

Long-term Management of North Sea Fisheries

SEAFISH

a report to
DEFRA
and
the North Sea Regional Advisory Council

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I. Executive Summary

This report is a key output from a project carried out at the request of the North Sea Regional Advisory Council (NSRAC) to help inform its discussions, and help it reach agreement on long term management plans for North Sea fisheries. It contains a mix of papers from researchers and scientists, reports from focus groups, outputs from workshops and views gathered during interviews with industry members around the North Sea. This report therefore does not provide a single, clear cut, agreed approach to long term management plans. Rather, it provides a start point for refining ideas and reaching agreement so that the NSRAC can provide advice to the European Commission on long term management plans for North Sea fisheries.

Sustainable development

Long-term management of fisheries is linked closely with the concept of sustainable development. The Report of the World Commission on Environment and Development first proposed the concept of sustainable development in 1987. Since then, FAO and others have stressed that it is only by taking account of ecological, economic, and social factors within an appropriate institutional structure that development can continue without exhausting natural resources. The modern concept of sustainability is seen as having at least four components: bio-ecological; social; economic and institutional.

The World Summit for Sustainable Development (WSSD) resolution to “maintain or restore stocks to levels that can produce the maximum sustainable yield” cannot be achieved by simply plotting a unique point on the yield or income versus effort curve. The Maximum Sustainable Yield (MSY) concept itself has shortcomings. MSY is not stable over time and it cannot take account of multi-species interactions. Because MSY is not achievable, too strong a concentration on the MSY approach is a recipe for failure. It is better to adopt the more general goal of achieving sustainable fisheries.

However, prioritising one of the components of sustainability to the exclusion of others – for example targeting a high biomass or making profit maximisation the only goal – will not achieve sustainability.

Failures in management and how we should address them

There can be no doubt that management of large volume demersal fisheries has largely failed in the north Atlantic. There are a number of reasons for this failure but the strong focus of management on the bio-ecological component of sustainability to the detriment of the other components has undoubtedly played a part. Two of the most important factors contributing to unsustainable fisheries are inappropriate incentives (to fishermen), and poor governance.

The Common Fisheries Policy has been a particular failure. Many of its fisheries are not biologically sustainable, management is essentially short-term and based on a single-species approach, many fishers feel alienated and do not comply with rules which they consider impracticable or inappropriate, discarding is commonplace, the quality of biological advice is impaired by poor data, and fishers distrust the advice. The division of responsibility between the Commission and Member States adds to the institutional complexity. Although the CFP may have curbed the worst excesses of over-fishing and provided some equity in sharing resources

between countries, management has been characterised by hostility and distrust between the different participants.

Where fishery management has been successful it has generally provided incentives to individual fishers, leading to behaviour which is consistent with conservation. The inclusion of objectives aimed at improving the economic and social components of sustainability should result in more rapid progress and should also bring benefits for conservation. However, under the CFP the institutions of management need to change before such progress will be possible.

The institutions of the CFP are not well designed for achieving sustainability as they stand. Co-operative approaches to management have only been used in the most rudimentary way. Co-management has some disadvantages; it requires managers to surrender some of their powers, it needs the full co-operation of stakeholders and it may bring difficulties in addressing long-term goals. However, co-management can bring better communication, greater transparency, stronger involvement and commitment of stakeholders and greater consent to the regulations. Strengthening co-management within the CFP seems the obvious first step to achieving sustainability and the establishment of the RACs should be seen in this light.

From examining recent developments in fisheries management in other parts of the World it is evident that long-term management requires, above all, good governance coupled with appropriate incentives (both positive and negative). Management measures must be tailored to particular fisheries – one size does not fit all – and the approach should be holistic, incorporating social and economic as well as biological objectives. Risk management must be robust, adaptive and flexible.

Where are we now in the North Sea?

Turning to the current position in the North Sea, there are a number of serious ecological concerns. Although some stocks appear to be responding well to recent, strong measures, the fishing mortality is still too high for many stocks. Some spawning stocks are at low levels, and there is the potential for damage to some non-target species.

Quota reductions, restricted days at sea and increased fuel costs have restricted vessel profitability. Many fleets have experienced several years of low average profit levels, and some have contracted sharply in size. Processing plants are closing and the infrastructure which supports fishing is declining. In a number of countries, transferable catch and effort arrangements have been introduced and some fishers believe that these are gradually encouraging economic goals at the expense of social goals.

Socially, the rapid changes in some fleets are uncomfortable for some communities. The attitudes of fishers towards managers are becoming more hostile. There is a perception that the general public no longer takes a positive attitude towards fishers.

Where do we want to go?

In terms of the direction in which we should move, there is a wish to be free of the current top-down “command and control” approach to management and in favour of a more bottom-up co-management or “stewardship” approach. Stewardship is where government delegates

management responsibility to stakeholders, while retaining the right to close a badly run fishery. There is agreement that management should focus on fisheries rather than fish stocks.

Ecologically, in particular, there is a range of views about the need to reduce fishing mortality. Few stakeholders and scientists would disagree that we need to establish biological objectives for stocks and mortality and move progressively toward them. Some fishers believe that species such as haddock, saithe and *Nephrops* are currently being exploited at acceptable rates of mortality. Others including scientists believe that for some species we still need to reduce fishing mortality by meaningful amounts. Environmental, multi-species and density dependent considerations are considered important in setting targets. Those targets must be reviewed from time to time, as they may well change. It is important to preserve key habitats and mitigate by-catch by appropriate measures. Scientifically we need to acquire a better understanding of how fleets generate fishing mortality. There is also a serious scientific challenge to develop a description of ecological sustainability that is both fleet orientated and stock orientated.

