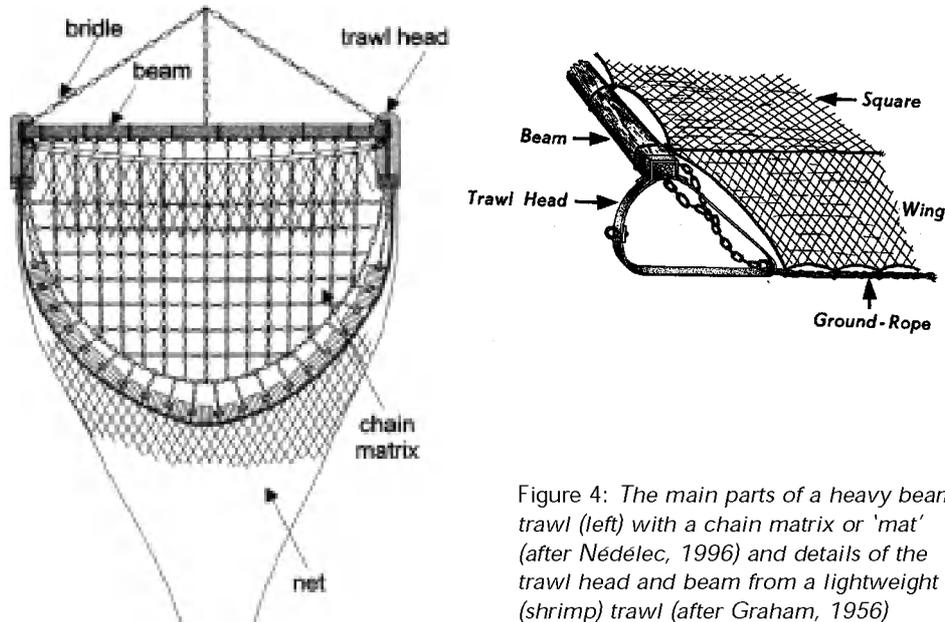


Figure 4: *The main parts of a heavy beam trawl (left) with a chain matrix or 'mat' (after Nédélec, 1996) and details of the trawl head and beam from a lightweight (shrimp) trawl (after Graham, 1956)*

**bathypelagic** – see Fig 1. deep, mid water; typically depths between 200 and 1000 m depth.

**beach seine** – a light-weight, encircling net deployed parallel to the shore and then drawn in to the beach by long ropes attached to the wing-ends of the net.

**beam trawl** – a bottom trawl that is kept open laterally by a rigid beam. Each end of the beam is attached to the apex of a roughly triangular metal 'trawl head' or 'shoe' ca 0.5-0.75m high (Fig. 4).

**belly** – the under-part of a bottom trawl that is in contact with the seabed while fishing.

**benthic** – a description for animals, plants – the benthos and habitats associated with the seabed (Fig.1).

**benthos** – all plants (phytobenthos) and invertebrate animals that live in or on seabed habitats, including the intertidal zone.

**Bern Convention** – the Council of Europe *Convention on the Protection of European Wildlife and Natural Habitats* (Bern 1979). The convention offers protection to plants, invertebrates and all vertebrates and is binding on all signatories, which includes the UK.

**biocoenosis** – the biological, ie living, part of an ecosystem.

**biodiversity** – the variability among living organisms from all sources including, among others, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species and ecosystems (CBD 1992).

**Biodiversity Convention** – the UN *Convention on Biodiversity* signed at the UNCED 'Earth Summit' in Rio de Janeiro 1992 to safeguard the total variety of animals, plants and all other living matter on Earth, ie the biodiversity, and their habitats.

**biogenic reef** – any structure that has been formed from living material. It can be applied to many fossilised structures, such as chalk cliffs, but is normally used to describe living structures such as those created by the cold-water coral *Lophelia pertusa*, colonial worms such as *Sabellaria* spp and molluscs, including the horse mussel *Modiolus modiolus*.

**biogeographic zones or regions** – major subdivisions of the Earth's surface encompassing plant and animal communities with common characteristics. The UK falls within the NE Atlantic (Iberia – Norway) part of the (marine) Palaearctic Region.

**bioherm** – a build up of biogenic material in one place to produce a mound (eg the cold-water coral *Lophelia pertusa*) or reef.

**biological conservation measures** – fishery management measures that are aimed at a particular species or stock of fish, eg minimum landing sizes (MLS), closed areas, quotas, rather than the method of fishing. (See also technical conservation measures.)

**biological interactions** – see fishery biological interactions.

**biological reference points** – see limit reference points and safe biological limits.

**biomass** – the total weight of living matter, either by species or all species combined. Also referred to as the standing stock.

**biome** – a term generally applied to large-scale, terrestrial botanic communities. At one level the marine environment might be viewed as a single biome but UK sub-tidal kelp forests, for example, could also be described as a biome.

**biosphere** – that part of the Earth's environment that is occupied by living organisms.

**biota** – any living organisms, both animals and plants.

**biotope** – the physical habitat with its associated, distinctive biological communities. The smallest unit of a habitat that can be delineated conveniently and is characterised by the community of plants and animals living there.

**bioturbation** – the disturbance or reworking of seabed sediments by the animals that live or feed on or in the sediment.

**Birds Directive** – the EU *Directive on the Conservation of Wild Birds* (79/409/ EEC) seeks to protect all wild birds and the habitats of listed species, in particular through the designation of special protection areas (SPA).

**bivalves** – molluscs with two hinged shells that encase the soft parts of the

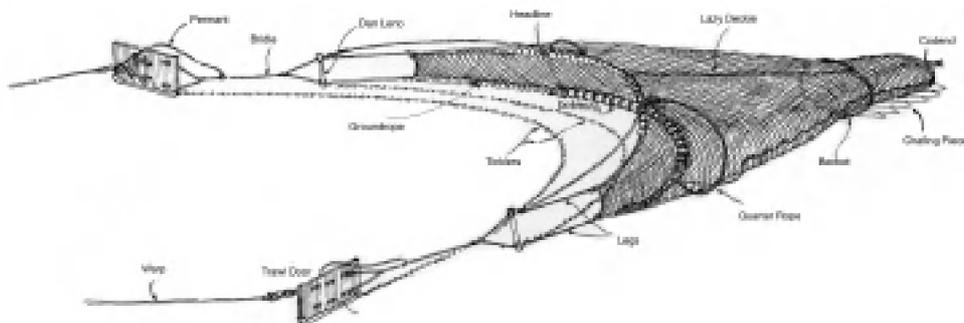


Figure 5: *The main parts of a demersal trawl (after Butcher 1980)*

animal, eg cockles, mussels, oysters etc.

**black-fish** – fish that are landed in commercial quantities without being recorded in vessels' fishing log books or without being declared to the appropriate authority as required by EU fishery regulations. Also the common name for a deep water shark: *Centrolophus niger*.

**$B_{lim}$**  – see limit reference points .

**$B_{msy}$**  – the spawning stock biomass (SSB) necessary to support a fishery that would produce the maximum sustainable yield (MSY).

**Bonn Convention** – the *Convention on Migratory Species of Wild Animals* (Bonn 1979) seeks to co-ordinate the conservation of migratory species, particularly those species whose life-cycle takes them across international and jurisdictional boundaries. Agreements reached under the

convention include ASCOBANS.

**bottom fishing gear** – any fishing gear that is operational when in contact with the seabed but usually applied to trawls, dredges and some seine nets.

**bottom trawl** – a trawl net (Fig.5) that is towed across the seabed rather than through mid water. They are also referred to as demersal trawls and include both beam trawls and otter trawls.

**$B_{pa}$**  – see limit reference points .

**bridle (sweep)** – the wires that connect an otter trawl 's doors, or 'otter boards', to the wing (front, outer) ends of the trawl (Fig.5). They help to increase the distance between the doors and thereby increase the width of the swept area or track from which fish can be caught.

**broodstock** – the mature animals in

a population that will breed and generate future year classes; a term more commonly applied to aquaculture than to wild populations where the term spawning stock biomass (SSB) is more generally applied.

**buffer zone** – a transition zone around a protected (or closed) area in which some activities may be restricted but not prohibited, to enhance the benefits to be gained from the protected area.

**by-catch** – the catch of non-target species and undersized fish of the target species. By-catch of commercial species may be retained or discarded along with non-commercial by-catch.

(See also discards and incidental catch.)

**byelaw** – legislation introduced at a local level to meet a specific need. Local authorities, sea fisheries committees (SFC) and ports and harbour authorities, for example, all have the power to introduce and enforce byelaws that can have a bearing on the marine environment and its resources.

**byssus** – a tough, thread-like structure by which mussels attach themselves to the substratum. The byssus is generated by a gland at the base of the mussel's foot.

## C

**canyons** – steep sided, narrow valleys that are typically found running down the slope from the continental shelf towards the abyss. They are a common feature along the outer margins of the Celtic Sea.

**capital stuffing** – high levels of investment through the continual addition of technical aids such as deck handling machinery and electronic navigation and fish-finding aids on the bridge, eg multiple echo-sounders, RoxAnn, DGPS, sonar etc.

**carapace** – the hard shell forming the back of a crab and the front half (thorax) of lobsters, prawns and shrimps.

**carrying capacity** – the maximum number or biomass of a given species

that a given ecosystem, environment or habitat can sustain without a deterioration in the quality of the environment or abundance of the resource. 'Total carrying capacity' is applied to the sum of all species combined, animal and plant, in the ecosystem or habitat.

**catadromous** – species of fish that spawn at sea but spend a large part of their life in freshwaters, eg the European eel and flounder. (See also anadromous and diadromous.)

**catch (C)** – the total quantity of fish that is retained by fishing gear and brought onto the deck or fishing station, ie landings plus discards.

**catch per unit of effort** – *CPUE*, the quantity of a given species, or all

species combined, that is taken from the sea (or landed – see LPUE) for each unit of effort (eg days at sea, hours trawling etc) that is expended in its capture. It provides a simple index of species abundance in the area of a fishery.

**catchability ( $q$ )** – the fraction of a fish stock that is caught by a defined unit of fishing effort (Ricker 1975).

**catch rate** – see catch per unit of effort.

**CEC** – the Commission of the European Communities (sic): since 1993, the legal title for the European Commission (EC) (Fig. 2 & 4).

**Cephalopoda** – molluscs that bear eight or ten sucker-bearing tentacles around the mouth, including squid, cuttlefish and octopus.

**Cetacea** – marine mammals that give birth at sea, eg dolphins, porpoises and whales.

**CFP** – the *Common Fisheries Policy* of the European Union (as revised in: *Council Regulation 3760/92*). It provides the framework for the management of the EU fishery sector, including all marine fisheries within 200 miles of member states' baselines. (For further information see References – EC Current.)

**chafer** – a sheet of material, often old netting, attached to the underside of demersal trawls, particularly beneath the cod-end, to reduce wear and tear (Fig. 5). ('Top-side chafers' are an illegal attachment.)

**chain mat or matrix** – an inter-linked network of lateral and longitudinal tickler chains across the mouth of a beam trawl between trawl heads ('shoes') and groundrope (Fig. 4). Mats are fitted when trawling on rough ground to minimise the amount of stone entering the trawl.

**charismatic species** – a species that is readily recognised, frequently with widespread popular appeal. They are sometimes used to focus attention on a (conservation) campaign or used as a logo, eg the Marine Conservation Society dolphin or WWF panda.

**chilled seawater tanks** – see CSW.

**circalittoral** – see sublittoral (Fig. 1).

**clam** – a colloquial name for bivalve molluscs that live buried in the seabed, but typically those species that can close the two shells completely, eg cockles, palourdes.

**climax community** – the 'final' community or assemblage of species in a particular habitat after progressing through a process of colonisation by first one then a succession of species until a state of equilibrium is reached between the species.

**closed area** – an area within which fishing by one or more methods of fishing, or fishing for one or more species of fish, is prohibited (see Fig. 6). Such areas may be permanently closed or be subject to closed seasons. (See Rogers 1997.)

**closed seasons** – a period during which fishing for a particular species, often within a specified area, is

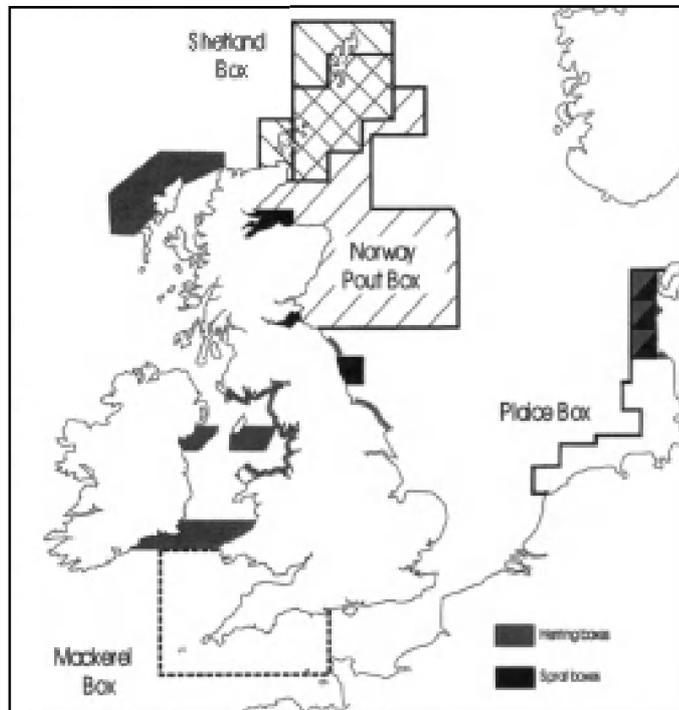


Figure 6: *Examples of some closed areas around the UK within which fishing is restricted as a stock conservation measure. (Courtesy of CEFAS, Lowestoft; Crown Copyright)*

prohibited. For example, salmon (*Salmo salar*), migratory (sea) trout (*Salmo trutta*), and native oysters (*Ostrea edulis*) may only be taken in UK waters at certain times of year.

**coastal fisheries** – see inshore fisheries.

**coastal state** – the country off whose coastline an area of sea occurs and which exercises jurisdiction over that sea area.

**coastal waters** – are defined in the (draft) EU Water Framework Directive as 'the surface water on the landward side of a line every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of the territorial waters is measured'.

