North Western Waters

Fisheries Ecosystem Plan

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MEFEPO

Making the European Fisheries Ecosystem Plan Operational

North Western Waters : Fisheries Ecosystem Plan

WHAT IS MEFEPO?

The Making the European Fisheries Ecosystem Plan Operational (MEFEPO) project is an EU-FP7 funded project designed to further development of a framework, and the supporting evidence base (natural and social science), required to integrate the Marine Strategy Framework Directive (MSFD) objectives within a reformed Common Fisheries Policy in the context of sustainable ecosystem based fisheries management (EBFM).

The transition to EBFM has considerable implications for the knowledge base required to support management, and requires new approaches to integrate and combine data on the ecological, social and economic pillars of sustainability. This transition also requires appropriate institutional structures to enable successful implementation.

The aim of MEFEPO is to demonstrate an operational approach to European EBFM and a description of how it can be delivered.

WHAT ARE FISHERIES ECOSYSTEM PLANS?

Fisheries Ecosystem Plans have been developed as a tool to assist managers and stakeholders simultaneously consider the ecological, social and economic implications of management decisions within a framework supporting EBFM.

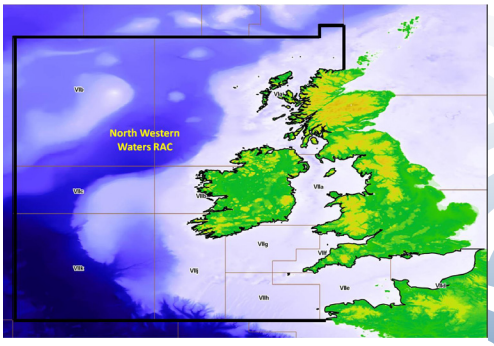
Through structured interaction with stakeholders, the MEFEPO project has developed Fisheries Ecosystem Plans (FEPs) for three major European marine regions (North Sea, North Western Waters and South Western Waters Regional Advisory Council (RAC) regions).

Central to the FEPs is a management strategy matrix which presents an overview of the potential impacts of different combinations of management measures on the ecological, social and economic status of the system. The FEPs also describe an operational model for regionalisation of European fisheries management in support of EBFM. This document is a summary of the North Western Waters FEP, and is supported by a more detailed technical report (see back page for details).

INTRODUCTION TO THE NORTH WEST WATERS REGION

The North Western Waters (NWW) RAC region is situated in the north east Atlantic off the west coasts of Ireland and Scotland, and extends into the Celtic Sea, Irish Sea and the English Channel. The NWW covers approximately 1.15 million km^2 and incorporates 12 ICES Divisions and three OSPAR regions. Parts of the EEZ (Exclusive Economic Zone) of three countries (UK, Ireland and France) make up the NWW. 20% of the NWW area is less than 100m deep, 17% lies between 100m and 200m and 20% between 1,000m and 1,500m. The dominant seabed feature of the western part of the NWW area is the Rockall Trough. This opens into the Porcupine Abyssal plane at its southern end and further south is the Porcupine Seabight.

Landings from the NWW area were estimated at 1.3 million tonnes in 2009. Key pelagic species are blue whiting, Atlantic mackerel, horse mackerel, herring and boarfish. Key demersal species include haddock, whiting, hake, monkfish and cod. Important invertebrate species contributing to NWW fisheries include scallops, *Nephrops*, crabs, whelks and blue mussels. Discards in the waters west of Ireland and UK (Scotland) vary between 31% and 90%, compared to the global average of 8%. The predominant pressures acting on the marine environment of the NWW region are fishing, climate change and an increase in harmful algal blooms (HABs).