Economically, fishing businesses need to be prepared for economic shocks that are inevitable when operating in an uncertain natural resource sector and in an uncertain global economy. In order to prevent recourse to unsustainable fishing activities, vessels need to build up economic resilience through having average profit levels which are enough to sustain the businesses through financially lean years. Efforts to improve profitability should not be restricted to cost reduction, but should also focus on maximising return for the sustainable harvest through a co-ordinated approach to marketing the catch.

Socially, changes imposed by governments should ideally occur at rates that local communities can adjust to and absorb.

How do we get there?

In the short term, we need to move towards developing long-term management plans that have industry "buy in", that have not simply been passed down from above but have been developed as a result of discussions with stakeholders.

Ecologically, general reductions in mortality rate might be brought about by agreeing a time scale for reducing fishing mortality significantly. For some species, it may be possible to take advantage of large year classes to 'bank' fish. The co-operation of fishers is needed to make sure that cuts in fishing mortality are actually achieved. Vulnerable species may require special protection by giving fishers incentives to avoid catching them.

Economically, where vessel numbers must be reduced, it is better to allow this to occur within the industry through natural economic mechanisms, with decommissioning as back-up when profitability is low. There is a need to rationalise and harmonise various mechanisms, vessel quotas, days at sea etc, and as far as possible to avoid regulations that make fleets less efficient.

Socially, again it is preferable for change to take place at a rate that can be absorbed by communities, especially if change is imposed by government. It is important for those communities to be involved in any decisions that will have significant impact. If structural change is imposed by government then there is a case for the government to take steps to ease the transition for those in the community who suffer the negative impacts of change.

TAC and days at sea management

A study commissioned by the Dutch Ministry aims to design a system of effort management that can be used to complement current TAC management. Initial work is based on the beam trawl fleet. The approach is to quantify the relationship between days at sea and fishing mortality. This relationship (*i.e.* the catchability) can be quantified by the F_{PUE} , which is the fishing mortality that is generated per day at sea. F_{PUE} can be used as an instrument for the management of a mixed fishery where fishing on the respective species needs to be decoupled to a certain extent. The proposed management system is very preliminary; further work is necessary to develop this concept, which may be an appropriate approach for some North Sea fisheries.

The way forward

Our institutions for managing fisheries need to change. We need bodies like the RACs that will help us work cooperatively to meet common goals. The NSRAC must think carefully about its own long-term development: a key objective is to be responsible, functional and efficient in providing advice to the Commission and other recipients, so that they accept and act on that advice. The NSRAC can make a significant move towards co-management by joining with the Commission in developing long-term management plans for the key fisheries.

Long-term management plans should address all four aspects of sustainability – ecological, social, economic and institutional - and should develop objectives for each of these. However, it is not yet clear how the different aspects of sustainability can be integrated or what kind of balance between the four components of sustainability will be acceptable to all interests. In particular there is tension between, on the one hand, having a strong biological basis for setting management objectives, and, on the other hand, seeking a strong economic basis.

Bio-economic models have been applied to help formulate management plans in other countries. They are usually tailored to the fisheries and fleets under investigation. There is a history of bio-economic model development for the North Sea, particularly with regards to herring, cod (also haddock, saithe and whiting), plaice and sole. Such models could be particularly useful to help develop long-term management plans for North Sea fisheries.

Key principles for long-term management planning were put forward during the Workshop. One of the great benefits of the development of long-term management plans would be to shift emphasis from the tactical to the strategic and to limit the involvement of political actors to the development of long-term objectives rather than year to year adjustments.

There is already a good basis for dialogue with the Commission to develop a long term management plan for the plaice and sole fisheries. Although it may prove difficult to establish an end-point for the plan, we know the direction we wish to move in. A gradual approach, with stakeholder participation, will be necessary. Measures already adopted by fishers may already be moving these fisheries in the right direction.

The basis for agreeing a long-term management plan for haddock is less secure. The existing management plan adopted by the Commission is very basic. Any future plan must take into account the strong fluctuations in recruitment which characterise this species. The primary bio-economic objective is for haddock fishing to continue at around the current rate of fishing mortality, with a low risk of collapse. It is important to make the most of good recruitment – to decide how much to bank for the future. A stable future includes retaining a good age structure, bearing in mind sporadic recruitment, giving the fishing industry flexibility and stability and

protecting it against risk. In managing haddock it will be especially important to take account of the different gear types/métiers which are used to catch haddock in the various fisheries and to develop fishery-specific regulations that work collectively to meet the overall stock objectives.

Discussion in the workshop generated a list of essential features for any long-term management plan. Each long-term management plan is likely to be multi-annual, regularly reviewed and based on clear analysis of the state of each fishery. Plans will take account of the economic health of the fishery and market considerations as well as fishing mortality and spawning stock biomass.

The material gathered by this project, and the presentations and discussions at the Workshop provided a richness of material which will be invaluable for future action. This report will go forward to the Demersal Working Group of the NSRAC, which will then wish to develop its views on long term management, defining the key fisheries and then setting out plans for particular fisheries. However, it will not be possible for the NSRAC to prepare sensible and robust long term management plans on the time scales envisaged by the Commission. The NSRAC will have to move at its own pace and set its own priorities. The current plans being considered by the EU and Norway must be regarded as transitional; they will allow time for managers and stakeholders time to agree on the current position and future objectives. The immediate need is for the RACs to meet with the EU and third party states like Norway, under the Chatham House Rule, to discuss the institutional changes which will be necessary to move towards more sustainable fisheries.

II. Project Description

A major future driver for change in the approach to fisheries management is the agreement reached at the World Summit for Sustainable Development (WSSD) in 2002. The European Union and its Member States who participated, agreed, among other things, to: “maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015.”