**coastal zone** – the space in which land-based activities and terrestrial environments influence the marine environment and *vice versa* (Hiscock 1996), but there is no universally recognised definition for the coastal zone (eg see Harden Jones 1994). Pragmatically, the seaward boundary to the coastal zone is usually set by the limits of enabling legislation; eg the Territorial Sea (national legislation), or 6 miles – the area covered by national legislation and local byelaws, and the waters within which only UK registered vessels may fish.

**coastal zone management** – CZM, see ICZM.

**Cod Boxes** – areas of the Irish and North Sea within which fishing for cod

is prohibited, and other fishing restricted, during the spawning season.

**cod-end** – the narrow, back end of a trawl into which the catch is funnelled while towing, and from which it is released after hauling.

**cod equivalent tonnage** – a conversion factor that can be applied to any species subject to TAC management and national quotas. It equates each species' market value to that of cod (= 1.0). The concept was introduced during the 1970s to facilitate the original CFP quota negotiations and continues as the basis upon which nations exchange quota in different species.

**cohort** – all the fish, or animals in a population that are of the same age, ie all fish spawned in the same year.

**cohort analysis** – a simplified approximation to virtual population analysis (VPA), a mathematical model with which to construct fish population life-tables as a basis for assessing the current status of a stock and forecasting the probable consequences of adopting various fishery management options.

**coliform bacteria** – rod shaped bacteria, eg *Escherichia coli* and *Salmonella*, whose presence in coastal waters are indicative of faecal pollution. Consumption of contaminated bivalve molluscs, eg oysters and mussels, can cause diarrhoea but the shellfish are readily purified of bacteria by depuration.

**collapsed stock** – the decline in spawning stock biomass (SSB), through

sustained fishing pressure or natural causes, to the point where it no longer generates sufficient recruits to support a fishery.

**Com Doc** – see Communication.

**commercial fisheries** – any fishery that is undertaken for financial gain but particularly one that generates sufficient revenue to contribute a significant proportion of the total income of those engaged in the fishery.

**Commission** – see CEC and EC.

**common law right** – *Magna Carta* (1215) guarantees the rights of the common man. These rights include unhindered access to the 'commons' – assets and benefits that belong to no one individual but are for the benefit of all, eg *ferae naturae*, the right to take wild animals, including fish in tidal waters. Only in exceptional circumstances can these rights be reduced or amended, eg see Several and Regulating Orders.

**Communication** – a formal document (Com Doc) adopted by the European Union outlining the Commission's views, intentions, or proposals on a particular subject, eg proposals for new fishery management measures.

**community** – the grouping of animals and plants that is found living together in a particular place, habitat or environment.

**competent authority** – an authority that has the statutory powers to introduce byelaws or other regulations that may be necessary to

meet national obligations towards EU legislation, but particularly for the Habitats and Species Directive, eg ministers, government departments, sea fisheries committees (SFC), ports and harbour authorities. (See Conservation Regulations.)

**conservation objective** – one or more measurable or otherwise definable objectives required under Regulation 33 of the Conservation Regulations to ensure that a European site maintains a favourable conservation status.

**Conservation Regulations** – *The Conservation (Natural Habitats, &c.) Regulations* (1994), and *The Conservation (Natural Habitats, &c.) (Northern Ireland) Regulations* (1995), are the Statutory Instruments (1994/2716) and (1995/380) setting out the powers and responsibilities of competent and relevant authorities to implement the Habitats & Species Directive in the UK.

**contaminant** – the increased presence of a substance in the environment as a result of human activities but with no significant adverse effects (GESAMP).

**continental shelf** – the area of seabed extending from the shoreline to a depth of about 200 m or where the slope increases sharply to abyssal depths (Fig.1).

**Council of Europe** – a non-legislative forum (Strasbourg, France) in which 40 member states discuss issues of mutual interest or concern. Action is implemented through

agreements and conventions, eg the Bern Convention. (This should not be confused with the European Council, an EU institution).

**Council of Ministers** – or Council of the European Union (EU) is one of the main Institutions of the European Union. It is the principal decision-making body of the EU with both executive and legislative powers. The Council is composed of one minister of each member state who is authorised to speak for their government. On the basis of Commission (EC) proposals, the Council adopts legislation on its own or jointly with the European Parliament, depending on the legal base (Fig. 2).

**Court of Auditors** – is the Institution of the European Union (EU) responsible for financial control and auditing the accounts of the EU and its Institutions. It serves to ensure that financial management of the EU, and its development funds, is sound and not fraudulent. It reports to the four other main Institutions, ie the Commission (EC), Council of Ministers, Court of Justice and the European Parliament.

**Court of First Instance** – a part of the European Court of Justice that deals with relatively simple matters and member states' challenges or legal actions against the EC.

**Court of Justice** – one of the main Institutions of the European Union (EU). It is the final arbiter in disputes arising under the EU Treaties and legislation. The court can impose fines

on member states. It is made up of 15 judges and 9 advocates-general who are appointed for a period of 6 years following agreement between member states' governments.

**CPUE** – see catch per unit of effort .

**crabber** – a fishing vessel that engages primarily in fishing with pots/creels for crabs and lobsters.

**creel** – an alternative name for a crab or lobster pot.

**critical environmental capital** – that part, or parts of the environment that is fundamental to the well being of species and habitats within the environment, the loss of which could cause irreversible changes or be

impossible to replace in human timescales.

**Crustacea** – invertebrates with a shell and many legs that are used for walking or swimming. Commercial species include: shrimps, prawns (eg *Nephrops*), crabs, lobsters and crawfish. A very high proportion of the plankton, particularly that part upon which many pelagic fish species feed, are also Crustacea.

**CSW** – chilled seawater tanks, the fish holds on (pelagic) fishing vessels are flooded and the waters cooled to a temperature that is less than ambient but is not fully refrigerated (see RSW).

**CZM** – coastal zone management, but see ICZM.

## D

**Danish seine** – see demersal seine.

**dahn** – a small, flagged buoy attached to the end of fixed gear to mark its position.

**days at sea** – a means of measuring fishing effort . A potential management measure to limit fishing effort by restricting the number of days per month or year each vessel may fish.

**decommissioning** – the formal procedure for removing a vessel from the fishing register and reducing the total tonnage of vessels or vessel capacity units (VCU) engaged in commercial fishing. A reduction in fleet size/capacity is a requirement of

the multi-annual guidance programme (MAGP). In the UK, a vessel must be physically scrapped to qualify for a decommissioning grant.

**deep-water species** – species that are normally found in waters greater than 400 m depth. They form three main categories: mesopelagic and bathypelagic species that live in mid-water and benthopelagic species (Fig.1). The mesopelagic (ca 400 - 1000 m depth) and bathypelagic (>1000 m) species are not exploited commercially by EU registered vessels. Among the more commercially important benthopelagic species are roundnose grenadiers, blue ling, orange roughy – and the angler or

monk-fish that is also found in coastal waters (UKBG 1999).

**demersal** – species of fish that live on, or in close proximity to, the seabed, eg flatfish, cod, haddock. The term also applies to fishing gear that is worked on the seabed (Fig.1).

**demersal seine** – a trawl-shaped net with extended wing ends each side of the net mouth. It is set in the middle of a long rope that is shot in a wide circle. When the two ends of the rope are hauled, they gradually draw the ropes and wing ends together and herd the fish towards the net and the cod-end.

**demersal trawl** – a net that is towed on the seabed rather than through mid water (Fig. 5).

**density dependence** --the regulation of a population or community of species by processes whose effects are proportional to the abundance of the population. For example, the mortality rate in a nursery area may increase as the number of juvenile fish in the nursery increases (density-dependent mortality). Similarly, the growth rate may decrease as the number of fish, and hence competition for food, increases (density-dependent growth). These processes contribute to the determination of environmental carrying capacity .

**depleted stock** – the decline in spawning stock biomass (SSB) to a level that is approaching, or is below, the lowest historic record but has not necessarily reached the point of

collapse. (See also limit reference points and safe biological limits.)

**depuration** – the purification of bivalve molluscs by holding the live animals for a prescribed period in circulating seawater that is continuously sterilized, eg by an ultra-violet light source. During the process, the bivalves purge their guts of food and any coliform bacteria that may have collected there.

**derogation** – a variation to, or temporary exemption from, EU legislation which enables an activity to be undertaken that would otherwise be prohibited. For example, the use of beam trawls might be prohibited in an area but there are derogations for shrimp trawlers which use a particularly light-weight beam trawl – sometimes known locally as 'shank nets'. Conversely, a derogation might be granted for a temporary or local prohibition to be imposed in an otherwise 'open' area.

**designated port** – one of 31 UK fishing ports where UK registered fishing vessels over 20 m in length must land their catch unless they make their landings in another EU state (eg see flag ship). Designated port status includes specific locations for 'klondiking'.

**DG Environment** – the Directorate-General, or department, in the European Commission (EC) that has lead responsibility for EU environmental policy, including marine nature conservation – formerly, DG XI.

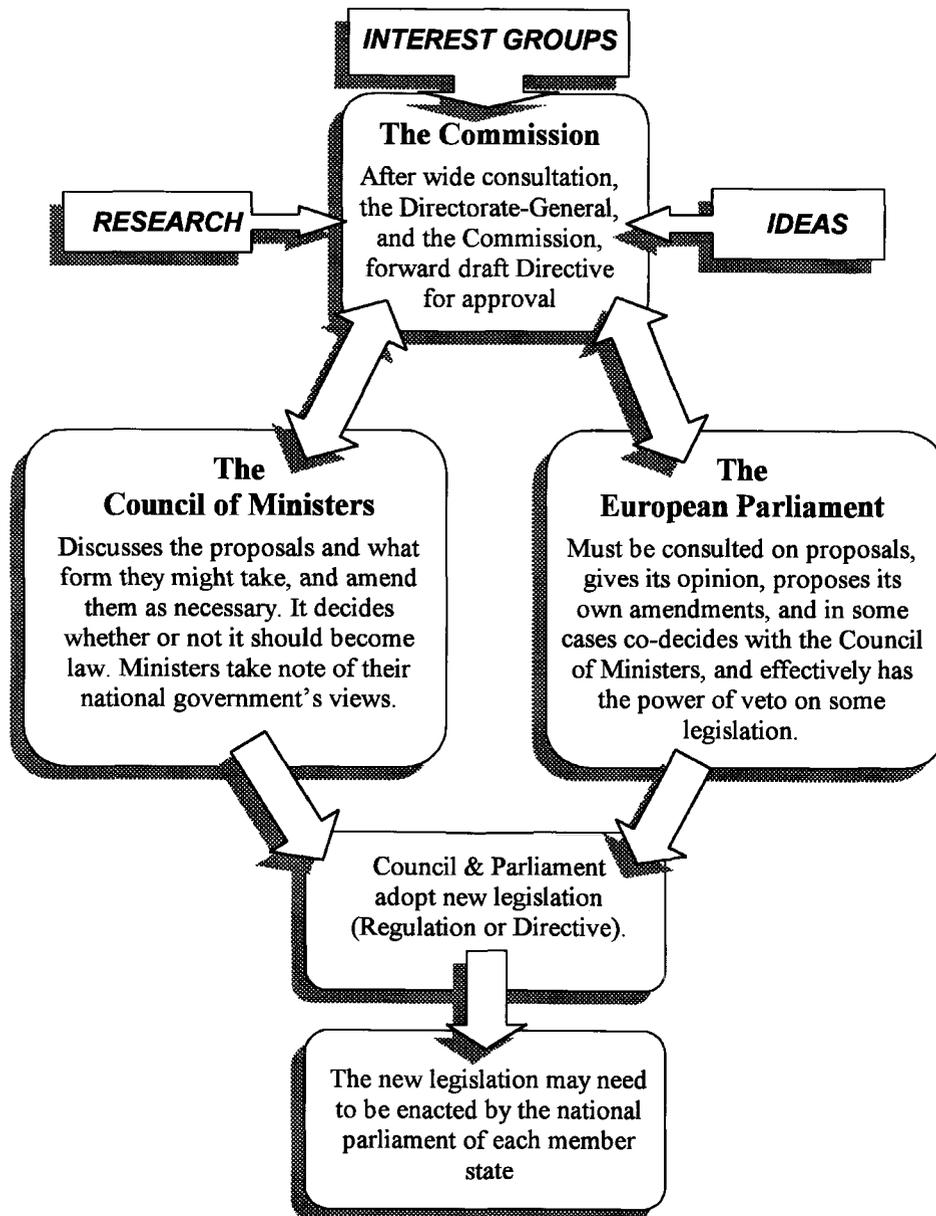


Figure 7: An outline of the procedure for agreeing EU laws. The details vary according to the subject being discussed (after Maughan, 1998)

**DG Fisheries** – the Directorate-General or department of the European Commission (EC) with lead responsibility for EU fishery policy - formerly DG XIV. DG Fisheries holds 'absolute competence' with respect to all aspects of fishery conservation and management within the European Union (EU) (Fig. 2).

**DG XI** – see DG Environment

**DG XIV** – see DG Fisheries.

**DGPS** – differential global positioning system: a satellite navigation system with an accuracy that can be better than  $\pm 5$  m.

**diadromous** – fish that spend part of their life in freshwater and part in saltwater; eg anadromous salmon and catadromous eels.

**diarrhetic shellfish poisoning** – see DSP.

**directed fishery** – a fishery with a clearly defined target species, eg a pelagic fishing vessel may target herring or mackerel but invariably in different areas and at different times of year.

**Directive** – EU legislation that is binding but leaves individual member states to decide how it should meet its obligations (eg primary legislation, Statutory Instrument, byelaw). If a member state fails to meet its obligations under EU legislation it can be reported to the EU Court of Justice, most probably by the Commission (EC), and fined (Fig. 7). (See also Regulation.)

**discards** – any fish, or other living

matter caught when fishing, that is not retained but returned to the sea – alive or dead.

**doors** – a generic name for a wide variety of 'otter boards' that are attached to trawlers' warps (towing wires). They work like a kite, but horizontally, pulling the wings of the trawl out to the side and holding it open laterally (Fig. 5).

**dredging** – a method for catching molluscs that live on or in the sea bed, eg clams, native oysters, scallops. Boats tow groups – 'gangs' – of dredges, each dredge rarely more than a metre in width. They are made of a robust steel frame, often with a toothed bar across the lower edge, and a heavily reinforced or chain link bag. (See also French dredge and Newhaven dredge.)

**drift nets** – curtains or sheets of netting that hang vertically in the water, either at the surface or lower in the water column. Pelagic fish are trapped when they try to swim through them but are too big and become wedged. They are widely used in UK coastal waters for herring and related species (eg pilchards) and on the high seas for migratory fish such as salmon and tunas.