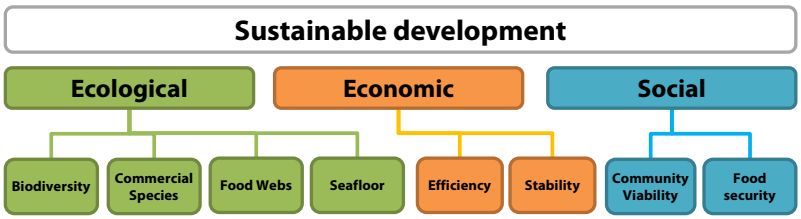
North Western Waters (NWW) region

DRIVERS OF CHANGE IN EUROPEAN FISHERIES MANAGEMENT

The Green Paper on the Reform of the Common Fisheries Policy (i) identified the need for EBFM taking account of the ecological, social and economic pillars of sustainability, (ii) stated an intention to move towards a longer term approach to fisheries management, and (iii) made commitments to greater stakeholder involvement in management. The Marine Strategy Framework Directive (MSFD) defines environmental objectives for European seas, based on sustainable utilisation of healthy marine ecosystems in support of sustainable development. The Integrated Maritime Policy specifies that individual sectors (e.g. fisheries) need to support MSFD objectives. These commitments have shaped the development of the MEFEPO Fisheries Ecosystem Plans (FEPs).

DEVELOPING THE FEPs FOR REGIONAL SEAS

'Descriptors' for the ecological, social and economic status of the fisheries were developed to enable simultaneous consideration of the potential impacts of different management strategies on the three pillars of sustainability. Stakeholders supported the MEFEPO "three pillar" approach to explore potential impacts of different management strategies on multiple objectives for the marine environment.



MEFEPO approach to the development of regional Fisheries Ecosystem Plans (FEPs).

Ecological descriptors, drawn directly from the MSFD, were selected at a MEFEPO stakeholder workshop as those most impacted by fishing activities (biodiversity, commercial fish, food-webs and seafloor integrity). Social and economic descriptors were defined to monitor the main aspects of fishing contributing to the economic and social wellbeing of society, in particular coastal communities. Economic descriptors focus on fishers' ability to maximise economic efficiency of fishing operations (efficiency) and minimising fluctuations in harvesting possibilities over time (stability). Social descriptors monitor employment opportunities within the catching sector (community viability) and securing catch potential for human consumption (food security).

CASE STUDY EXAMPLES

Preliminary case studies of selected fisheries have been developed to demonstrate practical application of the management strategies matrix approach. In each case, the potential performance of a limited number of management strategies was evaluated; two of the four NWW case studies are included in this summary. The efficacy of the management strategies was considered in the context of high level management objectives for European fisheries. The predicted change in the descriptor status associated with implementation of each management strategy was assessed.

Expected improvement in the status of the descriptor

Stable (i.e. no change in the status of the descriptor)

Expected deterioration in the status of the descriptor

Outcome unknown

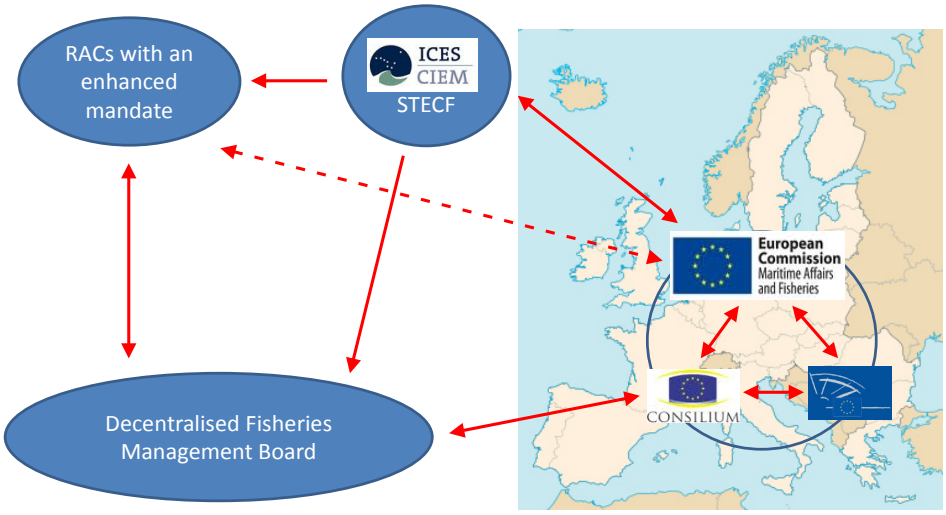
The suite of management strategies comprised of "business as usual" (BAU) and alternative strategies applying different management tools, to explore how the objectives of EBFM may be most effectively achieved. Trade-offs associated with different management approaches were examined. Management strategy matrices were completed based on the best available evidence (modelled, empirical and expert judgment) under the following assumptions:

- Timeframe: descriptor responses considered against a 5-10 years timeframe; other effects may take place in the shorter or longer term.
- Partial assessment: predictions based on changes in one (or a few) selected measures whilst assuming all other measures remain constant.
- Constant surroundings: all external factors were assumed to remain constant (e.g. price of fish, fuel prices, water temperatures).