The WSSD Declaration is one of a package of statements aimed at ensuring sustainable fisheries, building on previous international agreements such as:

The FAO Code of Conduct for Responsible Fisheries
The UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks
The Rio Declaration

The European Commission Directorate of Fisheries and Maritime Affairs has issued a Non-Paper, *Implementing sustainability in EU Fisheries: strategies for growth and employment*, which was revised on 6th August 2005. The communication focuses on paragraph 31(a), of the WSSD Declaration and its commitment to restoring stocks to levels that can produce maximum sustainable yields (MSY) by 2015. The Commission proposes that the Common Fisheries Policy (CFP) should be developed in accordance with the Declaration. The non-paper states that implementation is feasible following the 2002 reforms of the CFP, which took on the objective of ensuring “exploitation of living marine resources that provides sustainable economic, environmental and social conditions”. The introduction of management plans and recovery plans has already been a means towards that end. The Commission suggests that more progress is now required, and that appropriate measures should be taken during 2006.

The Commission's intention over the next two years is to propose long-term management plans that will, by 2015, return all major fish stocks in Community waters to levels of exploitation at which maximum sustainable yield can be produced. The rationale is that this approach will result in more stable yields from fisheries, which will become more sustainable biologically, economically, environmentally and socially. The Commission intends that this aim should be implemented by managing the fishing mortality (F), rather than by setting biomass targets.

The Commission established the basis for Regional Advisory Councils (RACs) in 2004, as a key part of the reform of the Common Fisheries Policy. RACs bring together stakeholders in the fisheries at a regional seas level. For the first time, stakeholders in the fisheries are able to assist the Commission and Member States in formulating fisheries policy, as part of a more inclusive approach towards fisheries management. The Commission intends to consult RACs about the rate of adjustment of fishing mortality rates towards the eventual targets, the stability criteria applied in harvest rules, and any other implementation measures associated with specific plans.

The North Sea RAC (NSRAC) was the first of the RACs to be established; in November 2004. It is therefore the first to address the Commission's wish to consult stakeholders on the formulation of long-term management plans. The NSRAC began the process of assembling views on the objectives of long term management by holding a Focus Group on Long-term Fisheries Objectives at Schiphol in the Netherlands in August 2005. The Focus Group concluded that there is now an opportunity in to adopt a different, more inclusive approach to fisheries management. That approach should aim to bring all fish stocks within sustainable limits through the management of the individual fisheries. It is particularly important to agree a working definition of sustainability. Achieving the changes will demand a lot from all participants.

The NSRAC concluded that next steps in taking its work forward would be to identify the main fisheries and fleet segments and to consider possible sustainability objectives for those fisheries, taking into account biological, economic, social and institutional factors. First, however, it would be necessary to examine the possible objectives for North Sea context by bringing together a number of stakeholders and experts to explore the various options.

This project, funded by Defra, focuses on developing possible targets for North Sea fisheries to enable fisheries management to move towards more sustainable fisheries. Plans should reflect stakeholders' views of the balance of objectives and the direction by which and the rate at which the fishery should achieve its objectives. Individual fisheries will probably require their own definition of sustainability and choice of measures for achieving sustainability. Policy makers must reflect on the definition of "fishery" since future economic sustainability may require flexibility in terms of the species exploited and the fishing gears employed. The Focus Group selected two fisheries, on the advice of fishers, to examine in the study.

The purpose of this project was to take the first steps towards achieving long term management plans for North Sea fisheries by reviewing the scientific, technical and economic background and then presenting proposals for discussion and elaboration by key individuals at a workshop. The outcome of the research and the workshop, held in Edinburgh on March 2nd and 3rd 2006 is this report. The NSRAC can use this report to help develop its own plans for long term management of the main demersal fisheries within the North Sea.

III. The NSRAC Focus Group on Long-Term Fisheries Objectives

The starting point for this project was the Focus Group on Long-term Fisheries Objectives held at Schiphol, the Netherlands, in August 2005. The Focus Group brought together fishers' representatives, environmental NGOs, scientists, economists and social scientists to explore the implications for North Sea fisheries of the WSSD commitment at Johannesburg in 2002 to bring stocks to maximum sustainable yield levels by 2015, and to consider long term objectives for the North Sea fisheries.

The Focus group proceeded under the Chatham House Rule to encourage openness and information sharing. As interpreted by the NSRAC the rule states: "Participants in the meeting are free to use the information received, but neither the identity nor the affiliation of the speaker(s), or participants in the discussion, may be revealed".

The Focus Group concluded that the European Commission should immediately undertake the key task of persuading stakeholders of the benefits of moving towards low F, high yield fisheries. Many fishers would be sceptical of the benefits of any changes proposed. However, it was important that stakeholders support a gradual and evolutionary change in the approach to managing fisheries in the North Sea. The NSRAC could assist in obtaining that support if it could agree appropriate goals with the Commission.

The Focus Group disagreed with the emphasis placed in the Commission's non-paper on the single-stock approach. The Group believed that the Commission placed too much emphasis on stock by stock management. The Commission should embrace the need to manage the fisheries that exploit the stocks and should take multi-species interactions into account. The guiding principles outlined in the non-paper provided a starting point from which to develop future management procedures and the interim arrangements which it set out were broadly satisfactory. However, the Focus Group felt that F_{MSY} was too simplistic a target for practical use and that a more general framework which incorporated all aspects of sustainability would be necessary. Each fishery should be looked at case by case, focusing on strategic objectives for each of them. The aim should be to bring all stocks above safe biological limits, with higher biomasses, by controlling effort and applying other measures within the different fisheries. Various alternative strategies should be evaluated with the aid of economic as well as biological modelling.

The Focus Group recommended that the RACs, together with the Commission, and with the advice of technical experts, should commence by identifying the main fisheries and fleet segments. The Commission should then join with the interested parties in choosing targets based on the evaluation of harvest control rules that are robust to uncertainty, rather than through fixed definitions of reference points. The aim should be to move in the direction of more sustainable fisheries at a rate to be discussed by the interested parties (Figure 1). As progress is achieved it would be important to provide incentives for fishers to move further in the right direction.