**DSP** – diarrhetic shellfish poisoning: a temporary illness caused by eating bivalve molluscan shellfish that have accumulated toxins from dinoflagellates (*Dinophysis* spp.) in the phytoplankton. Shellfish containing DSP are not permitted for sale.

**dumping** – a colloquial term for the deliberate disposal of catch. It implies

a scale rather greater than discarding and usually refers to fish that would normally be landed for sale. The causes of dumping can be market saturation, closure of quotas and high-grading. [This should not be confused

with, for example, the disposal (dumping) of dredge spoil at sea which is an activity licensed by MAFF under FEPA (*Food and Environment Protection Act 1985*).]

## E

**EC** – the European Commission or strictly, the Commission of the European Communities (CEC), one of the main Institutions of the European Union (EU) (Fig. 2 & 7). A Commission President leads a body of 20 Commissioners, each nominated by their government: two each from France, Germany, Italy, Spain and the UK, and one from each of the ten other member states, but ratified by the European Parliament, to which the Commission is answerable. Each Commissioner has responsibility for one or more of the 24 Directorates-General, eg DG Fisheries (Fig. 2) and DG Environment. The Commission draws its powers from the European Treaties (eg *Treaty on European Union, EC Treaty*); it formulates and implements EU legislation and is 'guardian' of the Treaties. About 15,000 civil servants work in support of the Commission.

**EC Decision** – a legal instrument of the European Union (EU). Decisions can be formal responses by the Commission to a query or challenge on the meaning or interpretation of a Treaty, eg the *Treaty of Rome* or *Maastricht Treaty*, or a step in the initiation of new legislation (Fig. 7) by the Council of Ministers or European

Parliament.

**ecdysis** – see moulting.

**echo-sounder** – an instrument mounted in a ship's hull that generates a pressure wave and records the energy reflected back from the seabed or any object in the water column. It records depth or indicates the presence of particles in the water column, including fish. Echo-sounders are also attached to mid-water trawls to monitor their position in the water column and the catch as it enters the net. Steerable, hull-mounted echo-sounders (sonar) are used to search ahead or around a ship for fish shoals.

**ecological quality (EcoQ)** – an overall expression of the structure and function of the (aquatic) systems, taking into account the biological community and natural physiographic, geographic and climatic factors as well as physical and chemical factors including those from human activities (OSPAR).

**ecological quality objective (EcoQO)** – the desired level of the ecological quality (EcoQ) relative to predetermined reference levels (OSPAR). (See also EcoQO reference level.)

**ecologically significant habitat** – is a habitat of importance for the wider ecological processes, functions and species it supports.

**ecologically significant species** – is a species that has a controlling influence on a community, ie a keystone species.

**ecology** – the study of the inter-relationships between animals, plants and the non-living components of their environment, in their natural surroundings.

**EcoQO reference level** – the level of ecological quality objective where the influence of human activities on the ecosystem is minimal (OSPAR).

**EcoQ** – see ecological quality.

**EcoQO** – see ecological quality objective.

**ecosystem** – a discrete unit comprising both living and non-living parts; it can range in size from something as small and ephemeral as an intertidal pool, or rather larger, eg the North Sea or Earth's oceans.

**ecosystem approach** – the pursuit of a simultaneous understanding of the dynamics of all the populations in an ecosystem and their interactions with each other and their environment.

**ecosystem management** – a framework for maintaining the equilibrium between all the component parts of an ecosystem rather than focusing on individual parts of the ecosystem, which is the current practice with fishery management.

**ecotone** – a narrow and fairly sharply defined transition zone between two or more communities (Allaby 1998); eg the different plankton communities that occur on opposite sides of fronts.

**ecotope** – the non-living, ie abiotic, part of an ecosystem.

**EEZ** – exclusive economic zone; the area of sea (typically 200 nautical miles from baselines) over which the coastal state claims ownership of all economic resources, eg minerals, hydro-carbons and fish. NB The EU holds 'absolute competence' with respect to all fish and fishery matters within 200 nautical miles of member states' baselines. The UK Government does not claim an EEZ, but see UK waters (Fig.1).

**effort (f)** – the total quantity of fishing gear in use for a specific period of time (Ricker 1975). Effort can be expressed in a multitude of ways: days away from port, hours trawling, length of drift net, number of hooks used, and so on. At its most basic, it is the total number of boats engaged in a fishery and/or the number of days they were fishing.

**effort control** – a system of fishery management that focuses on limiting the quantity of fishing gear or the duration of its deployment rather than on limiting the quantity of catch that can be taken. (See also TAC and quota.)

**EFH** – see essential fish habitat.

**egg survey** – a means of estimating spawning stock biomass (SSB) by taking plankton samples at regular

intervals of space and time across the target species' spawning ground and season. The number of fish eggs in the samples is proportional to SSB.

**elasmobranch** – fish with a skeleton of cartilage, eg sharks and rays. (See also teleost.)

**endangered** – a species, stock or population is 'endangered' if it is facing a high risk of extinction in the wild in the near future (IUCN Current).

**endemic** – a natural or naturalised population that is normally found in a particular area.

**engine capacity or power** – is measured in numerous ways. For example, shipyards frequently express a fishing vessel's power in terms of 'tonnes bollard pull' or horse power (hp) but EU regulations refer to engine power in kilowatts (kW).

**environment** – the physical surroundings and climatic conditions that influence the behaviour, growth, abundance and overall performance of a population or species.

**environmental sustainability** – the control of current and future activities to prevent irreversible or other significant, long-term change to the environment or its dependent living resources. (See also sustainable development.)

**environmentally sustainable fisheries** – fisheries that safeguard the requirements of all animals and plants within an ecosystem or habitat and do not cause irreversible or other significant, long-term change to the

environment or the communities of species that live within that environment.

**epifauna** – animals that live on the surface of the seabed or other substratum.

**equilibrium yield ( $Y_E$ )** – the catch taken from a fish stock when it is in equilibrium with fishing of a given intensity, ie the fishing activity is not causing the abundance of the stock to change. This is also known as sustainable yield (Ricker 1975). The year-on-year yield can be in equilibrium with the stock even if spawning stock biomass SSB is depleted.

**escape gap** – a gap between the base and the netting of a crustacean parlour pot to allow small crabs and lobsters to escape. (See also sorting grid and square mesh).

**essential fish habitat (EFH)** – any habitat that is fundamental to the well being of populations or communities of fish. It may be applied to a habitat that a species utilises throughout its life or at a particular time, eg spawning, nursery or feeding areas. The concept was given statutory recognition in the USA (1998) and now forms part of the US national fishery management programme.

**EU** – the European Union: a politico-economic association of 15 European nations: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK. The Union's affairs are managed

through its main Institutions: the Commission (EC), the Council of Ministers, the Court of Auditors, the Court of Justice and the European Parliament.

**European Council** – is made up of the executive head of government of each member state of the European Union (EU). The Council meets twice a year and sets the broad guidelines for EU development and activities (Fig. 2). (This should not to be confused with the Council of Europe.)

**European Parliament** – one of the main Institutions of the European Union (EU). There are 626 directly elected members of the European Parliament (MEP). The parliament cannot initiate legislation directly, as do national assemblies, but its reports can 'spur the Commission (EC) to action' (Weidenfeld & Wessels 1997). It has general powers for supervision of the Commission and it ratifies the appointment of new Commissioners. It can reject the EU budget as a whole, alter non-compulsory expenditure not specified in EU primary legislation and call in the Court of Auditors if it is not happy with the Commission's financial management. It has co-decision powers with the Council of Ministers on environmental issues but not for fisheries (Fig. 2 & 7).

**European (marine) site** – a conservation area designated under the Habitats Directive (SAC) or the Birds Directive (SPA).

**European Union** – see EU.

**eutrophication** – the enrichment of water by nutrients causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms present in the water and to the quality of the water concerned (OSPAR & EU Urban Waste Water Treatment Directive).

**exclusion zone** – an area within which fishing, anchoring, and often passage, is not permitted. There are exclusion zones of 500 m radius around all offshore gas and oil installations. Others can be found on military ranges and around historic wreck sites etc. (See also closed area, buffer zone and NTZ.)

**Exclusive Economic Zone** – see EEZ.

**exotic species** – see non-native species.

**exploited stock** – any stock of fish that is subject to commercial fishing activity. (See also fishable stock/biomass.)

**exploitation pattern** – the variation in fishing mortality, by age group, in a fish stock.

**exploitation rate** – the ratio of fish caught by fishing (**F**) to total mortality (**Z**) (Ricker 1975).

## F

**F** – formally, the instantaneous rate of fishing mortality (the natural logarithm of the change in abundance due to fishing per unit of time), but more simply, the proportion of the population killed each year by fishing.

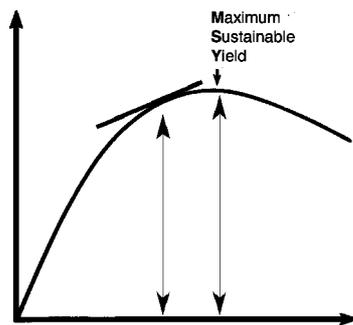


Figure 8: A generalised yield-per-recruit (YPR) curve showing the point at which the fishing mortality rate ( $F$ ) is equivalent to the maximum sustainable yield ( $F_{msy}$ ) and the point at which the slope of the curve is approximately 10% the slope of  $F=0$ , ie  $F_{0.1}$  (See also Fig.10)

**$F_{0.1}$**  – the estimate of fishing mortality ( $F$ ) that corresponds to a point on the yield-per-recruit (Y/R) curve where the slope is 10% of the slope at the origin. It is an approximation to the level of fishing mortality that will generate the maximum sustainable yield ( $F_{MSY}$ ) when a more exact estimate is not possible (Fig. 8).

**Factortame** – the name given to a landmark ruling of the Court of Justice (ECJ) against the UK government concerning flag-ships. The government introduced legislation that sought to

block non-UK nationals from establishing fishing companies in the UK, registering vessels in the UK, and fishing against the UK quotas. The ECJ ruled that this was contrary to the provisions of the European 'single market' and that the UK government must pay compensation to the companies that were affected by the UK legislation.

**factory ship or trawler** – a large vessel that takes the catch from other boats, or fishes itself, and processes the catch on board. They have facilities for filleting, freezing and sometimes, canning and the production of fish meal and oil. They form the focus of klondiking operations most frequently originate from Russia and countries of the former Eastern Bloc.

**fauna** – all animal life from microscopic benthos and zooplankton through Crustacea and fish to mankind.

**favourable conservation status** – a basic requirement of the Habitats Directive. The conservation status of a habitat is 'favourable' when:

the natural range of the habitat and the area that it covers are stable or increasing; and the specific structure and functions that are necessary for its long-term maintenance are likely to continue for the foreseeable future; and the conservation status of its typical species are similarly stable or increasing.

The conservation status of a species is

'favourable' when:

the species' population dynamics indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitat; the species' natural range is neither being reduced nor is it likely to be reduced for the foreseeable future; there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

**fecundity** – the number of eggs that a female fish produces annually.

**fish** – taxonomically, 'fish' are members of the superclass Pisces, including elasmobranchs and teleosts. In UK law 'fish' are all animals classified as Crustacea, Mollusca and Pisces. Thus, UK fishery legislation cannot be applied directly for the management or conservation of species such as edible sea urchins or lugworm even though such species may be subject to commercial exploitation.

**fish stock** – scientifically, a population of a species of fish that is isolated from other stocks of the same species and does not interbreed with them and can, therefore, be managed independently of other stocks (*cf* gene pool). However, in EU legislation the term 'stock' is used to mean a species of fish living in a defined sea area, the two are not always synonymous (Holden 1994).

**fishable stock or biomass** – that part of the total biomass that is exploited. (See also exploited stock.)

**fishery biological interactions** – any interaction between two or more populations or species, but particularly those that are influenced by fishing activity. For example, there is a close relationship between cod (the predator) and *Nephrops* (the prey) in the Irish Sea. When Irish Sea cod are at a low level the *Nephrops* population can increase in abundance as there are fewer predators. Conversely, when trawl activity is directed away from cod towards *Nephrops*, cod abundance can increase. This is due to reduced fishing mortality ( $F$ ) and the fact that cod will prey on species other than *Nephrops* (Brander & Bennett 1986).

**fishery commissions** – are international bodies convened to agree management measures for the conservation of internationally exploited fish stocks (Fig. 2). Beyond the 200 mile limit of EU member states' baselines, fishery management falls to the North East Atlantic Fisheries Commission (NEAFC), the Baltic Sea Fisheries Commission (BSFC), the North Atlantic Salmon Conservation Organisation (NASCO) and the International Commission for the Conservation of Atlantic Tunas (ICCAT). The EU, as represented by the EC (DG Fisheries), retains 'absolute competence' within 200 miles of member states' baselines and represents member states on international fishery commissions.

**fishery conservation** – the conservation and sustainable use of exploited fish stocks. It is the principal objective of UK and EU fisheries

legislation; fishery management is the primary method through which the objective is pursued.

**Fisheries Council (EU)** – the popular name for the Council of Ministers when the agenda is dominated by fishery matters and fisheries ministers attend rather than other ministers of member states' governments (Fig. 2 & 6).

**fishery limits** – the European Commission (EC) holds 'absolute competence' for all aspects of fishery management within 200 nautical miles of member states' baselines. Member states are responsible for enforcing fishery management measures on their own national fishing fleets and within their own sector of the 200 mile EU fishing limit (Fig. 1). Member states may introduce and enforce national management measures within 12 nautical miles of baselines (the Territorial Sea), subject to the approval of DG Fisheries. Some EU member states and Norway have historic rights to fish in prescribed areas of the outer half of the UK Territorial Sea (6-12 nautical miles). (There are some, but very limited, reciprocal arrangements for UK vessels.) Only UK registered fishing vessels are permitted to fish within 6 miles of UK baselines (but this does not diminish the international right to navigation and free passage). There is a body of UK legislation that applies only within the 6 mile limit (or 3 miles in a few small areas), eg Environment Agency and Sea Fisheries Committee (SFC) byelaws. All UK fishery legislation is subject to approval by the EU (DG Fisheries) and

must not be in conflict with EU legislation, nor can it be 'discriminatory', ie it must not favour one group of fishermen to the disadvantage of another group.