OPERATIONAL MODEL FOR REGIONALISING THE COMMON FISHERIES POLICY

Appropriate institutional structures to facilitate stakeholder participation in management at appropriate regional scales are considered a prerequisite for successful implementation of EBFM within Europe. The institutional framework below was developed by the MEFEPO project through structured interaction with stakeholders (key-informant interviews, observation of RAC/international meetings discussing the CFP reform, large survey and workshops).

The model is based on a decentralised management structure with decision-making power devolved to Member States (MS) co-ordinated at the regional level, enhanced Regional Advisory Councils (RACs) with appropriate scientific support, and a more collaborative approach between MS, RACs and science to develop long term management plans (LTMPs).



Governance model for regionalisation of the Common Fisheries Policy developed by stakeholders at the MEFEPO workshop in Haarlem, April 2011. Decentralised Fisheries Management Board (DFMB) similar to the '*Cooperative Member State Council'* model put forward by Raakjaer et al. (2010) but supported by RACs with an enhanced mandate.

KEY COMPONENTS

- The institutional structure and formal distribution of powers remains largely unchanged.
- Voluntary agreements, soft law and *de facto* authorities rather than *de jure* authority to make decisions. Based on informal regional politico-administrative structures.
- MS with fishing interests in a regional sea area establish Decentralised Fisheries Management Board (DFMB) to deal with fisheries management issues specific to that area.
- The DFMBs put forward their recommendations for formal approval to the overall EU Fisheries Council
- RACs become a working group for the DFMBs.
- RACs represented as observers at DFMBs.
- Regions can calibrate the institutional model to meet regional needs.

This model provides a high degree of flexibility within the present legal structures. However, this freedom comes at the expense of its scope given that it relies upon voluntary agreements, soft law and *de facto* authorities based on quality of input rather than *de jure* authority to make decisions.

More details on the operational model for regionalising the Common Fisheries Policy can be found in the MEFEPO *Key operational challenges to the introduction of an ecosystem approach to fisheries management: Workshop report* (van Hoof et al. 2011) on the project website: http://www.liv.ac.uk/mefepo/Reports_and_outputs.htm

CASE STUDY FISHERY 1: *NEPHROPS*

Introduction to the fishery

Nephrops require a muddy seafloor habitat in which to burrow and the distribution of suitable sediment defines the species distribution. *Nephrops* are primarily fished using bottom otter trawls; direct effects of bottom trawls on benthic habitats are related to physical disturbance by contact with the seafloor. A large proportion of the catch in the Nephrops fishery in NWW is made up of non-target, invertebrate by-catch species; non-marketable by-catch is discarded at sea. Commercial fish species (e.g. cod, whiting) caught as by-catch are landed if quota allows; over-quota or undersized fish are discarded.

State of the stock

Functional Units in VI (FUs 11 to 13): Two out of the three FUs in VI were fished above F_{MSY} in 2009. For 2011 a TAC of 13,681 tonnes applies in area VI, ~15% reduction on 2010.

Functional Units in VII (FUs 14 to 22): FUs 14 and 15 were fished above F_{MSY} and FU 16 had falling catch and abundance in 2009; FU 18, Aran, was fished below $F_{MSY.}$ F_{MSY} is unknown for FUs 19-22 but LPUEs were stable. For 2011 a TAC of 21,759 tonnes applies in area VII, ~3% reduction on 2010.

Current management (Business as usual)

The following tools are currently being employed for *Nephrops* management in NWW:

- Total allowable catch
- Effort (days at sea)
- Minimum landing size
- Mesh size restrictions (reduction of by-catch)
- Seasonal closures

BAU performance

- Effort controls considered effective due to direct relationship between effort and catch.
- Fails to address "poor" condition of ecological descriptors and hence fails to meet objectives of the MSFD.
- TACs have been successful in reducing the overall landings but allow redistribution of fishing effort among Functional Units as set at higher spatial scales (ICES division rather than FU).
- Discarding of by-catch is high in some FUs.
- Minimum landing size is not considered important, desirable size is market driven.