The Focus Group recognised that currently the information on fishing effort expended by the different fleets was insufficient. It would be necessary to ensure that Member States and the Commission collected appropriate data and that ICES provided relevant multi-species and multi-disciplinary advice.

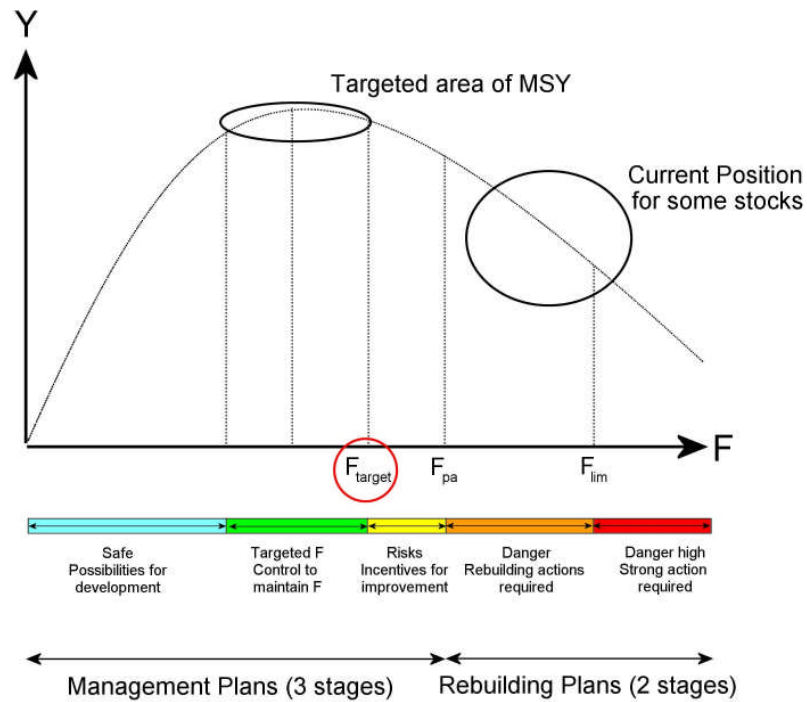


Figure 1. It is important to agree robust harvest control rules with stakeholders, which will move fisheries in the desired direction by defining an area, with upper and lower boundaries, to aim for. Absolute values are not important; it is the direction of travel that is paramount.

The Focus Group concluded that there is now an opportunity to adopt a different, more inclusive approach to fisheries management. That approach should be aimed at bringing all fish stocks within sustainable limits through the management of the individual fisheries. It is particularly important to agree a working definition of sustainability. Much will be demanded of all the interested parties to bring the necessary changes about.

IV. Reviewing the Scientific, Technical and Economic Background

The project brought together six presentations:

1. Comments provided at the Workshop on the topic of “Sustainability”: **Jean-Jacques Maguire**
2. A desk study aimed at pulling together papers, case studies and reports relevant to a long term management of North Sea fisheries: **John Pope**
3. A literature review of international experiences of long-term options: **Diana Tingley**
4. Modelling to assess fleet reaction to management: **Simon Mardle**
5. Consultation with key individuals within the fisheries research institutes, ICES & other international bodies, the Commission, stakeholders & Member States etc. on their thoughts in relation to long term management objectives: **John Pope**
6. TAC and days at sea management: **Sarah Kraak**

The presentations are summarised below. The full texts of Parts 2, 3, 4, 5 and 6 are available as annexes to this report.

1. The Sustainability of Fisheries: J-J Maguire

Our Common Future

- The Report of the World Commission on Environment and Development (1987) first proposed the concept of sustainable development
- The report clearly describes (page 37) how environmental stresses are linked to one another, to the patterns of economic development, and how both are linked to social and political factors
- Continued (sustained) development is needed to reduce poverty and inequalities
- It is only by taking account of ecological, economic, and social factors in an integrated decision-making system (i.e. within the right institutional framework) that development can continue without exhausting natural resources.

Definition of sustainability

The modern concept of sustainability evolved from the Bruntland Commission and is seen as having at least four components:

- Bio-ecological
- Social
- Economic
- Institutional

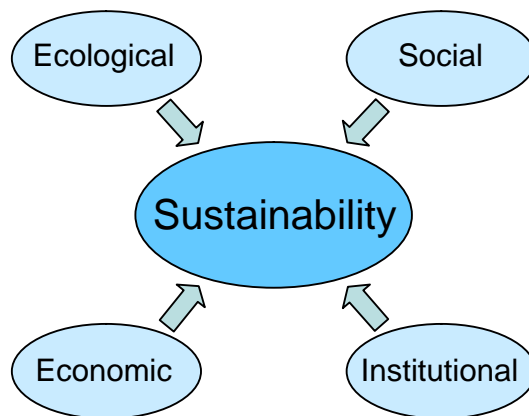


Figure 2. The four components of sustainability

The definition of sustainability may change over time, as it is redefined by society. ***Sustainability is not a unique point on the yield or the income versus effort curve***

The nature of un-sustainability

Fishing is not the only cause of fluctuations in fish stocks:

- Un-sustainability is often linked to over-exploitation, but resources do fluctuate naturally
- The abundance and presence of species is dependent on hydro-climatic conditions
- There may be external threats; voluntary or accidental
- Well-managed fisheries do not imply an absence of fluctuations in resource abundance or availability

Has bio-ecological sustainability been achieved in large scale demersal fisheries in the North Atlantic?

Bio-ecological sustainability has been the main focus of fishery management in the North Atlantic. After more than 20 years of intensive fishery management, most traditional demersal fisheries are in crisis:

- There are severe restrictions on North Sea cod
- Northeast Arctic cod are outside safe biological limits with TACs set twice as high as the scientific advice
- Icelandic cod are fished at twice the target fishing mortality rate
- Canadian cod fisheries yield only a fraction of past landings
- Georges Bank and Gulf of Maine cod are over-fished and over-fishing is still occurring

There are some positive signs for haddock and yellowtail in the NW Atlantic

Has the economic component of sustainability been achieved?