**fishery management** – the integrated process of information gathering, analysis, planning, decision making, allocation of resources, formulation and enforcement of fishery regulations which govern the present and future fishing activities in particular to ensure the continued productivity of the resources (EC 1999).

**fishery protection vessel** – various agencies' patrol boats that inspect fishing vessels' gear and catch at sea and enforce EU and national fishery legislation. The Fishery Protection Squadron of the Royal Navy (RN) operates on behalf of MAFF within 200 miles of UK baselines and has the powers to inspect and enforce fishery legislation aboard UK registered fishing vessels operating in the waters of other nations or on the high seas. The waters around Scotland are patrolled by vessels of the Scottish Fishery Protection Agency and similarly, DARD maintains a patrol boat for operation off the coast of Northern Ireland. Around the coasts of England and Wales Sea Fisheries Committee (SFC) boats operate in their own districts (within 6 miles of baselines) – with the exception of the Isles of Scilly SFC whose district is patrolled by the Cornwall SFC boat. The Environment Agency also patrols within 6 miles of England and Wales' baselines enforcing legislation for

migratory species conservation (eg salmon) and pollution control. (See also fishery limits and sea fishery inspectors.)

**fishery or statistical rectangle** – see ICES Rectangle.

**Fishery Order** – a generic term applied to regulations that establish either Several Order or Regulating Order fisheries – orders that remove or limit the public, common-law right to fish.

**fishing effort** – see effort.

**fishing intensity** – fishing effort per unit area; eg hours trawling per ICES Rectangle.

**fishing mortality rate** – see **F**.

**fishing power** – a relative measure of the ability of one vessel or type of gear to catch fish compared to another vessel or type of gear. Thus, a motor trawler is more powerful, in terms of catching capability, than a sailing smack or steam trawler and a purse-seiner is more powerful than a driftnetter.

**fixed gear** – any fishing gear that is anchored or attached in some other way to the seabed so that it does not drift or move while it is in fishing mode, eg crab pots, long-lines and bottom set gill nets.

**flag ship** – a UK registered fishing vessel, fishing against the UK quota, operated by a UK company but one that is a subsidiary of a parent company registered in another EU member state (most frequently the

Netherlands or Spain). All UK registered fishing vessels are required to make a minimum number of visits/landings to UK ports but the majority of flag ships' catches are landed in their ultimate owners' states.

**flatfish** – bony fish (ie not skates and rays) that live on the seabed and have a pigmented upper surface and a pale or white underside, eg Dover sole, megrim, plaice.

**F<sub>lim</sub>** – see limit reference points.

**flora** – all plant life including phytoplankton, phytobenthos and seaweed.

**fly dragging/seining** – a common name for fishing with a fly seine, a lightweight form of demersal seine.

**F<sub>MSY</sub>** – the level of fishing mortality (**F**) that corresponds to the peak value on a dome-shaped yield-per-recruit curve and the value that will produce the maximum sustainable yield (MSY) from a fish stock (Fig. 8 & 10).

**footrope** – the weighted rope that forms the lower edge of a drift, gill, tangle or trammel net.

**foul hooked** – a fish that has been caught in any hook-and-line fishery where the hook is impaled somewhere other than through the mouth.

**F<sub>pa</sub>** – see limit reference points.

**freezer trawler** – a trawler that processes the catch and freezes it at sea.

**French dredge** – a heavyweight scallop dredge in which the tooth bar

across the lower edge of the dredge mouth is not spring-loaded. It has a diving plane across the top of the mouth to help force the dredge into the seabed. (See also Newhaven dredge.)

**front** – the boundary or boundary zone between two water masses with different physical properties, typically where the thermocline (a steep temperature gradient) or halocline (salinity gradient) reaches the surface. There is often above-average biological activity in the vicinity of a front including concentrations of plankton, plankton feeders, migratory species – and consequently, fishing

activity.

**fyke net** – cylindrical nets (ca 0.5 m diameter) held in shape by a series of hoops and fixed in their fishing position by stakes. An inverted funnel of netting forms part of the net mouth to aid fish entering the net but hindering attempts to leave. These funnels may be repeated further down the net if it is very long. They are most commonly used for eel fishing in rivers but occasionally they are used in estuaries and intertidally. A plain wall of netting several metres long is often attached to the mouth of the net to act as a 'leader' to the net mouth.

## G

**gadoid** – fish of the cod family, eg cod, haddock, Norway pout, pollack, saithe (coley), whiting, pout whiting and others.

**gastropods** – snail-like molluscs such as whelks, winkles and limpets.

**gear** – an all-embracing term for fishing equipment in total or in part, eg warps, long-line, tickler chains, bridles, dredges, etc.

**gear restriction** – a fishery management measure that prohibits or otherwise restricts the use of particular fishing methods in a specified area or season. These restrictions are widely adopted by Sea Fisheries Committees (SFC) and are often associated with closed areas and closed seasons.

**gene pool** – the sum of all the genetic material, including its variations and mutations, held within a group of organisms that interbreed but form a more or less separate breeding population (ie stock) from other populations of the same species, eg salmon in the Scottish Dee are drawn from, and contribute to, a different gene pool to that of salmon that breed in the Welsh Dee.

**generation time** – the average time taken for an organism to develop from fertilisation through to sexual maturity. This can be as little as a few days for small organisms such as phytoplankton or 5-10 years for large, late maturing fish such as sharks and rays.

**genome** – the sum of genetic material

held in either an individual egg or sperm before they unite in fertilisation to form the genotype.

**genotype** – the sum of the genetic material in each organism following fertilisation. (See also genome.)

**ghost fishing** – the continued capture of animals by fishing gear that has been lost or abandoned. Such gear can continue to fish until it is retrieved, destroyed (by time and weather) or otherwise ceases to fish, eg weighed down with weed, debris and/or cadavers.

**gill nets** – curtains of netting that hang vertically in the water, either in a fixed position (eg surface or seabed) or drifting, that trap fish by their gill covers – operculum – when they try to swim through the net's meshes. (See also drift, tangle and trammel nets.)

**Graham's Great Law of Fishing** – all fisheries that are unregulated become unprofitable (Graham 1943). (See also Tragedy of the Commons.)

**groundrope** – the rope that forms

the lower, front edge of a trawl or demersal seine (Fig. 4 & 5) and is in contact with the seabed while towing or closing.

**growth overfishing** – occurs where fish are caught before they are able to make their optimum (in terms of growth) individual contribution to exploited biomass. As a result, the stock as a whole is fished at a level where it cannot deliver the maximum sustainable yield (MSY).

**growth rate** – the increase in weight per unit of time. The instantaneous rate of growth is the natural logarithm of the ratio between the initial and final weight per unit of time.

**gutted weight** – the weight of fish with their viscera removed. The majority of roundfish (eg cod, haddock etc) and flatfish (eg sole, plaice etc) are normally landed gutted (but see 'rounders') whereas pelagic fish are landed whole. The principal reason for the difference is that each group of fish keeps better if stored in their respective condition.

## H

**HAB** – harmful algal blooms, blooms of dinoflagellate phytoplankton that are inherently toxic, eg – species associated with red tides (including *Gonyaulax* spp) and, or shellfish poisoning (eg *Pseudonitzschia* sp., *Dinophysis* spp. and *Alexandrium* spp.). Blooms of otherwise harmless algae that have increased to a point where they are

causing problems of de-oxygenation are also 'harmful' but may more generally be referred to as 'nuisance algal blooms'. Significant de-oxygenation can happen at night when the algae are consuming oxygen, or when the bloom collapses and the dead organisms create an abnormal increase in biochemical oxygen demand (BOD).

**habitat** – the place where an organism lives, as characterised by the physical features. For example, rocky reefs, sandbanks and mud holes all provide particular habitats that are occupied by animals adapted to live in or on one of them but probably cannot thrive, or even survive in the others.

**Habitat Action Plan** – see HAP.

**habitat degradation** – adverse alterations to a particular habitat type through physical disturbance or pollution. For example, trenching a pipeline through a mud patch could result in the mud being fluidised and unsuitable for *Nephrops* burrow construction.

**habitat restoration and rehabilitation** – programmes to halt activities causing adverse effects and improve the condition of a habitat by active intervention and return it to its previous condition. Such programmes can include the reintroduction (stock enhancement) of animals and plants normally associated with the habitat.

**Habitats (and Species) Directive** – *Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna* requires EU member states to protect scheduled species and to designate and manage special areas of conservation (SAC) for the protection of, among others:

Habitats – sandbanks slightly covered by seawater at all times, estuaries, intertidal mudflats and sandbanks, lagoons, large shallow inlets and bays, reefs, submerged or partly submerged sea caves;

Species – Atlantic salmon, bottle-nosed dolphins, harbour porpoise, common and grey seals, lampreys, otters, shads, sturgeon.

(See also Conservation Regulations.)

**Hague Preference** – an agreement reached by the Council of Ministers (The Hague 1976). Areas that were highly dependent on fishing (eg Ireland and the Highlands and Islands of Scotland) were allocated quotas from the TAC that were greater than was justified by their track record from the early 1970s. As a consequence, when the CFP was ratified (1983) it resulted in the TACs being set higher than ICES recommendations for several years in order to meet the terms of the Preference without 'disadvantaging' other member states. (See Holden 1994).

**handline** – a hook-and-line method of fishing, eg for mackerel, ostensibly hauling by hand but an increasing number of 'handliners' are now fitted with hydraulic shooting and hauling systems. (See also long-line.)

**HAP** – habitat action plan: these plans form part of the UK Biodiversity Action Plan (UKBAP) to protect UK species and habitats. Marine 'priority habitats' for which plans have been published (UKBG 1999) include:

littoral and sub-littoral chalk, *Lophelia pertusa* reefs, maerl beds, *Modiolus* beds, mudflats, mud habitats in deep water, *Sabellaria* reefs, saline lagoons, seagrass beds, Serpulid reefs, sheltered muddy gravel, sub-littoral sands and gravel, tidal rapids.

**harmful algal blooms** – see HAB.

**haul** – the act of drawing-in a net to recover the catch but also used as a general term for effort, eg x hauls per day.

**Heinke's Law** – the largest plaice are found in the deepest water. More specifically, the abundance of plaice is inversely proportional, and their size is directly proportional to their distance from the shore (and depth of water).

**High Seas** – the sea beyond the jurisdiction of coastal states. Generally, this means beyond the Territorial Sea but 'high seas fisheries' are those that occur beyond coastal states' 200 mile fishery limits or EEZ.

**high grading** – the practice of retaining only the most valuable part of a catch and discarding the species and, or size groups that have a lower commercial value even when it would not be an offence to retain and land them.

**historic access rights** – the right that certain nations' fishing vessels have to fish within the 6-12 mile band of the UK Territorial Sea. The majority

of these rights are restricted by place, season, species and gear.

**Hybrid Order** – a general term to describe a particular practice for managing a shellfish Regulating Order fishery. The rights of the Regulating Order are held by an organisation, usually a Sea Fisheries Committee (SFC), which then allocates fishing access and stock ownership rights to individuals, within the Regulated Order fishery, as if these secondary rights were a Several Order.

**hydraulic dredge** – a method of fishing for bivalve molluscs that are buried in the seabed, eg cockles, razorfish or clams. The dredge is trailed behind the boat at the end of a 10-20cm diameter pipe. Water is pumped at high pressure to the mouth of the dredge and directed back up the pipe. As the water rises up the pipe it creates suction and lifts the sand and benthos (including the target species) to the surface. The larger animals are retained by a sorting grid while the water, sand and undersize animals are returned to the sea.

## I

**ICES** – the International Council for the Exploration of the Sea, an independent scientific advisory body founded in 1902. It is funded by 19 member states' governments from around the North Atlantic (including Canada and the USA) and Baltic Sea. It

encourages research into commercial fish stocks, their biology and all factors (natural and man made) that may affect their abundance. It does not undertake research in its own right but has a secretariat (in Copenhagen) to facilitate and co-ordinate

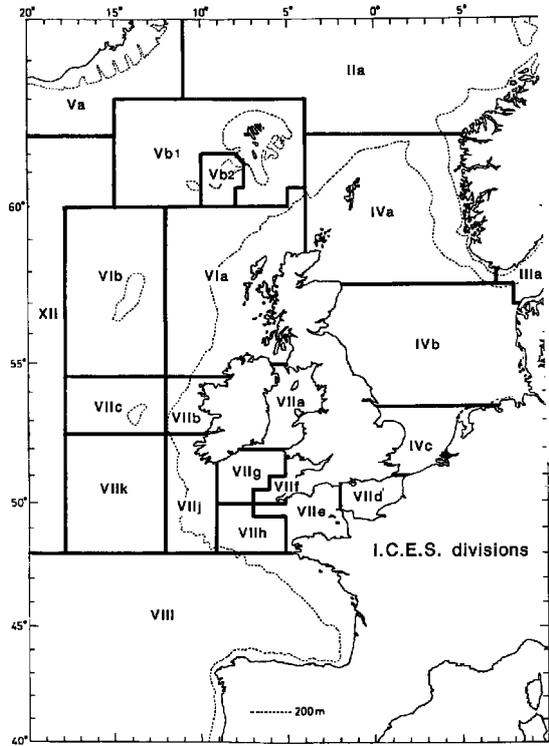


Figure 9: ICES sub-Areas (Roman numerals) and Divisions (Roman lower-case letters) around the British Isles

collaboration, including fishery stock assessments, between member states. Work is carried out through numerous working groups convened under the remit of one or more standing committees:

- Advisory Committee of Fisheries Management (ACFM),
  - Advisory Committee for the Marine Environment (ACME),
  - Baltic Committee,
  - Fisheries Technology Committee,
  - Living Resources Committee,
  - Mariculture Committee,
  - Marine Habitat Committee,
  - Oceanography Committee,
  - Resource Management Committee.
- (See Fig. 3)

**ICES (sub-)Area** – a major statistical division of the Northeast Atlantic based loosely on biogeographic zones. The North Sea, for example, forms ICES sub-Area IV (Fig. 9).

**ICES Division** – statistical area of the Northeast Atlantic comprising a variable number of ICES (fishery or statistical) Rectangles, eg Division VIIId and VIIe are the eastern and western English Channel respectively (Fig. 9).

**ICES Rectangle** – fishery statistics are collected and collated in 'ICES Rectangles'; these are half degree of latitude by one degree of longitude. The rectangles may be further divided into 'sub-rectangles' (quarter degree latitude by half degree longitude), and

exceptionally, may be divided again (one quarter degree of latitude by one quarter degree of longitude).