Alternative management strategies

Management at Functional Unit level

The overriding management consideration is that management should be at FU level to ensure that catch opportunities and effort are compatible and in line with the scale of the resources in each of the FUs (ICES 2010). This view is supported by the NSRAC (2011), therefore this initiative has been considered as a key component of each of the following potential management strategies.

Strategy A: Increase Closed Fishery Areas

Currently 75% of one *Nephrops* FU (the Porcupine Bank) has a seasonal closure to fishing (3 months) which reduces effort when the highest proportion of females would be caught. Under this strategy seasonal closures would apply to 100% of the FU.

Strategy B: Minimise By-catch

Addresses by-catch (and thus discarding) through an increase in the minimum mesh size for *Nephrops* trawls from 70mm to 90mm and use of "Swedish Grid" separators in all FUs.

Strategy C: Increase Creels, Decrease Trawls

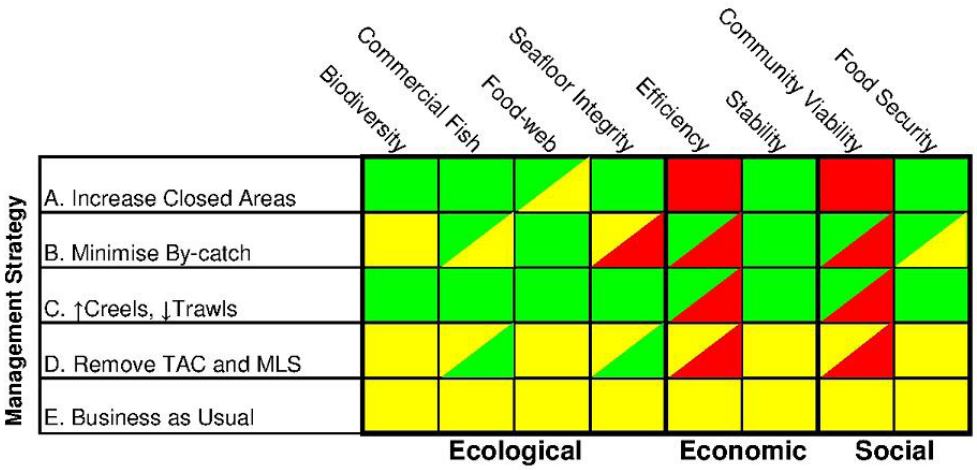
Use of trawls would be greatly reduced and areas of each FU would be open to creel fisheries only (in inshore and offshore FUs) which have significantly less impact on the seafloor and less by-catch.

Strategy D: Remove MLS and TAC

Streamlining the current management tools by (i) removing the minimum landing size (a market for larger *Nephrops* and a mesh size restriction curbing the by-catch of undersize prawns means that the MLS may be redundant) and (ii) restricting catch by limiting effort rather than using a TAC (there is strong, positive correlation between effort and catch in *Nephrops* trawl fisheries).

Management strategies matrix

The matrix examines expected outcomes from the alternative management strategies over a 5-10 year horizon.



Management guidance

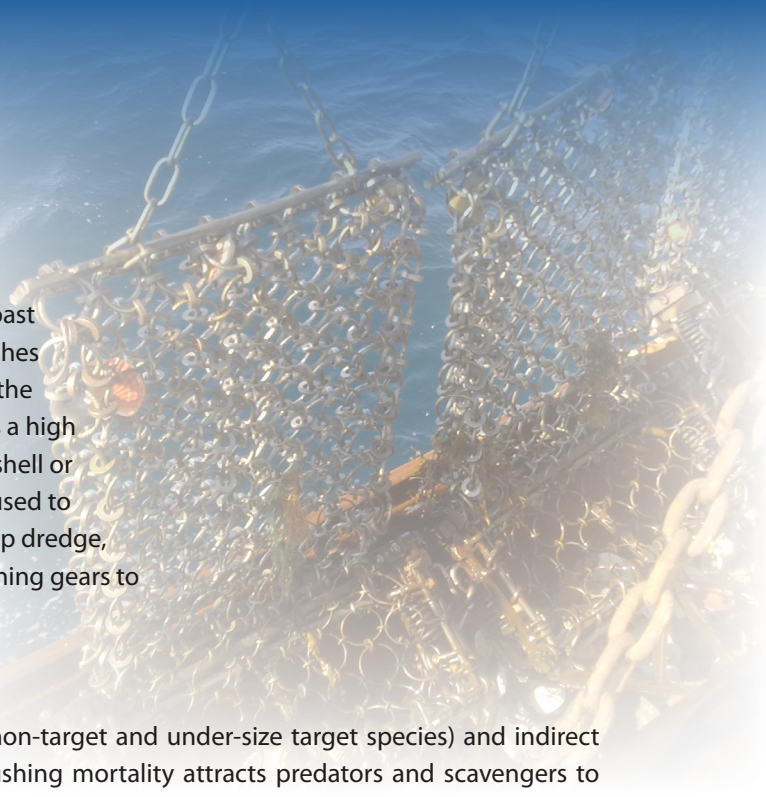
Review of the alternative management strategies indicates that it is possible to modify management in the *Nephrops* fishery to provide improvement in the ecological descriptors without significant deterioration in social and economic descriptors. However there is variation in performance among management strategies.