- It is difficult to say, as data has not been collected, analysed and reported in a systematic way
- The number of offers in buy-back programs suggests it is not
- Increases in fuel prices have certainly had an effect
- It depends on the fishery

Has social sustainability been achieved?

- It is difficult to say, as data has not been collected, analysed and reported in a systematic way
- Press reports would suggest that it is not: the number of boats (and fishermen) is decreasing, and fish processing plants are being closed
- Equity is not enhanced

Has institutional sustainability been achieved?

- Fishery management institutions in the North Atlantic have mostly been concerned with the bio-ecological component of sustainability (conservation)
- TACs have been the main conservation tool; scientific advice has been the main factor in determining TACs
- Landings, and particularly catches, are believed to be unreliable by a large number of interested parties, which undermines the credibility of the scientific advice
- Decision-making is far from transparent, which further undermines the credibility of the entire system
- Although fishery management institutions do continue to exist, it is difficult to describe them as being sustainable
- It is not clear that existing institutions are assets in achieving sustainability

Fishery management of large volume demersal fisheries has failed in the north Atlantic

- Considerable human and financial resources have been invested in fishery management in all countries bordering the North Atlantic since at least the mid to late 1970s
- The most direct result is depleted demersal stocks and unreliable fishery statistics
- It may be that fishery management processes are focussing too much on the bio-ecological component of sustainability to the detriment of the other components

Fishery management successes do exist

Hilborn, Orensans, and Parma (2005) discuss:

New Zealand lobster, Chilean artisanal fisheries, Canadian sablefish, West Australian rock lobster, Gulf of Carpentaria prawns, Tasmanian abalone, Northeast Chatham Rise orange roughy in New Zealand, Pacific halibut, US hake and pollock cooperatives, Geoduck in British Columbia and in Puget Sound

In these fisheries, successful institutional systems provide incentives to individual operators leading to behaviour which is consistent with conservation

Fishery management objectives

- MSY was identified at the 2002 Johannesburg Summit because it was the only one available
- The shortcomings of the MSY concept have been known for at least 30 years (Larkin 1977)
- MSY is not stable over time, the carrying capacity of the environment changes, natural mortality changes, the form of the stock recruitment relationship may change
- Inability to incorporate multi-species interactions is a major shortcoming
- It is impossible to achieve MSY for all species of predators, prey and competitors at the same time in a changing environment
- MSY is a recipe for failure because it is not achievable

How can a multi-dimensional definition of sustainability help?

- We must recognise that ecological systems are dynamic and unpredictable with major influences from environmental forcing
- Benefits should be sought for all four dimensions of sustainability (bio-ecological, economic, social, institutional)
- Improvements under the economic, social, and institutional components should be easier to measure and (possibly) achieve
- Improvements in the bio-ecological component will then accrue as an additional, but necessary, benefit

Summary

- Sustainable development is clearly a multidimensional concept
- Fishery management in the North Atlantic has been overtly focused on the bio-ecological dimension of sustainability and it has failed under the four dimensions of sustainability
- It should be easier to agree on measures to improve the economic, social and institutional dimensions of sustainability and progress should also be easier to measure
- A directional approach is necessary: start improvements and then gather information to monitor progress
- Institutions need to change

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2. Review of European Literature and Experience in managing fisheries: John Pope

Introduction

Any form of fisheries management has to prevent the race to fish which leads to the tragedy of the commons. In practice there are three ways forward:

1. By making laws that forbid excess fishing
2. By introducing (mostly economic) incentives or disincentives that discourage excess fishing
3. By persuading all fishers that excess fishing should be avoided.

The first approach is traditionally associated with managers, lawyers and some biological scientists who argue that the well-being of fish will automatically lead to the well-being of fishers. The second tends to be the preferred approach of economists. The third is the preferred approach of sociologists and indeed anthropologists. Examples of each are:

1. TACs, Mesh Regulations and Derogations, Effort Controls.
2. Extraction Taxes, ITQs, TIEs.
3. Co-management, Stewardship, Some Technical Measures, Rotations, Tabu, Iwa law.

It is clear that the tools overlap between the three groups but the spirit in which they are applied is quite different. Moreover, the three approaches tend to have three different foci:

1. The Fish Stock. (biologists)
2. The Fishing Fleet. (economists)
3. The Fishing Community. (sociologists)

For a simple fishery these are just three facets of a single problem and it is possible that any of the three management approaches might work. For the North Sea demersal fisheries, simple solutions based upon any single approach are unlikely to work.

The three approaches correspond to three of the four component of sustainability (see figure 2 above). The fourth component is the institutional framework that combines the three approaches. The purpose of this paper is to use some recent European literature to illustrate the advantages, disadvantages and state of development of the various approaches and to consider how and what institutional framework might help in applying them.

Managing by laws that forbid excess fishing

The essence of the CFP approach to managing fisheries is a series of regulations. There has been little direct input from fishers. Its faults are:

- Generally it has not delivered biological sustainability.
- Its political focus is essentially short term.
- Fishers are alienated and some feel justified in non-compliance.
- Poor fishing practices like discarding are common.
- It has fouled up the biological advice on which it is based.
- Fishers distrust the science.

- The response to one law failing is to back it up with another.
- Only legally definable measures can be applied (e.g. problems with some useful selective gears).
- The system seems to lead to mutual distrust and hostility between groups.

The CFP approach does have some virtues

- Relative stability provides equity in sharing resources between countries.
- Some single species fisheries seem to be managed well.
- Perhaps like a road speed limit, it may have curbed the worst excesses of fishing.

How might the existing system be improved?