**ICZM** – integrated coastal zone management, the co-ordination of all activities, regulatory and management functions to safeguard all natural resources and processes found in and affecting the coastal zone.

**IMM** – the Intermediate Meeting of Ministers to the North Sea Conference. In 1997 a meeting of west European ministers and EU Commissioners convened in Bergen "to discuss the integration of environmental issues in the North Sea" (Svelle *et al*, 1997). A *Statement of Conclusions* was issued following the meeting setting out general targets and aspirations for closer integration of environmental protection and nature conservation in fishery management. Subsequently, these became part of EU fishery policy (EC 1999).

**incidental catch** – sometimes used as an alternative to by-catch and discards but also used to differentiate the individual captures of (charismatic) species that are not a normal part of the catch. Thus, an incidental catch could be commercial species such as porbeagle or basking shark, or birds, turtles and marine mammals.

**indicator species** – a species that can be monitored as a representative of a broader community of species or one whose abundance gives an indication of the status ('health') of a particular habitat, ecosystem or environment.

**industrial fishing** – the capture of fish specifically for reduction to meal and oil. Target species include oil-rich pelagic species such as mackerel and herring but more commonly they are the smaller species with little or no alternative commercial use, eg sprats, sandeels and Norway pout.

**infauna** – animals that live buried in the seabed, eg cockles and lugworm.

**inkwell pot** – a traditional, wicker-work crab or lobster pot with a single opening at the top. Wicker-work has largely been replaced by steel rod and plastic.

**input controls** – the management measures introduced to limit the amount of effort used in the exploitation of a stock. The controls can be any one, or a number of measures, eg days at sea, gear restriction, closed areas etc.

**inshore fisheries** – occur in coastal waters, overwhelmingly within the Territorial Sea if not within 6 miles of the coast. The majority of inshore boats are less than 10 m in length and have a 'permit to fish' equivalent to a Class A licence (MAFF 1999).

**integrated coastal zone management** – see ICZM.

**intertidal** – the foreshore or area of seabed between high water mark and low water mark which is exposed each day as the tide rises and falls. Also called the littoral zone (Fig 1).

**introduced species** – any species that occurs outside its normal geographic range as a direct or indirect

result of human activity and one that has not been found to occur naturally in the area within historic time. The term applies equally to non-self sustaining (alien) populations and to established non-native species.

**Irish Box** – an area of sea off the south of Ireland to which access by Spanish registered fishing vessels is limited to a maximum of 40 at any one time.

**ITQ** – individual transferable quotas are a form of fishery management in which quotas are allocated to individual boats. It is for the skipper/owner to decide if and when their quota is taken or if it should be leased or sold on to a third party. ITQ management is practised in Iceland and New Zealand.

## J

**J-net** – a type of intertidal / coastal stake-net salmon trap that is worked on the east coasts of Scotland and NE England. The trap is set to one side of the outer end of a 'leader' wall of netting – thereby forming a 'J' shape. (See also T-net).

**jigging** – a term most frequently associated with fishing for squid with handlines that are 'jigged' up-and-down. On squid fishing boats the 'handlines' are operated hydraulically.

**jumbo** – a name often applied to the largest market category of certain fish, eg 'jumbo mackerel' and 'jumbo haddock'. It is also the name for a short-handled rake used to gather cockles manually in certain intertidal fisheries, eg Burry Inlet and Morecambe Bay.

**juvenile** – an immature fish, ie one that has not reached sexual maturity (but could still be larger than the minimum landing size – MLS).

## K

**keep box** – a floating box in which live Crustacea are kept until collected for market. (See also vivier.)

**keystone species** – a species that forms an essential part of a community or assemblage of species without which the rest of the community cannot exist. For example, reef building species such as the colonial

worm *Sabellaria* spp or the horse mussel *Modiolus modiolus* are keystone species that provide specific habitats within which many other species live. (See also ecologically significant species and habitats.)

**klondiking** – the practice of 'landing' catches, usually of pelagic species, to factory ships anchored offshore. The

catches still count against the catching vessels' national quota even though they are not put ashore.

**k-selected species** – species that tend to be large, long-lived, with low

fecundity and are best adapted for stable environmental conditions, eg large elasmobranchs and marine mammals. (See also r-selected species.)

## L

**landings** – that part of the catch which is put ashore. Frequently, landings provide the only record of total catch; ie the landings plus discards.

**landings per unit of effort** – the total quantity of a given species, or all fish combined, that is landed for each unit of effort (eg days at sea, hours trawling etc) expended in its capture. It is an alternative means of expressing catch per unit of effort (CPUE) and provides an index of abundance in the area of a fishery.

**larvae** – the developing animal after it has hatched from its egg but before it has reached the adult or even juvenile stage. Many marine larvae drift in the plankton.

**length cohort analysis** – a procedure for constructing a population life-table, the basis for analytical stock assessments, using length-groups as an alternative for age-groups (as used in VPA) where ageing is difficult or otherwise not practicable.

**licensing** – a widespread method of fishery management that limits entry to a fishery. Licence conditions can vary from simply granting an individual the

right to fish, through to specifying not only the gear used and quantity/number of fish that may be taken but the time and place of fishing too, as in some salmon fisheries. Anyone who wishes to fish commercially in the UK must obtain one or more of the following four classes of licence:

Vessels >10 m in length

Class A (whitefish) licence to fish all demersal species, including 'pressure stocks', and up to 500 t of pelagic species per year;

Class A (pelagic) licence to fish for herring, mackerel, horse mackerel, pilchards, sprats and blue whiting;

Class B licence to fish all demersal species except pressure stocks, but including non-pressure stocks;

Class C – licence to fish for 'miscellaneous species', ie species that are not subject to TAC restrictions plus a limited number that are;

Vessels <10 m in length

Class A (<10 m) licence, or 'permit to fish' for all stocks.

**limit reference points** – are biological or fishery management indicators that define the point at which precautionary action must be taken to safeguard a fish stock. In order for stocks and fisheries exploiting them to be within safe biological limits, there should be a high probability that: 1 – the spawning stock biomass (SSB =  $B$ ) is above the threshold where recruitment is impaired; 2 – the fishing mortality ( $F$ ) is below that which will drive the spawning stock to the biomass threshold, a condition that must be avoided. Thus:

$$B_{lim} = \text{minimum acceptable biomass}$$

$$F_{lim} = \text{maximum acceptable fishing mortality}$$

( $lim$  stands for 'limit').

The certainty with which these points can be identified varies with the quality of assessment data available. Therefore, ICES has also identified precautionary reference points that identify higher biomass thresholds than  $B_{lim}$  and lower fishing mortality thresholds than  $F_{lim}$ :

$$B_{pa} = \text{precautionary minimum biomass}$$

$$F_{pa} = \text{precautionary maximum fishing mortality}$$

( $pa$  stands for precautionary approach).

In many instances, the value for  $B_{pa}$  will be the same as the value previously identified as the minimum biologically acceptable limit – MBAL (ICES 1998a and ICES Current).

In circumstances where the relationship between the exploited

stock and the spawning stock is not clear, as is the case with some of the deep-water species of fish, limit reference points may be expressed with respect to the 'unexploited stock':

$$U_{lim} = \text{minimum acceptable percentage of unexploited biomass}$$

$$U_{pa} = \text{precautionary minimum percentage of unexploited biomass.}$$

(See ICES 1998b).

**littoral** – the edge of the sea, but particularly the intertidal zone (Fig.1).

**live bearers** – animals that incubate their young internally and produce live, free-living offspring, eg many sharks including spur dogs, *Squalus acanthias*.

**live weight** – the weight of fish before it is gutted, ie the whole (or live) weight. (See also gutted weight and rounders.)

**log book** – a set of forms issued by the EC that skippers of vessels >10 m in length must complete after each haul recording: date, time, place, duration of fishing, species composition and estimated weight of retained catch (ie total catch less discards). Completed forms must be handed in on return to harbour or produced at sea at the request of a fishery inspector.

**long-line** – a method of fishing with baited hooks. An inshore cod long-line, for example, has hooks set on short (ca 0.5 m) lengths of line – 'snoods' – attached to the main line at intervals of 2-5 m. The total length of

line can range from 2-300 m to several km in high seas long-line fisheries – where the snoods are longer and set rather further apart.

LPUE – see landings per unit of effort.

Luxembourg Compromise – an

unofficial procedure adopted at a Council of Ministers meeting (Luxembourg 1956) under which the Council would not proceed to a vote if a member state declared that it would be 'against the national interest' to adopt the proposal under discussion (see Holden 1994).

## M

**M** – formally, the instantaneous rate of natural mortality (the natural logarithm of the change in abundance due to natural causes per unit of time); but more simply, the proportion of the population killed each year by predation, illness (eg parasite load), old age etc.

**Mackerel Box** – a mackerel nursery area around the south-west peninsula of England, and extending into the Celtic Sea, (Fig. 6) within which directed fishing for mackerel by purse seiners and pelagic trawlers is prohibited.

**macro-fauna** – any animal that is readily visible to the naked eye.

**maerl** – twig-like, calcified red algae that act as keystone species and form a particular habitat. Maerl is marketed as 'calcified seaweed' for horticultural use.

**MAGP** *x* – the EU Multi-Annual Guidance Programme (where *x* is a particular programme lasting 3-5 years). The, legally binding, aim is to reduce the total fishing power of the combined EU fishing fleet. Each member state has targets for fleet reduction (vessel numbers, tonnage, engine power etc) that they must meet.

**management unit** – is a fishery exploiting a species of fish living in a defined area upon which (eg) EC management is based. In some cases the management unit includes two or more stocks; in other cases one stock is split in two, usually to meet political requirements, eg to exclude the vessels of a member state from fishing in a particular zone (Holden 1994).

**mariculture** – marine aquaculture.

**Marine Consultation Area** – see MCA.

**Marine Environmental High Risk Area** – see MEHRA.

**Marine Nature Reserve** – see MNR.

**Marine Protected Area** – see MPA.

**Marine Stewardship Council** – a non-governmental organisation that encourages consumers to purchase fish taken only from environmentally responsible and sustainable fisheries. All fish products that MSC judge to be from such sustainable fisheries will be permitted to carry an 'eco-friendly' seal of approval.

**maximum economic yield** – the maximum, most cost-effective yield (eg tonnes per unit of effort) that can be taken on a sustainable basis (Fig. 10). On a yield-per-recruit (YPR) curve the MEY is found at a slightly lower level of fishing mortality ( $F$ ) than is the maximum sustainable yield (MSY).

**maximum sustainable yield** – see MSY (also Fig. 8 & 10).

**MBAL** – minimum biological acceptable limit: an estimate of spawning stock biomass below which ICES recommends it should not be allowed to fall for fear of imminent recruitment failure and stock collapse. (See also limit reference points.)

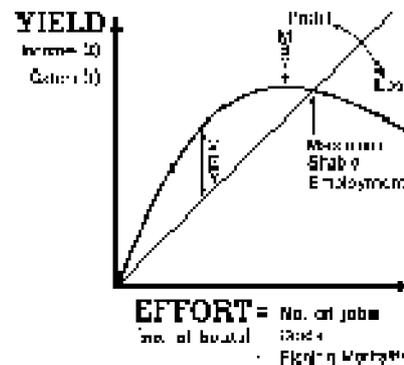
**MCA** – marine consultation area: a non-statutory nature conservation designation for Scotland. It identifies areas of nature conservation interest for which widespread consultation is desirable before any development takes place. (See also SMA.)

**MEHRA** – marine environmental high risk area: a UK designation proposed in the Donaldson Report following the wreck of the oil tanker *Braer*, Shetland. They will be sea areas with high marine traffic densities adjacent or close to coastal or shallow-water areas that are considered particularly vulnerable to environmental damage from oil spills or other noxious cargoes. (See also PSSA)

**mesh selection** – the process by which fish above a certain size are unable to pass through the meshes of a fishing net but fish below that size can do so. It works most successfully in

free hanging nets such as drift nets and gill nets, but trawls are also regulated by minimum mesh size (MMS). The efficiency of trawl mesh selection varies enormously as the shape of the meshes change in response to changing loads while towing. For example, as catch, and hence drag, increases the cod-end meshes tend to close. (See also square mesh.)

**MEY** – see maximum economic yield.



**mid-water trawl** – a trawl that is designed specifically for the capture of pelagic species, eg herring and mackerel, and is towed in mid water rather than across the seabed.

pelagic species, eg herring and mackerel, and is towed in mid water rather than across the seabed.

**migratory fish** – a high proportion of the commercially exploited species in the North Atlantic undergo migrations (directional movements over anything from a few hundred to tens of thousands of kilometres) during their life-history, if not seasonally. In UK legislation, however, 'migratory

fish' are those named in the *Salmon and Freshwater Fisheries Act (1975 – and related Acts)*: salmon (*Salmo salar*), sea trout (*Salmo trutta*) and eels (*Anguilla anguilla*). Internationally, the term tends to describe species with oceanic migrations moving through several jurisdictions in the course of a year, eg blue sharks, tunas, swordfish, sailfish etc.

**minimum landing size** – see MLS.

**minimum mesh size** – see MMS.

**miscellaneous species** – are stocks not subject to quota management (eg mullet, crabs, whelks), plus some stocks which were not subject to quotas in 1984 when broad-scale, UK licensing was introduced) but are now under quota, eg North Sea prawns (*Nephrops*), anglerfish, skates and rays (MAFF 1999). (See also pressure stocks and non-pressure stocks.)

**misreporting** – the inaccurate recording of catches in EU fishing log books or comparable reporting systems. Among the more common practices are under-reporting the quantity of fish caught or reporting the catch as being taken in a different area from the one in which it was actually made. The latter example is most widespread when the quota for a species in one ICES Division has been taken but quota is still available in an adjacent Division. (See also under-reporting and black-fish.)

**mixed fishery** – a fishery that takes multi-species catches. Pelagic fisheries tend to take relatively 'clean' single species catches whereas multi-species

catches are more frequent in demersal fisheries.

**MLS** – minimum landing size: the smallest length at which it is legal to retain a fish or offer it for sale. Ideally, it is the minimum length at which not less than 50% of a given species first reach sexual maturity. In practice it tends to be set at a level influenced by market acceptability and is frequently less than the biological optimum.

**MMS** – minimum mesh size: the smallest size of mesh that can be used legally in any given type of net. It is measured either down one side of the mesh (knot-to-knot) or – more usually - across the diagonal under tension (stretched mesh). The MMS is set to allow at least 50% of the target species at their minimum landing size (MLS) to pass through the mesh.