If the overarching management objective is to work towards Good Ecological Status (GES) in the context of the MSFD, then strategy C is considered to be the most appropriate given that a reduction in trawling and replacement by creels is predicted to provide improvement across all four ecological descriptors (biodiversity, commercial fish, food webs and seafloor integrity). This strategy is also predicted to provide improvement in terms of stability of catches and food security due to improvement in commercial stocks. However, strategy C may have negative effects on some parts of the *Nephrops* fleet where individuals are unable to afford the switch between gears (community viability) or where catches are reduced (efficiency).

Strategy A is most likely to have a negative effect on employment and will also limit choice on where fishers can fish. Closing areas has the potential to cause increases in effort in areas where fishing is not restricted, potentially limiting access to areas of high profitability. Furthermore, depending on the location of the closures, and the scale of the fleet operating in their proximity, additional fisheries closures may exclude some fishers due to their inability to switch effort to different (non-protected) areas.

None of the strategies considered would significantly improve efficiency as they do not control fishing effort at the individual level, meaning that boats would continue to fish until their costs are equal to revenues. It may be possible to improve efficiency through the introduction of a rights based management (RBM) system, to ensure that fishing rights end up with the most efficient fishers (those with the lowest harvesting costs) and this could be used in conjunction with the strategies considered. However, acceptability of the various forms of RBM differs among stakeholders and further investigation is required to examine application in this fishery.

CASE STUDY FISHERY 2: SCALLOPS



Introduction to the fishery

Scallop is an important commercially exploited bivalve. The fishery occurs mainly in inshore waters off the south east coast of Ireland, in the south Irish Sea and in the western approaches to the UK and France. Important fisheries also exist around the Isle of Man and off the west coast of Scotland. The scallop is a high value species. Scallops are most abundant on gravel, sand/shell or stony substrates at depths of 15-75 metres. The main gear used to catch scallops is a toothed spring loaded "Newhaven" scallop dredge, which is considered to be among the most damaging of fishing gears to benthic communities and habitats.

State of the stock

Currently there are no formal stock assessments or quotas in England, Wales or Northern Ireland. UK stock status is variable with many considered to be fully or overexploited. The majority of the Isle of Man stocks are considered to be fully or over-exploited. Stocks in Irish waters are considered to be stable, with low exploitation rates and stable age structures. All French stocks are considered to be fully or overexploited. Output from virtual population analyses in Scotland indicate that spawning stock biomass (SSB) in some areas has declined to historically low levels.

Current management (business as usual)

Scallop fisheries are mainly managed at the national level thus there are many management tools used in Member State's territorial waters (12nm) but relatively few are employed in offshore areas.

EU level regulations applicable to all fleets in NWW include:

- Minimum landing size
- Effort (days at sea and engine size/power)

BAU performance

Current landings of scallops in NWW countries are mostly stable (with the exception of certain Scottish stocks), however this may represent a sequence of depletions where fishers are continuously finding previously unfished areas. Problems with the market for scallops exist: the processing costs are high and scallop producers cannot compete with cheaper imports from outside the EU. The effort of the Irish fleet, for example, may be restricted by this market, with cheaper imported scallops making many fishing trips unprofitable.