1. Adopt approaches to assessment that fishers can understand.
2. Create advisory panels of fishers to predict how new rules will be circumvented

Managing by incentives or disincentives that discourage excess fishing

This approach aims to take away the temptation to fish to excess. The approach has not been used in the CFP though some measures are adopted at national level. Possible approaches are:

- Decommissioning.
- IQ/IE and ITQs/ ITE like structures.
- Extraction taxes.
- Sectoral imposts (offenders are charged for extra enforcement or requirements for observers etc.)
- Area based ITEs (see Sarah Kraak's paper).

Since few of these measures have been applied to North Sea fisheries we are not certain of their effects. Their advantages might include:

- Decommissioning eases graceful withdrawal
- Transferable catches may reduce misreporting
- Transferable effort may consolidate fleets
- Extraction taxes may soak up any supernormal profits, repay science and enforcement costs and pay society a rent for the fish
- Sectoral imposts might either encourage better behaviour or drive offenders out
- Area based ITEs could reduce some of the perverse tendencies of effort management.

What are the disadvantages?

- Decommissioning money may find its way back into fishing
- Decommissioning may not improve the profitability of remaining fishers

- ITQs may concentrate fleets and reward the most efficient and are thus inimical to life style concerns. They may also encourage high grading
- The value attached to ITQs creates an inertia towards innovative management
- Non- fishing ITQ holders are a tax on remaining fishers
- Bad behaviour is often a symptom of low profitability and thus might be exacerbated by taxes or imposts
- Data requirements for adequate monitoring of economic measures do not fully exist.

How might things be improved?

- Better economic data and longer term models are needed
- Existing and new fleet based models all need better data
- Decommissioning schemes might be paid for by a deferred extraction tax
- A number of national transferability schemes are ad hoc in nature and might be aligned/tided up to advantage
- A limited experiment with area based ITEs would be justified.

Managing by persuading all fishers that excess fishing should be avoided

Co-operative approaches are only used in the most rudimentary way under the CFP, although they may make either of the alternative approaches more legitimate and more workable. Approaches can be classified under the broad headings of:

- Co-management - government and stakeholders co-operate in management
- Stewardship - government delegates general management responsibility to stakeholders but retains the right to close a badly run fishery
- Community management - government is not involved in management at all.

The first of these, co-management is most relevant to the RACs. What are the advantages of engaging in co-management?

- Better two-way communication
- Greater transparency
- Greater involvement and commitment of stakeholders
- Consent to regulations.

The disadvantages might include:

- Co-management is difficult to arrange if different stakeholders are playing a zero sum game (what I win you lose)
- Long term goals can be difficult for stakeholders who cannot see themselves as part of them
- Long-term thinking is difficult for fishers of wildly fluctuating stocks.

How can we improve things?

- Taking steps up the ladder of co-management (see next section) at EU level
- Adopting higher forms of co-management at national level
- Managing a sustainable local fishery using a high degree of co-management.

Getting our act together institutionally

Institutionally it would seem that the CFP is failing and needs to be improved. Strengthening co-management structures within the CFP seems the obvious first step and indeed the establishment of the RACs can be seen in this light. Institutionally, co-management arrangements may be classified into five broad types:

- *Instructive*: government informing users on the decisions they plan to make
- *Consultative*: governments consult users but take the decisions themselves
- *Cooperative*: government and users agree decisions together
- *Advisory*: users advise government of decisions to be taken and government endorses them
- *Informative*: government delegates authority to make decisions to user groups who inform government of their decisions.

Currently, the CFP only reaches the first step of this ladder. RACs may wish to move towards the third and even fourth steps.

What else might help?

- Relative Stability is a cornerstone of the CFP. However, discarding, black landings and quota hopping have undermined it. Can the general concept be retained while its operational definition is reconsidered?
- Days at sea limits appear to be a more effective constraint than catch restrictions. Might the approaches proposed by Sarah Kraak's review paper be worth experimenting with?

Trying experimental management approaches on fleet sectors may be the best way to break out of the current management sclerosis.

The full text of this presentation is in Annexe 1.

3. Long-term Management Options, Experiences from around the World: Diana Tingley

Over-exploitation and un-sustainability

We have seen that there are four components of sustainability (Figure 2). Six key factors have been found to contribute most to overexploitation and un-sustainability in the world's fisheries. These are:

1. Inappropriate incentives
2. Lack of good governance
3. High demand for a limited resource
4. Poverty and lack of alternatives
5. Complexity and lack of knowledge
6. Interactions of fisheries sector with other sectors and environment.

The most important factors are (1) inappropriate incentives and (2) lack of good governance. Fisheries management has been found to fail where incentives are created (either directly or indirectly) which lead to unsustainable fishing practices; or alternatively where appropriate incentives are not explicitly introduced to encourage sustainable fishing practices.

The second most important factor was defined as a 'lack of good governance' which can stem from conflicting management objectives, a lack of transparency and openness or a lack of ability to manage fisheries effectively including a lack of (political) will to make the right decisions. Many features of poor governance are linked to the creation of inappropriate incentives. For example, management which does not take the views of key users into account can lead to a reduced incentive to comply with measures.