**MNR** – marine nature reserve: an area of sea and seabed (which can include intertidal areas) designated under the *Wildlife and Countryside Act (1981)* for the purpose of conserving marine flora and fauna or geological or physiographic features of special interest and/or providing opportunities for study and research. The designation can be applied throughout UK territorial waters; sites designated already are: Lundy MNR (England), Skomer MNR (Wales), Strangford Lough MNR (Northern Ireland).

**mobile fishing gear** – any gear that is towed or otherwise moved through the water, eg trawls, seines, dredges etc. (See also fixed/static gear.)

**molluscs** – all animals in the Phylum Mollusca including: gastropods, eg whelks and winkles; bivalves, eg cockles and mussels; cephalopods, eg squid and cuttlefish.

**monitoring** – the regular and systematic collection of environmental and biological data by agreed methods and to agreed standards. Monitoring provides information on current status, trends and compliance with respect to declared standards and objectives. (See also surveillance.)

**monofilament** – a single strand of nylon (or similar) line that is often translucent, and therefore, difficult to see in water. It is widely used in the manufacture of static gear nets, eg gill nets, as well as the more commonplace fishing line for anglers.

**mortality** – the death of organisms through natural causes (*M*), eg predation, or fishing (*F*) etc. It is usually expressed as an instantaneous rate: the natural logarithm (with sign changed) of the ratio of number of animals surviving to the end of the year and the number at the start of the year (Ricker 1975).

**moulting** – the process by which Crustacea such as shrimps, crabs and lobsters, cast their hard shell periodically to increase in size. The new shell is soft at first to allow expansion but hardens rapidly.

**MPA** – marine protected area: any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective

means to protect part or all of the enclosed environment (Kelleher 1999).

**MSVPA** – multi-species virtual population analysis: a mathematical procedure by which to construct population life-tables of inter-related populations, including predator-prey relationships. It aims to provide a more realistic basis for assessing the current status of stocks than do single species assessments carried out by VPA or SVPA.

**MSY** – maximum sustainable yield: the largest average catch that can be taken continuously from a stock under existing environmental conditions (Fig. 8). (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others). Also known as maximum equilibrium catch (Ricker 1975).

**Multi-Annual Guidance Programme** – see MAGP.

**multifilament** – the most common form of line, twine or rope; many strands of natural or man-made material are twisted together more or less tightly. (See also monofilament.)

**multi-monofilament** – a system in which a small number of monofilament strands are twisted loosely together before making up netting for static gear, eg tangle nets.

**multi-purpose fishing vessels** – vessels that are equipped or can be readily adapted to work more than one type of fishing gear as the seasons or opportunities change, eg trawler-purse seiner, crabber-liner.

## N

**NAO** – see North Atlantic Oscillation.

**native species** – self-sustaining populations that can be rare or commonplace but have not been introduced by man's intervention, either deliberately or accidentally. (See also non-native species.)

**Natura 2000** – The EU-wide network of protected sites established under the Birds Directive (SPA) and the Habitats Directive (SAC) .

**natural mortality rate** – see **M**.

**NEAFC** – North East Atlantic Fisheries Commission, notionally the international fisheries commission with responsibility for fishery conservation and fishery management in the north-east Atlantic. In practice, its role is limited to the high seas fisheries (including deep water fisheries) beyond coastal states' (and EU) 200 mile fishery limits . The EC represents member states on the Commission (Fig. 2).

**nekton** – animals that can swim against the current rather than drift like the plankton.

**neritic zone** – the area of sea encompassing non-oceanic waters, or more generally, the waters covering the continental shelf (Fig.1).

**neuston** – plants and animals that live in the surface few centimetres of the sea. Some of the animals are nektonic but most are planktonic (Fig.1).

**Newhaven dredge** – a scallop dredge in which the tooth bar across the lower edge of the dredge mouth is spring-loaded to minimise snagging on the seabed. (See also French dredge).

**non-discriminatory** – a basic principle of the CFP is that any management measures must not discriminate against, or be in favour of, one group of fishermen rather than another. This applies equally to EU and national legislation. For example, a ban on scallop dredging in a specified area must apply to all scallop dredgers from all ports, fleets and nations.

**non-native species** – any organism that has been introduced deliberately or accidentally by human activity and has established a self-sustaining population in an area beyond its normal geographic range. (See also alien species and introduced species. Eno *et al.* 1997)

**non-pressure stocks** – are stocks for which the quota allocated to the UK in 1984 (when broad-scale, UK licensing was introduced) were considered large enough to allow unrestricted fishing (MAFF 1999), ie:

Species	ICES Division
Plaice	IIa, IV, VIIa, h, j k;
Sole	VI, VIIh, j, k;
Cod	VIIa;
Whiting	VII;
Megrim	Vb, VI;
Sprat	VIIId, e;

Pollack Vb, VI, VII;

Nephrops Vb, VI, VII.

(See also miscellaneous species and pressure stocks.)

**non-sector fishery** – that part of the national fishing fleet whose participants are not members of a producer organisation (PO). Most of the national quota for each species is distributed among the PO but a small proportion is retained for the non-sector fleet and is managed by the government fishery departments.

**non-target species** – any species that form part of the by-catch but are not (one of) the principal species that the fishery is exploiting. For example, turbot are a valuable by-catch in beam-trawl catches but there is not a directed turbot fishery by beam trawlers.

**North Atlantic Oscillation** – annual variations in the pressure ratio between the low pressure that tends to be centred on Iceland and the prevailing high pressure system over the Azores. The ratio appears to follow a long-term cycle of higher and lower values, causing both the average annual air temperature and precipitation in northern Europe to vary significantly. It may also influence sea temperatures, currents, and hence, fish stocks, but details are less well understood than those of the *el Niño* phenomenon and anchovy stocks in the southern Pacific.

**North East Atlantic Fisheries**

**Commission** – see NEAFC.

**Norway pout box** – an area of the north-eastern North Sea within which industrial fishing (for Norway pout) is prohibited to protect juvenile haddock (Fig. 6)).

**No Take Zone** – see NTZ.

**NTZ** – no take zone, a marine protected area (MPA) from which the removal of any resources, living or dead (eg marine aggregate) is prohibited.

**number at age** – the estimated number of fish caught each year by individual age groups. These data are the basis upon which analytical stock assessments such as virtual population analyses (VPA) are made. (See also length-cohort analysis).

**nursery** – an area readily identified as one of particular importance, year-on-year, for juvenile fish. For example, many estuaries form bass nursery areas, sandy bays on the east coast of England frequently provide plaice nursery areas, while The Wash and Thames Estuary are important sole nurseries.

**nutrient enrichment** – the addition of nutrients, mostly nitrogen and phosphorus, to the marine environment as a result of man's activities, eg sewage discharge, agricultural and slurry run-off from estuary and riverside farm land. This can lead to enhanced algal growth including harmful algal blooms (HAB).

## O

**Objective x funding** – classes of the EU Structural Funds . Thus, support is available for:

Objective 1 Promotes the development and structural adjustment of regions whose development is less well advanced than elsewhere in the EU (ie the local gross domestic product (GDP) is less than 75% of the EU average), eg parts of Wales, the Highlands and Islands of Scotland, parts of NE England (until 2006);

Objective 2 Supports the economic and social redevelopment of areas previously dependent on what is now a declining or redundant industry (including fisheries);

Objective 3 Combats long-term unemployment and helps the young find work.

**offal** – the intestines and other parts of the fish that are discarded when fish are gutted. It is widely thought that the total quantity of offal discarded has stimulated the increase in abundance of many scavenging birds in the last quarter of the 20<sup>th</sup> century, eg fulmars in the North Sea.

**offshore marine protected areas** – marine protected areas (MPA) that might be established beyond the Territorial Sea (12 nautical miles) to meet the provisions of the Habitats Directive or OSPAR Annex V.

**open access fishery** – a national or international fishery for which there

are no restrictions or licensing requirements to participate although they may still be subject to TAC and quota management.

**Order in Council** – an order issued by the Privy Council that gives the force of law to administrative regulations, usually drawn up by UK government departments, without the need for parliament to amend the primary legislation from which the power of enforcement stems. The order is often issued in the form of a Statutory Instrument.

**OSPAR** – a combination (1992) of two earlier conventions (Oslo and Paris) to create the *Convention for the Protection of the Marine Environment of the Northeast Atlantic*. Annexes to the convention address specific issues:

Annex I prevention and elimination of pollution from land-based sources;

Annex II prevention and elimination of pollution by dumping or incineration;

Annex III prevention and elimination of pollution from offshore sources;

Annex IV assessment of the quality of the marine environment;

Annex V protection and conservation of ecosystems and biological diversity.

**otolith** – a free-floating bony structure in the middle ear of a fish that forms part of its balance sensory system. It grows annually by

alternating winter-summer additions of opaque and translucent layers of material. In many fish, these appear as annual rings under a microscope and enable the fish to be aged.

**otter trawl** – a demersal trawl that is held open laterally by otter boards or 'doors' (Fig. 5).

## P

**pair fishing/trawling** – a method where two boats tow a trawl between them to hold it open laterally; ie there are no trawl doors. In the UK fleet it is widely used by boats engaged in fishing for pelagic species.

**Paralytic Shellfish Poisoning** – see PSP.

**Particularly Sensitive Sea Area** – see PSSA

**parlour pot** – a rectangular crab and lobster trap with two chambers of netting stretched over 3-4 hoops. The initial entrance may be either a rigid plastic or loose, net funnel. A second (loose net) funnel leads the animal into the 'parlour' from which there is no escape (but see escape gap).

**peeler crab** – a crab that has gone soft preparatory to, or immediately following, the loss of its hard shell when moulting.

**pelagic** – relating to mid water, eg herring, sprats and mackerel are all pelagic species that are vulnerable to capture in mid water by pelagic

**over-fishing** – any fishery where the total fishing effort is greater than is required to meet or match a specific management objective, eg maximum sustainable yield (MSY). (See also growth overfishing and recruitment overfishing.)

**ovoviviparous** – see live bearers.

trawls. Pelagic birds are species that do not return to land, other than to breed, but roost each night on the sea surface, eg fulmars and petrels (Fig. 1).

**pelagic trawl** – an otter or pair trawl that is towed in mid water and is neither designed nor suitable for towing across the seabed. (See also demersal trawl.)

***Phaeocystis*** – a colonial phytoplankton organism (*Phaeocystis pouchetti*) that is naturally abundant in coastal waters during the spring. When the bloom dies, *Phaeocystis* can create floes of creamy-brown foam that in some circumstances can reach nuisance proportions, eg as a consequence of nutrient enrichment.

**phytobenthos** – microscopic plants that live in the surface layers of the seabed, particularly in shallow water and intertidal areas. (See also phytoplankton and benthos.)

**phytoplankton** – microscopic plants floating in the water column that drift to-and-fro with the tides. (See also plankton and zooplankton.)

**Pinnipedia** – marine mammals that come ashore to give birth, eg seals and walruses.

**Plaice Box** – introduced in 1989 to protect juvenile plaice. It extends along the coasts of the Netherlands, Germany and Denmark and covers the main plaice nursery area for the southern and central North Sea (Fig 6). Fishing with beam trawls by vessels more powerful than 220 kW (300 hp) is prohibited within this area.

**plankton** – the animals and plants that float in mid water and drift to-and-fro with the tides. (See also nekton.)

**PO** – producer organisation: associations of individuals, companies and other bodies within the fishing industry intended to optimise supply and increase efficiency of marketing – both fundamental objectives of the CFP. Some POs also manage the quotas awarded, under licence, to members' boats. (For further information see References – EC Current.)

**pots** – a general term to describe traps used to catch crabs, lobsters, larger species of prawns, eg *Nephrops*, and some molluscs, eg whelks and octopus. (See also creel, inkwell pot and parlour pot.)

**potter** – a fishing vessel engaged in fishing for Crustacea by using pots rather than nets.

**prawn** – a colloquial name for Crustacea larger than shrimps but smaller than lobsters. The fishing industry use 'prawns' as a name for *Nephrops* (ie scampi, Dublin Bay prawn, Norway lobster, langoustine).

**precautionary approach** – a decision to take avoiding action based on the possibility of significant environmental damage, even before there is conclusive evidence that damage will occur (DOE 1992). This approach requires fishery managers to pay due regard to the uncertainties of stock assessment and management. They must implement the appropriate precautionary action if limit reference points are reached.

**precautionary principle** – the principle of safeguarding the marine ecosystem by reducing emissions of hazardous substances at source and minimising physical disturbance of marine habitats caused by human activities using appropriate technologies and measures.

This applies to all human activities for which there exists a scientific basis for believing that damage to living resources is likely to result. Measures adopted should be based on pessimistic assumptions regarding uncertainties in the measurement and prediction of effects on the marine environment (Gray & Bewers 1996).

'...by virtue of which preventive measures are to be taken when there are reasonable grounds for concern that substances or energy introduced, directly or indirectly, into the marine environment may bring about hazards to human health, harm living resources and marine ecosystems, damage amenities or interferes with legitimate uses of the sea, even when there is no conclusive evidence of a causal relationship between inputs and the effects' (OSPAR).

**precautionary TAC** – a total allowable catch that is set for a particular stock or species but for which a full analytical stock assessment (eg virtual population analysis, VPA) is not possible or has not been made. It may be set on the basis of the average catch over the previous 5 years, for example, as a safeguard against over-exploitation.

**pressure stocks** – are those for which the quotas allocated to the UK in 1984 (when broad-scale UK licensing was introduced) were considered insufficient to allow unrestricted fishing by the UK fleet. Only vessels <10 m or those holding a Class A licence can fish pressure stocks, ie:

Species	ICES Areas & Divisions
Herring	All
Mackerel	All
Saithe	All
Haddock	All
Hake	All
Anglerfish	All except IVa, b, c
Cod	All except VIIa
Whiting	IIa, IVa, b, c, Vb, VI
Plaice	Vb, VI, VIIa, d, e, f, g
Sole	IIa, IV, VIIa, d, e, f, g
Megrim	VII.

(See also miscellaneous species and non-pressure stocks.)

**priority habitats** – are natural habitats in danger of disappearance for which the EU has particular responsibility for their conservation in view of the proportion of their natural range that falls within member states'

territory (Habitats Directive).

**priority species** – are endangered species for which the EU has particular responsibility for their conservation in view of the proportion of their natural range that falls within member states' territory (Habitats Directive).