BAU performs poorly under the ecological pillar. Due to the inefficiency of the Newhaven dredge, a maximum of ~30% of the catch is kept. The damaged by-catch (of non-target and under-size target species) and indirect fishing mortality attracts predators and scavengers to recently dredged areas, which has the potential to alter local food-webs. Scallop dredging leads to incidental mortality of some other commercial species, such as crab, in some areas.

Alternative management strategies

Strategy A: Rotation of Closed areas

A proportion of the fishing area would be closed to scallop dredging and the "fallow" area rotated every 4 to 6 years. Mainly aimed at the offshore fishing areas but could be extended to inshore areas if required.

Strategy B: Fishing Technology and Increased RBM

Use of improved fishing technology (e.g. dredges whose tines are individually sprung) to reduce indirect fishing mortality and wider environmental impacts and introduction of rights based management (RBM) to limit fishing effort (e.g. Individual Transferrable Quotas).

Strategy C: Fishing Technology and Catch Control

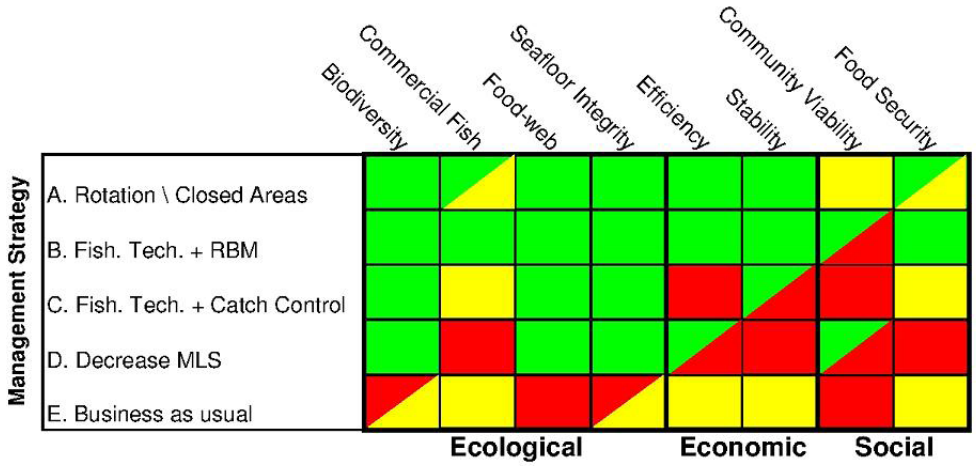
Use of improved fishing technology (e.g. dredges whose tines are individually sprung) to reduce indirect fishing mortality and introduction of a total allowable catch (TAC) to limit target species mortality to compensate for increased fishing efficiency. TAC for each ICES division in which commercially viable offshore scallop populations exist (e.g. VIa, VIIa and VIIg).

Strategy D: Reduce Minimum Landing Size (MLS)

Reducing the MLS would increase the proportion of legal catch in each haul and decrease effort required to fill the hold. Currently, MLS is 110mm in the English Channel and Irish Sea, and 100mm elsewhere due to spatial differences in growth rates; under this strategy MLS would be reduced by 10mm in both areas.

Management strategies matrix

The matrix examines expected outcomes from the alternative management strategies over a 5-10 year horizon.



Management guidance

Scallop management in NWW is predominantly at a national level and scallop dredging is one of the most destructive fishing practices. There is scope for significant improvements in all three pillars but the best way to affect the change will depend on the overall objective.

If the overarching objective is to improve the ecological descriptors and achieve GES for the MSFD then management strategies A (closed areas) and B (fishing tech. and RBM) are the most appropriate. Closed areas would lead to definite improvements in those specific areas and probable improvements in unprotected areas whereas improving fishing technology and introducing RBM would likely lead to improvements in the entire region. Overall more descriptors are expected to improve under strategy B. Both strategies are expected to lead to an improvement in the stability descriptor, though it should be noted that the rotation/closed area strategy should produce a greater improvement than RBM. Closed areas greatly increase the density, and therefore spawning potential, of scallop whereas dredged areas, even under reduced effort, still have damaged adults and juveniles and reduced habitat complexity, which can impair scallop recruitment.

If the management objective is to maximise employment, then strategy D (reduce MLS) is best placed to achieve this in the short term. Maximising employment will provide short term improvements in terms of the social and economic pillars. However there may be long term consequences as a result of negative impacts of maximised employment on the ecological descriptors and thus the ecosystem which, in the longer term are likely to have a negative impact on the social and economic descriptors through loss of earnings.