Experiences around the world have shown that there are a number of possible solutions to the above six problems. Different solution paths which can help resolve these factors are:

- Granting secure rights for resource users (this helps deal with factor 1. Inappropriate incentives)
- Transparent, participatory management (help deal with factors 1,2 and 5)
- Support – science, enforcement, planning (4,5)
- Benefit distribution (1,3)
- Integrated policy (1,3)
- Precautionary approach (4,6)
- Capacity building, public awareness (5)
- Market incentives (1,2)

Managing fishing capacity

There are many ways of managing fishing capacity. Incentive-blocking programmes are only effective in reducing capacity in the short-term: in the long-term factors such as the race-to-fish, substitution of uncontrolled inputs for controlled ones and technical change/creep all tend to erode the anticipated benefits of the programmes. Such incentive-blocking programmes include:

- Limited entry programmes (e.g. licensing, days at sea restrictions)
- Buyback / decommissioning programmes
- Gear and vessel restrictions
- Aggregate quotas (i.e. Total Allowable Catches (TACs))
- Non-transferable vessel catch limits (e.g. non-tradable Individual Vessel Quotas)
- Individual effort quotas (IEQs)

If management is changed to allow a fisher to internalise the social cost of exploiting the resource and which encourages taking a long-term view of resource health, for example by establishing cooperatives, co-management, or rights-based fisheries, the consequences of over-capacity in the form of over-fished stocks should be corrected. Incentive-adjusting instruments include:

- Individual transferable quotas (ITQs)
- Taxes and royalties
- Group fishing rights (i.e. community quotas/community-based management)
- Territorial use rights (i.e. Several/Regulating Orders)

It should be noted that Individual Transferable Effort Quotas (ITEQs) can be both incentive-blocking and reducing in terms of fishing capacity management. The transferable nature of ITEQs helps fishers to better match their holdings of ITEQs with their amount of fishing capacity and available resources. However the extent to which effort controls (i.e. days at sea restrictions) contain fishing capacity and total catch levels can be eroded where input substitution or technical change is occurring. It can also be difficult to predict the true link between an effort unit and the amount of catch in these circumstances and where the impact of effort controls are being eroded, Total Allowable Effort (TAE) will have to be revised downwards continuously over time.

Most of the world's major fisheries are either close to, or already are, overcapitalized and overexploited. A survey of major fishing nations in the world found that less than 50% of these nations managed fisheries using some form of rights-based or incentive aligning, territorial, group or community, or taxes or royalty-based fishing capacity management measure. However more than 80% of nations used some form of access, temporal, gear, fish size or access-related restriction.

The management experiences of a range of countries are discussed in more detail in Annex 2, however a brief review of key points from each country is presented as follows.

Experiences from different countries

Canada

The collapse of the Canadian fisheries Atlantic groundfish fishery was extremely costly to both the general tax payer and the affected fishing industries and communities alike. Huge sums of money were spent on restructuring including projects aimed at moving employment out of fishing as well as providing direct income support to many fishers most affected by the stock collapse during the 1990s. In spite of the sums of money spent, progress has been very slow in terms recovering groundfish stocks.

Fisheries and Oceans Canada (the responsible government department) initiated a fundamental programme of change in response to the collapse and problems in other West-coast fisheries, by placing greater emphasis on conservation, sustainability, economic viability and adopting a co-management approach allowing fishers more control and involvement in the management process. Most fisheries are now managed using IQs, ITQs or Individual Vessel Quotas. Extensive stakeholder involvement is now evident in Canadian fisheries management; however, this involvement is still, in many cases, in its infancy.

Australia

ITQs have been used in the management of a number Australian fisheries since the early 1980s - there are currently at least twenty ITQ-managed fisheries, accounting for about 22% of the total value of Australian mostly single species (and one multi-species) fisheries. However, the majority

of commercial fisheries within the Commonwealth of Australia are managed via input controls such as limited entry, limited cod-end sizes, area restrictions, seasonal closures and fishing methods prohibited in sensitive areas. The best management tool is selected for each fishery based on a range of bio-ecological and economic/social factors. The majority of attributable fishery management costs are recovered from industry.

Management is highly participatory with various joint Industry/Government bodies being established to advise on fisheries management issues - these bodies often include community and conservation representatives. Specific fisheries management strategies in use are based on publicly available Fishery Management Plans that have been developed through these various Management Advisory Committees and Consultative Committees. They identify, on a fishery-specific basis, objectives, describe fishing concessions (i.e., statutory fishing rights, ITQs, fishing permits and foreign fishing licenses), allocation procedures and detailed rules governing fishers.

The Australian Fisheries Management Authority has recently announced a massive new decommissioning programme in Commonwealth fisheries: in 2006 a one-off decommissioning scheme is planned to reduce the fleet by some 50%. This programme is partly designed in response to the pressures of current over-fishing but also for fleets targeting stocks which are thought to be at risk of over-fishing. Furthermore, the fleet reduction is also intended to address issues related to displacement of fishing capacity from areas being set-aside as Marine Protected Areas.

Faroes

The early 1990s saw a disastrous collapse in fish stocks in Faroese waters. Denmark agreed a loan package on the condition that the Faroese implement a quota system but this was seen as an outside imposition. When it was finally agreed and implemented in 1994, fishermen responded by refusing to comply with the rules. Eventually the industry was asked to come up with an alternative and a new system - based on days-at-sea restrictions rather than catch limits - was introduced in 1996. Additionally, there are also a system of closed areas designed to protect stocks, especially juvenile fish and spawning stocks.

The new system was successful in that it was accepted by the fishing industry which has played a large part in its development. However, over the period 1996-2001 the Total Allowable Effort inside the main effort control zone was reduced by 17% in response to changing fishing practices, input substitution and technical creep. It was thought that less than one-third of the fleet was actually restricted in their activities by the days-at-sea restrictions and that there was a considerable amount of input substitution. Further, catch-per-day was thought to have increased by 25-30% over the same period due mainly to the introduction of newer, larger vessels. The system has required many revisions over time and in 2005 government proposed that tighter controls were introduced on effort transfer restrictions between industrial and artisanal fleet in an attempt to deal with problems of equity related to quota concentration.

Iceland

In 1976, following the extension of the fisheries jurisdiction to 200 nautical miles, marine scientists warned that fishing mortality in the cod fisheries seemed alarmingly high, that the spawning stock was threatened and that this level of catch could not be sustained. Iceland began to regulate fisheries using effort quotas in the period 1977-83 but they encouraged a 'race to fish' - vessel owners rushed to maximise their catch, fishing capacity increased and the number of fishing days had to be reduced.