**Producer Organisation** – see PO.

**productivity** – the total biomass generated by a population, stock or species each year as a result of growth and reproduction – less the quantity lost through mortality.

**property rights** – legal ownership of a particular property or resource. Generally speaking, *Magna Carta* (1215) excluded ownership or exclusive rights to any fish in tidal waters. However, ownership rights to named shellfish species in a defined area can be allocated through Regulating and Several Order fisheries.

**PSP** – paralytic shellfish poisoning, this can result from eating bivalve molluscan shellfish that have accumulated toxins from the *Alexandrium* spp. dinoflagellates in the phytoplankton. When toxins are detected above 80 mg/100 g of shellfish flesh the shellfish may not be harvested commercially or offered for sale. The toxins are heat stable and can result in mild symptoms of numbness in tongue or lips or in very extreme cases lead to death through respiratory paralysis.

**PSSA** – Particularly Sensitive Sea Area: an area recognised by the International Maritime Organisation

(IMO) as an area of ecological, sociological or scientific significance that may be vulnerable to damage by maritime traffic.

**purse seine** – a deep curtain of netting that is shot in a circle to form an enclosing cylinder around shoals of pelagic fish. A 'pursing wire' attached to the end and lower edges is drawn in

to close the bottom of the cylinder. At the same time, the net is progressively hauled aboard to concentrate the fish alongside the boat in the final bight of netting – the 'purse'. The fish are pumped from the purse into the hold (CSW or RSW tanks if the fish is intended for human consumption).

## Q

**qualified majority voting** – the European Union (EU) Council of Ministers has a range of voting systems to meet specific circumstances. If no alternative is stipulated in the Treaties, a simple majority is sufficient. For matters of constitutional importance, a decision must be unanimous in Council and then ratified by each member state's government. Most frequently, however, decisions are reached by 'qualified majority'. Voting is weighted such that Germany, France, Italy and UK each have 10 votes; Spain 8, Belgium, Greece, Netherlands and Portugal 5 each; Austria and Sweden each have 4; Denmark, Finland and Ireland 3 each and Luxembourg 2.

Sixty-two of the total of 87 votes carry a motion with a qualified majority.

**quota** – a fixed proportion of the TAC allocated to each fishing nation. (See also relative stability.) This national quota allocation is further sub-divided into quotas for specific areas, seasons, fisheries or organisations, eg producer organisations (PO).

**quota hopping** – a colloquial description for vessels registered in one country of the European Union (EU), and fishing against that country's quota, but ultimately owned by a company in another member state, and often landing most of its catch in the owner's country. (See also flag ship.)

## R

**Ramsar Convention** – the international *Convention on Wetlands of International Importance especially as Waterfowl Habitat* (Ramsar, Iran 1971). Coastal waters of particular

importance can be designated as Ramsar sites but they do not normally exceed 6 m in depth. During the 1990s the convention was amended to broaden its application to embrace,

among others, the needs of fish with an associated move towards closer involvement with fishery management.

**rarity** – a rare habitat is one that is restricted to a limited number of locations or to small, few and scattered locations in UK waters. A rare species is one that is sessile or has limited mobility and occurs in a limited number of locations in UK waters (Laffoley *et al*, 2000).

**rays** – flat, bottom-dwelling elasmobranch fish, eg thornback ray, cuckoo ray, blond ray, and skates.

**razor fish** – bivalve molluscs with long (*ca* 10-25 cm), narrow shells reminiscent of a cut-throat razor blade, eg *Solen* spp., *Ensis* spp.

**recreational fisheries** – any fishery that is undertaken for pleasure rather than income; most frequently it is represented by beach and boat angling. Recreational sea fishing is not licensed but it is subject to minimum landing size (MLS) regulations and its activities can be curtailed by quota restrictions.

**recruit** – a young fish joining the exploited or spawning stock for the first time.

**recruitment** – the number of young fish joining the stock each year. Juvenile fish recruit to the exploited stock once they have grown to a length greater than the minimum landing size (MLS) and/or they move onto the fishing grounds. They recruit to the spawning stock once they reach sexual maturity.

**recruitment overfishing** – the situation that results from fishing the spawning stock biomass (SSB) down to a level where it cannot produce sufficient juveniles each year (recruits) to replace the total annual losses through fishing (**F**) and natural causes (**M**).

**Red Data Book** – a worldwide list of 'vulnerable', 'threatened' and 'endangered' species maintained by the World Conservation Union (IUCN Current).

**redfish** – the colloquial name for a number of red species. In the north-east Atlantic it usually refers to the bathypelagic species *Sebastes marinus*.

**refrigerated seawater tanks** – see RSW.

**regionalisation** – a concept that implies management targeted more precisely to meet local needs and conditions rather than assuming a single, general approach is equally applicable throughout EU waters. A corollary of this approach also assumes greater devolved powers for fisheries to be managed at a local level with greater participation by fishermen and other groups with an interest in sustainable fisheries and their management.

**registered fishing vessel** – any European vessel that fishes commercially must be registered with its national fishery department and display port registration letters and numbers, eg LO 62.

**Regulating Order** – a variation in the public right to fish for molluscs

otherwise guaranteed by *Magna Carta* (1215). The Order is usually granted to a public body, eg Sea Fisheries Committee (SFC), to manage a wild-stock mollusc fishery. The species covered by each order are named. Licences are then issued to individuals granting them the right to fish the named species within the area covered by the order. The order does not affect the public right to fish within the regulated area for species not named in the order.

**Regulation (EU)**- legislation that has immediate, equal and binding effect throughout all member states. The method of implementing the legislation is not left to each member state to decide, as with Directives, but is specified in the Regulation. Any state that does not implement a Regulation can be reported to the Court of Justice, most probably by the Commission (EC), and fined (Fig. 7). (See also Directive).

**Regulations (SAC)** – see Conservation Regulations.

**Regulation 33** – the paragraph in the UK Conservation Regulations that requires nature conservation bodies to advise relevant authorities as to the conservation objectives for a European marine site and notify them of any operations that may cause a deterioration to the habitat(s) or disturbance of species for which the site has been selected.

**Regulation 34** – the paragraph in the UK Conservation Regulations that requires the relevant authority to establish a (single) management scheme for the protection of each

European marine site.

**relative stability** – the principle within the current formulation of the CFP (*Council Regulation 3760/92*) which guarantees that each EU member states' quota for each species is a constant proportion of the TAC. This principle blocks countries such as Spain, Portugal, Sweden and Finland from fishing in the North Sea, for example, as they do not have a track record of catches from the area to justify allocating them a quota from the TAC.

**relevant authority** – any public body that has a function or duty in relation to a marine area but particularly a site designated under the provisions of the Habitats Directive. (See also Conservation Regulations.)

**representivity** – an area that contains examples of habitat or biotope types, habitat complexes, species, ecological processes, or other natural characteristics that are typical and representative (Laffoley *et al* 2000).

**retention curve** – the relationship between the size of a fish and the probability that it will be captured and retained by a fishing gear (hook, net, trap etc). (See also selection curve.)

**responsible fisheries** – fisheries combining respect for ecosystems and biodiversity with the needs of consumers and the interests of the fishery sector (EC 1999).

**Rio Convention** – UN *Convention on Biodiversity* (UNCED 1992).

**rock-hopper trawl** – a demersal otter trawl (Fig. 5) with rubber discs or 'wheels' fitted to the groundrope. A second wire 'groundrope' passes through the discs off centre; this prevents the discs from rotating freely. If the groundrope snags a seabed obstruction the discs try to turn and the second wire gets wound around the groundrope and acts as an accumulator spring. Eventually, the tension becomes too much and as it is released the trawl 'hops' free of the obstruction.

**rounders** – demersal fish such as cod, haddock and flatfish that are landed before gutting in contrast to the normal practice of gutting them at sea.

**round-fish** – demersal species of fish other than flatfish, eg cod, haddock, whiting, hake.

**RoxAnn<sup>®</sup>** – an echo-sounder system that distinguishes how hard and how rough the seabed is relative to a standardised calibration site. The information can be stored and displayed in plan format on a 'monitor' to show areas of, eg, rock, gravel, sand and mud.

**RSW** – refrigerated seawater tanks: the fish holds on pelagic fishing vessels are flooded and the waters cooled to a temperature significantly less than ambient (see CSW).

**r-selected species** – a species with a high reproductive rate, ie short generation time, and is able to take advantage of sudden changes in environmental conditions. These species are usually small with a relatively high fecundity, eg many invertebrates but also small fish such as sprats and sand eels. (See also K-selected species.)

## S

**SAC** – special area of conservation: a site designation specified in the Habitats Directive. Each site is designated for one or more of the habitats and species listed in the Directive. The Directive requires a management plan to be prepared and implemented for each SAC to ensure the favourable conservation status of the habitats or species for which it was designated. In combination with special protection areas (SPA), these sites contribute to the Natura 2000 network.

**safe biological limits** – in essence, this equates with a stock being above the 'minimum biologically acceptable level' (MBAL). The concept is fundamental to the ICES precautionary approach to fishery management and the application of limit reference points. (See Serchuk & Grainger 1992).

**sampling** – the systematic collection of environmental or biological data to measure specific features, eg temperature or salinity regime, average size or abundance.

**sanctuary area** – a colloquial name for any area that can offer any species, including commercial fish, some measure of protection. Some are statutory, eg the 500 m radius exclusion zone around an oil rig, or a marine nature reserve (MNR). Others may occur through nature or chance, eg inaccessible rocky areas or wrecks, either of which can prove a hazard to fishing. (See also closed area and NTZ.)

**SAP** – species action plans form part of the UK Biodiversity Action Plan (UKBAP) to protect UK priority species and habitats. Marine priority species for which plans have been published (UKBG 1999) include:

baleen whales, harbour (common) porpoise, small dolphins, toothed whales, marine turtles, basking shark, common skate (*Raja batis*), 'selected commercial fish species', 'selected deep-water fishes', native oyster, 12 non-commercial invertebrate species and two seaweeds.

**satellite surveillance** – a system for monitoring the whereabouts of individual fishing vessels in real time. The basic system was introduced in January 2000 by DG Fisheries for vessels over 24 m in length. The system has the potential capability to monitor whether or not a vessel is engaged in fishing, is steaming, or laid-to.

**SCI** – see Site of Community Importance.

**Scientific, Technical and Economic Committee on Fisheries** – see STECF.

**Sea Fisheries Committee** – see SFC.

**Sea Fishery Inspectors** – the branches of the Government's fishery departments with responsibility for enforcing fishery legislation around the UK coast. In England and Wales the inspectors (British Sea Fishery Officers – BSFO) are employed by MAFF; in Scotland and Northern Ireland they are part of the devolved governments' civil service. In England and Wales, Sea Fisheries Committees' (SFC) fishery officers also have enforcement powers within their individual committee's district but they do not have the full powers of a BSFO. (See also fishery limits and fishery protection vessels .)

**seed** – a colloquial term used in the molluscan shellfish cultivation industry; juvenile animals 'planted out' for on-growing.

**seine net** – an encircling net that may be either a curtain of netting, eg purse seine and beach seine, or similar in basic design to an otter trawl, eg demersal seine.

**selection curve** – the relationship describing the rise and subsequent fall in the proportion of fish encountering a net that are retained by a given mesh (or fish-hook) size as the fish increase in size. (See also mesh selection and retention curve .)

**selectivity** – a measure of a gear's ability to target and capture a species

of fish while allowing juveniles and non-target species to escape.

**Sensitive Marine Area** – see SMA.

**sensitivity** – a very sensitive habitat or species is one that is adversely affected very easily by factors arising from human activities and is expected to recover over a very long time period, or not at all.

**separable virtual population analysis** – see SVPA.

**set net** – any net that is attached to the seabed while it is fishing, eg J-, T-nets, tangle and trammel nets.

**Several Order** – an order removing the public right to fish for named shellfish normally guaranteed by *Magna Carta* (1215). The Order assigns exclusive rights to an individual or organisation to improve and manage an area of seabed and ownership of named species of shellfish living on it. The chosen method of management is usually through cultivation (mariculture) but it includes stock enhancement. The order does not affect the public right to fish within the area for species not named in the order.

**SFC** – Sea Fisheries Committees that operate in 12 'districts' around the coasts of England and Wales:

Cumbria, North West and North Wales, South Wales, Isles of Scilly, Cornwall, Devon, Southern, Sussex, Kent and Essex, Eastern, North Eastern, Northumberland.

Each committee has responsibilities for representing the local fishing industry,

conservation of local fish stocks and fishery management within its district – out to 6 nautical miles from baselines, including responsibility to manage fisheries with due regard to the environment and wildlife. It has the powers to make byelaws, subject to ratification by MAFF, and is both a relevant and competent authority with respect to the management of special areas for conservation (SAC). (See also Conservation Regulations.) Half the membership of each committee is appointed by the coastal local authorities and the other half by MAFF. MAFF appointees are drawn from the local fishing industry, in the broadest sense, and include a representative of the Environment Agency and someone with expertise relevant to nature conservation and environmental protection. The Environment Agency exercises the authority of a sea fisheries committee in the Severn, Welsh Dee and Taw-Torridge Estuaries.

**SFI** – see Sea Fishery Inspectors .

**shellfish** – molluscs and Crustacea; fish with a hard outer case or shell.

**shellfish poisoning** – see ASP, DSP, PSP.

**Shetland Box** – an area off the Orkney and Shetland Isles (Fig. 6) within which priority to fish is given to vessels whose home port is in the islands. All island vessels less than 26 m and some over 26 m can fish in the area plus 128 'Shetland Box' licensed vessels from Belgium, France, Germany and UK fishing for demersal species. These restrictions are in recognition of the islanders'

dependence on fishing for a living. (See also derogation and Hague Preference.)

**side-scan sonar** – a form of echosounder that views the seabed obliquely and has greater power to discriminate detail than a conventional, vertical echosounder.

**side-trawler** – a traditional design of trawler from which the trawl is deployed over the side rather than from the stern, as has been more usual since the 1960s. (See also stern-trawler.)

**Site of Community Importance** – is a site which, in the biogeographic region to which it belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a habitat or species scheduled in the EU Habitats (and Species) Directive.

**Site of Special Scientific Interest** – see SSSI.

**skate** – eg common skate (*Raja batis*) a rare (UKBAP) species, a member of the ray family (*Rajidae*). (See also rays.)