If the objective is to maximise long-term profit then strategy B is the best option as it will improve commercial stocks and efficiency. However, as outlined above, the acceptability of RBM varies greatly between member states. Strategy A also provides advantages to commercial stocks and efficiency and closed areas may be a more universally acceptable management tool than RBM. That said, the proposed reform of the CFP includes plans for the introduction of individual fishing quotas for assessed stocks.

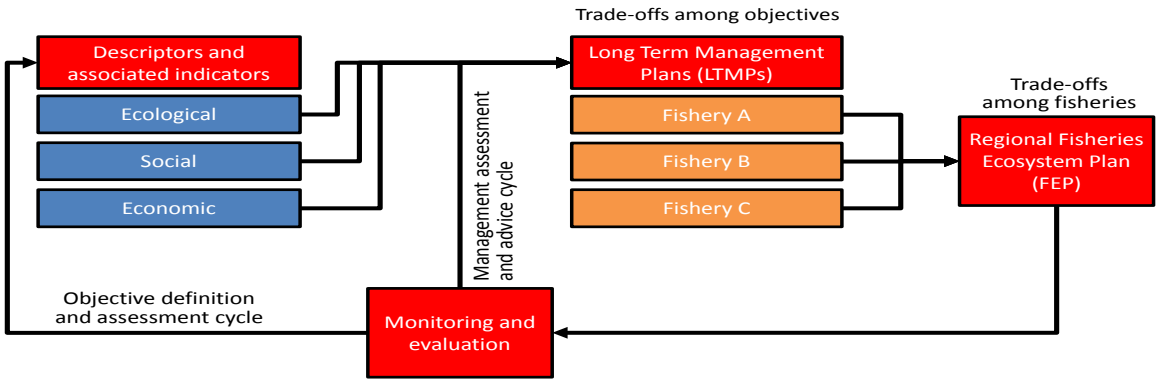
Due to the fact that the pillars and descriptors are interconnected, the right management strategy will lead to positive knock-on effects in almost all of the descriptors and pillars. However the reverse is also true.

SUMMARY

We have demonstrated the application of a management strategy evaluation matrix approach to the development of regional Fisheries Ecosystem Plans (FEPs) to help decision-makers to simultaneously consider ecological, social and economic implications of decisions, and to inform the development of EBFM for European fisheries. The case study fisheries examined should be seen as heuristic examples and not definitive assessments of the potential effects of different management strategies.

To make EBFM a reality, the next steps are:

- To develop long-term management plans (LTMPs) for each of the region's fisheries considering the ecological, economic and social implications for ecosystem components. LTMPS should be integrated into regional FEPs.
- To develop closer integration among stakeholders, fisheries scientists, ecologists, social scientists and economists to develop effective management advice for LTMPs. Social and economic descriptors, and appropriate (region specific) indicators, require further scrutiny and development.
- The development of management strategy matrices requires additional information to support management advice, much of which is "new" to the formal fishery advisory process. Qualitative assessments and expert judgement will be required to supplement analytical modelling to meet the increased data requirements of LTMP development to make them operational in the short term.
- To ensure that the management framework is adaptive and able to respond to new information and understanding to allow decisions based on the best available evidence.
- To implement appropriate governance mechanisms that facilitate true stakeholder engagement to generate credibility in the management process and foster stakeholder support, this includes both definition of objectives and indicators as well as the development and evaluation of LTMPs.



Ultimately management decisions will be made on the basis of overarching objectives. Trade-offs are required both between the pillars of sustainability in the development of LTMPs, and between individual fisheries when integrating LTMPS into regional FEPs. Due to the nature of the trade-offs, it may not be possible to satisfy all stakeholder groups simultaneously. Resolution of these trade-offs is not a technical scientific decision, however development of decision support frameworks such as the management strategy evaluation matrices can aid managers in making appropriate decisions on the basis of the best available information.

This document complements a technical report entitled *Fisheries Ecosystem Plan: North Western Waters* (Bloomfield et al. 2011) available to download from the MEFEPO website from October 2011, www.liv.ac.uk/mefepo/Reports_and_outputs.htm

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SEVENTH FRAMEWORK PROGRAMME