**slipping** – releasing fish from any net, but particularly a purse seine, without first bringing them aboard.

**SMA** – sensitive marine area: a non-statutory nature conservation designation for England. It identifies areas of nature conservation interest for which widespread consultation is desirable before any development takes place. (See also MCA.)

**soak time** – a measure of effort applicable to static/passive fishing gear such as drift nets, set nets and pots. It is the period of time between the gear being set in its fishing position and being hauled to remove fish.

**sorting grid** – a rigid grid inserted into a shrimp trawl to allow shrimps to fall back into the cod-end but diverts many fish to an escape panel in the top of the trawl.

**SPA** – special protection area: a designation specified in the Birds Directive to safeguard birds, particularly migratory species, and their habitats. In combination with special areas of conservation (SAC), these sites contribute to the Natura 2000 network.

**spat** – juvenile bivalve molluscs. (See also seed.)

**Spawning Stock Biomass** – see SSB.

**Special Area of Conservation** – see SAC.

**Special Protection Area** – see SPA.

**Species Action Plan** – see SAP.

**square mesh** – traditional manufacturing methods produce netting that falls most naturally into a diamond shape. Under tension there is a tendency for the meshes in diamond-mesh trawls to close and reduce the effectiveness of mesh selection. Modern net-making machinery can produce square-mesh netting which is less prone to closure under tension.

There are an increasing number of management measures that require square-mesh panels to be built into the top of demersal trawls to facilitate the escape of juvenile and undersize fish.

**SSB** – spawning stock biomass: the total weight of all sexually mature fish in a population or stock. It is the sexually mature part of an exploited population upon which the future survival of the stock, and its fishery, depends.

**SSSI** – site of special scientific interest: an area of land notified under the *Wildlife and Countryside Act* (1981) as being of special nature conservation or geological or physiographic interest. The designation SSSI applies throughout Great Britain. The equivalent designation in Northern Ireland is Area of Special Scientific Interest (ASSI). Sites are notified by the appropriate nature conservation agency.

**stake net** – a colloquial term for a wide variety of intertidal nets, including salmon traps, that are held in shape and position by stakes driven into the seabed.

**standing stock** – the total number or biomass of a population at a given time.

**static gear** – any form of fishing gear that operates without being towed or moved through the water, eg Crustacea pots, long-lines, set nets, traps.

**Statutory Instrument** – a document bringing into force, usually as a result of an Order in Council, a

variation to existing legislation without the need for Parliament to amend the primary legislation.

**STECF** – the Scientific, Technical and Economic Committee on Fisheries of the EC, DG Fisheries (Fig. 2). Unlike ICES working groups and ACFM (Fig. 3) which only consider stock assessments and management from a scientific perspective, the STEFC is expected to consider the socio-economic implications of modifying or varying scientific, including ICES', advice.

**stern-trawler** – a trawler that shoots and hauls its net from the stern rather than over the side as was more usual up to the 1960-70s.

**stock** – see fish stock.

**stock and recruitment** – the notional relationship between the size of the (parent) spawning stock and the number of recruits joining that stock in later years. The probability is that a depleted stock will produce fewer recruits than an abundant stock of the same species but the nature of the relationship between these two extremes is not well understood.

**stock assessment** – the investigation, analysis and numerical description of the recent history and current state of a fish stock and the fishery that exploits it, ie distribution, abundance, size or age structure, fishing effort, catch rates etc.

**stock biomass** – the total weight of all fish of all ages in a given population or stock.

**stock enhancement** – any measure that will improve the abundance of the stock but more generally applied to hatchery rearing and release to the wild of fish, particularly salmon, Crustacea and molluscs.

**straddling stocks** – any stock of fish that migrates regularly across international jurisdictional boundaries but particularly highly migratory species such as tunas. Their management is covered by the provisions of the *UN Convention on Straddling and Highly Migratory Fish Stocks* (1995).

**Structural Funds** – the EU multi-annual budget for reducing social and economic inequality across the Community. (See also Objective **x** funding.)

**sublittoral** – depths greater than the intertidal zone (Fig. 1).

**subsidiarity** – devolution by the EU of responsibility to national or local government for meeting and enforcing EU policies, monitoring national catches and closing fisheries once the national quota is taken.

**suction dredge** – see hydraulic dredge and air-lift.

**surplus production** – the quantity of fish resulting from growth plus recruitment each year that exceeds the quantity of fish lost through natural mortality (**M**). It is the quantity of fish available to support a sustainable fishery.

**surveillance (fishery)** – the operational activities of Sea Fish

Inspectors and fishery protection vessels to ensure that national and EU fishery regulations are observed and implemented. (See also satellite surveillance.)

**surveillance (scientific)** – the conduct of field surveys with *post hoc* detection of trends followed by explanation of those trends. Also (nature conservation), monitoring and/or sampling with sufficient rigour and regularity to detect any change in the attribute or species for which a site has been designated. (See also monitoring and sampling.)

**sustainability** – meeting the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987 – *the Brundtland Report*).

**sustainable development** – development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987 – *The Brundtland Report*).

Development that takes account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long-term as well as short-term advantages and disadvantages of alternative actions (IUCN 1980).

Development integrating into all the relevant sectoral policies, at national and international level, the implications of economic growth on the environment, and seeking to satisfy the needs of the present and future generations equitably, in particular by allotting a value to environmental resources in order to identify and

evaluate the economic activities on the environment (EC 1999).

**sustainable fisheries** – fisheries with an annual catch, including discards, that does not exceed the surplus production of the stock (ie annual growth plus recruitment less the annual natural mortality – **M**). Fisheries can be sustainable at levels of stock significantly below the stock that would support MSY or MEY but only if managers pay full regard to limit reference points. (See also environmentally sustainable fisheries.)

## T

**T-net** – a type of intertidal / coastal stake-net salmon trap that is worked on the east coasts of Scotland and NE England. The trap is set across the outer end of a 'leader' wall of netting – thereby forming a 'T' shape. (See also J-net).

**TAC** – total allowable catch, the quantity of fish that can be taken from each stock each year. The figure is agreed by the Fisheries Council of Ministers each December for the following year. EU member states are allocated a fixed proportion of the TAC as their national quota. (See also relative stability and track record.)

**tangle net** – a bottom-set net that is attached to a headline much shorter than the length of netting so that the net hangs in loose folds. Some fish are trapped by the operculum – gill cover – (see gill nets) while others, including Crustacea, become enmeshed in the

**sustainable catch** – see sustainable fisheries.

**sustainable yield** – see sustainable fisheries.

**SVPA** – separable virtual population analysis: a procedure for constructing fish population life-tables as a basis for assessing the current status of a stock and forecasting the probable consequences of adopting various fishery management options. This model differs from VPA by 'separating' the effects of time (trends) from current activity in estimating fishing mortality rates (**F**).

loose netting. (See also trammel nets.)

**target species** – the primary species of fish that a fishing vessel aims to catch during a given fishing operation. In pelagic fisheries this can be a single species, eg herring or mackerel, but it is usually a group of species in demersal fisheries, eg cod and whiting or plaice and sole.

**technical interactions** – the interaction of one technical management measure with another. For example, the optimum minimum mesh size (MMS) in a cod fishery is too large for optimum mesh selection of whiting which are a more slender and smaller species. Thus, too many large, marketable whiting could escape. Naturally, the converse is also true. Similarly, Dover sole, which is an extremely supple fish, can escape through much smaller meshes than can a plaice of the same length. These

technical interactions highlight a fundamental shortcoming in single-species TAC-quota management and mixed-fishery mesh regulations.

**technical conservation**

**measures** – fishery management measures aimed primarily at the equipment used in fishing rather than the time and place they fish or what they catch, eg minimum mesh sizes (MMS), engine power, width of individual (eg scallop) dredges and the number towed by one boat. (See also biological conservation measures.)

**technical / technology creep** – the continual increase in efficiency of fishing power. This applies to all aspects of fishing operations from stronger twine in trawl construction, through improved designs for propellers, to ever more precise and accurate navigation aids. Throughout the last quarter of the 20<sup>th</sup> century this 'creep' was estimated to average about 2-3% per year.

**teleost** – a fish with a bony skeleton, eg herring, cod, plaice. (See also elasmobranch.)

**Territorial Sea** – the area of sea over which the coastal state exercises jurisdiction (as permitted by the UN *Convention on the Law of the Sea*), normally 12 nautical miles from baselines (Fig.1).

**third country** – countries that are not members of the European Union (EU), eg Norway, Poland, Mauritania etc.

**tickler chain** – a heavy chain across the mouth of a trawl in front of the

ground-rope. They penetrate soft seabeds and disturb – 'tickle' – flatfish buried there and cause them to rise up and enter the trawl. Otter trawls can be rigged with 2-3 tickler chains but a heavy beam trawl may have as many as twelve. (See also chain matrix.)

**tooth bar** – the lower front edge to the mouth of a scallop dredge or similar. (See also French and Newhaven dredge.)

**total mortality** – see **Z**.

**track record** – a record of catches taken or participating in a particular fishery going back a specified number of years. Often a prerequisite to being allocated a quota at national, regional or individual boat level.

**tractor dredge** – a modified agricultural potato digger towed behind a tractor to gather cockles from the intertidal area at low water.

**Tragedy of the Commons** – the title of a seminal essay by Hardin (1968) which argued that any natural resource (fishery) that was open to all-comers was doomed to over-exploitation and collapse. (See also Graham's Great Law.)

**trammel nets** – set nets made from three layers of netting, a central sheet (the lint) with small meshes sandwiched between two outer sheets (armouring) of large mesh netting. A fish swims through the first outer layer's meshes and pushes the inner small mesh layer through a mesh of the second large mesh layer to form a pocket with the small mesh net. It becomes trapped – trammelled – in

this pocket. (See also gill nets and tangle nets.)

**transhipping** – the process of passing fish from the catching vessel to a factory ship or carrier vessel off-shore without ever putting the catch ashore. The catch still counts against the catching vessel's (national) quota. Also known as klondiking.

**traps** – any form of static gear that catches fish by enclosing them and preventing their escape but without holding them fast as with gill nets or long-lines.

**trawl** – a large, funnel-shaped net (Fig. 5) that is towed through the water by single or paired boats. The mouth of the net is held open by a beam (beam trawl) or floats along the headline, weights along the groundrope and is pulled open

laterally either by the doors attached to the towing wires (warps) or two boats pulling one warp each. (See also demersal trawl and pelagic trawl.)

**trawler** – a fishing boat that tows a trawl.

**trolling** – a method of hook-and-line fishing where the lines are trailed out behind a boat that is underway. It is used to catch surface swimming pelagic species such as mackerel and tuna.

**turf community** – the populations of animals (and plants) that often grow closely together and encrust rocks and other habitats.

**twin rig** – an arrangement of what is essentially two otter trawls joined in the centre by a shared bridle or at the wing ends, to fish side by side when towed by a single boat.

## U

**UKBAP** – the UK Biodiversity Action Plan, the Government's programme aimed at meeting some of its obligations under the UN *Convention on Biodiversity* (1992). A wide range of habitat action plans (HAP) and species action plans (SAP) are being implemented to help safeguard and improve the conservation status of priority habitats and priority species.

**UK Waters** – include all tidal waters within 200 miles of baselines over which the UK exercises certain rights and jurisdictions. The extent of potential action by the UK in these

waters is subject to the rights of other states under the UN *Convention on the Law of the Sea* (UKBG 1999). The UK Government does not claim an exclusive economic zone (EEZ) (Fig. 1).

**U<sub>lim</sub>** – see limit reference points.

**UNCLOS** – the UN *Convention on the Law of the Sea* that provides for the regulation and management of all living resources and the establishment of exclusive economic zones (EEZ).

**under-reporting** – failure to meet the legal requirement under the CFP to report fully and accurately all the fish

that have been caught and landed.  
(See also misreporting and black-fish.)

**undersize fish** – any fish that is less than the legal minimum landing size

## V

**vagrant species** – species that have strayed, by migration or drift with currents, beyond their natural range but have not established self-sustaining populations. Most vagrant species found in UK waters are from warmer waters to the south and west of the British Isles.

**VCU** – vessel capacity units:

*[length (m) x breadth (m)] + 0.45 engine power (kW)*

a formula (MAFF, 1999) standardising different classes of fishing vessels as an aid to meeting targets of the Multi-Annual Guidance Programme (MAGP).

**vivier** – a term used to describe boats and lorries that carry live fish, but Crustacea in particular. (See also keep box.)

## W

**warps** – the heavy wires with which boats tow trawls (Fig. 5).

**white fish** – any of the demersal species, eg cod, haddock, plaice, but not the pelagic, oil-rich species.

**Working Group (ICES)** – *ad hoc* committees convened by one or more of the ICES standing committees (Fig. 3) to assess the status of particular

(MLS). It is an offence for anyone to retain or offer for sale undersize fish.

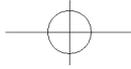
**U<sub>pa</sub>** – see limit reference points.

**VMNR** – voluntary (ie non-statutory) marine nature reserve. (See also MNR.)

**V-notch** – a notch put in the tail fan (telson) of egg-bearing lobsters. In some areas there are voluntary agreements to return notched animals to the sea but some Sea Fisheries Committees (SFC) have byelaws making it an offence to land such animals. The notch is lost at moulting.

**VPA** – virtual population analysis: a mathematical procedure with which to construct fish population life-tables as a basis for assessing the current status of a stock and forecasting the probable consequences of adopting various fishery management options.

stocks (eg North Atlantic Salmon WG), fisheries (eg Arctic Fisheries WG), or specific aspect of fishery science or technology (eg acoustics, ecology, genetics etc). Participation is open to any accredited scientist from any ICES member state. Participants are expected to assess the available data impartially and give priority consideration to stock conservation and sustainability.



## Y

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**year class** – all the fish in a population that were spawned in the same year, eg the '1998 year-class'.

**yield per recruit** – the mean long-term yield in weight from every individual fish that is recruited to the exploited stock.

## Z

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**Z** – formally, the instantaneous rate of total mortality (the natural logarithm of the change in abundance due to fishing per unit of time); but more simply, the proportion of the population dying each year through natural causes (**M**) and as a result of fishing (**F**), ie  $Z = F + M$ .

**zooplankton** – all the animals, mostly microscopic, that swim in mid water but drift to-and-fro with the currents. (See also phytoplankton.)



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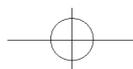
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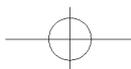
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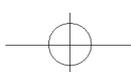
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