Iceland's major commercial fisheries are now managed through ITQs which were introduced in 1984. Support for ITQs in Iceland, is not universal. The small boat sector and fishermen's unions have complained that the cost of renting quota has reduced the crew's income. Consolidation has resulted in a profitable fleet but has left some vulnerable fishing dependent communities economically exposed as quota has left their communities and ITQs have also been criticised for promoting concentration of ownership.

However, there is also evidence that ITQs have brought considerable economic benefits. Over-investment in fishing capital has been restrained and the fishing fleet has contracted, fishing effort has been significantly reduced. Most Icelandic fishing firms have become profitable since the introduction of the ITQ system. This was probably also aided by the industry-funded (in retrospect) decommissioning programme implemented between 1990 and 1997 to assist in adjustment out of the fishery.

New Zealand

In the period after the extension of fisheries jurisdiction to 200 miles in 1978, the introduction of licence limitations and other input controls failed to check investment in the New Zealand inshore sector. This led to over-capitalisation, a serious decline in the sustainability of fish stocks and poor profitability. The ITQ system was introduced as a result in 1986 and currently 50 key species, of the 130 commercially exploited, are managed by the ITQ system. Over-exploitation has been greatly reduced and the stock size of most species has either increased or stabilised. Profitability has improved and although the fishing fleet and number of fishers at sea has reduced, the number of people employed in the onshore fisheries sector, in areas such as processing, has increased overall. The continual revision of the ITQ system to include more species and improve its performance has led to criticism about its increasing level of bureaucracy, complexity and cost - the majority of which is cost recovered from the industry. However, the fishing industry is a staunch supporter of the system. This has built a consensus in favour of management based on clear use rights.

Stakeholders now want more control over the management of their activities and the Ministry of Fisheries is currently working towards the use of Fisheries Plans as a form of co-management tool. These Plans will identify objectives and detailed rules governing fishers and allow stakeholders to participate more in fisheries management by encouraging them to propose new and innovative management options tailored to the particular characteristics of a fishery. It is proposed that management measures (tools and services) may be undertaken by both the Ministry and by stakeholders.

New Zealand fisheries management is also subject to a number of management strategies which are seen as key additional long-term management approaches to be used alongside the established quota management system. The Strategy to Manage the Environmental Effects of Fishing has at its core environmental standards, which will be set with input from all stakeholders and these standards will specify the limits of acceptable effects of fishing on the aquatic environment. The Ministry of Fisheries recognises that setting environmental standards will require careful consideration of environmental obligations, value from utilisation of fisheries, social values, and the value for future generations. Some of these factors cannot be maximised simultaneously and, therefore, trade-offs must be made.

The draft Marine Protected Area Strategy sets out to develop and implement a strategy for establishing a network of areas that protect marine biodiversity, including marine reserves, world

heritage sites, and other coastal and marine management tools such as mataitai and taiapure areas (customary fisheries management), marine area closures, seasonal closures and area closures to certain fishing methods. This strategy is currently the subject of debate between a number of government agencies on how it should be implemented.

The key points to note are that the two most important factors which contribute to unsustainable fisheries are:

- inappropriate incentives, and
- lack of good governance.

Experience from other countries shows that the most effective ways of tackling these issues are:

- Granting secure rights for resource users
- Transparent, participatory management
- Benefit distribution
- Integrated policy
- Market incentives

The full text of this presentation is in Annexe 2.

4. Modelling to assess fleet reaction to management: Simon Mardle

The assessment of the potential effects of long-term management strategies is an important step in the process of accepting a preferred strategy. Bioeconomic models are designed for this, enabling “what if” analyses to be undertaken that take into account the details of the fisheries system, including the multiple objectives that characterise it. The economic component of the model provides the link between stocks and fleets, making an estimation of fleet reaction to management a key feature.

Models can be invaluable for scenario analysis which by definition enables ‘risk assessment’ to be made. Properly implemented, scenario analysis incorporates ideas from decision-makers and stakeholder representatives. Not only can scenario analysis be used to highlight risks, but it can also highlight opportunities and trade-offs of potential management strategies. This process assists in transparency, accountability and commitment of all interest groups.

Considerable attention has been focused on bioeconomic models in fisheries. In Europe, they have not been used to any extent to assist in the development of fisheries management plans. However, in other countries (e.g. Australia and New Zealand), they have been applied to aid in management plan formulation and analysis, but only on a limited number of occasions. Most bioeconomic models are bespoke to the fisheries and fleets under investigation, even though they follow the same structure. There is a history of bioeconomic model development for the North Sea, particularly with regards to herring, cod (also haddock, saithe and whiting), plaice and sole. There is particular scope for the use of such models for the development of management plans for North Sea fisheries.

The full text of this presentation is appended as Annexe 3.

5. Discussions on long-term management: John Pope

Introduction

The problems of managing a fishery can be compared to those of navigating a ship. To navigate we ask three questions

- Where are we?
- Where do we want to go?
- How do we get there?

We need to look for these positions and courses with respect to each of the four FAO aspects of sustainability discussed in the previous section.

Discussions were held on the subject of long term management of the North Sea with 22 fisheries experts in Scotland, England, Holland, Denmark, Belgium and France. The approach used and a summary of the discussions is included at Annexe 4 and transcripts are available at NSRAC HQ).

Here, suggestions and conclusions based upon the opinions of those experts are gathered into those that reflect the current situation, those that reflect the desired long-term situation and those that reflect the route to take to get there. These are further subdivided into issues of institutional, ecological, economical and social sustainability. A selection of the experts' comments from which the conclusions were drawn is gathered in the same order in Annexe 6.

Where Are We Now?

Institutionally:

A number of comments reflected on the current state of management institutions. The most emphatic suggested that the institutional framework of the CFP was flawed, under pressure and breaking down in various ways. But additionally there were a number of comments that suggested unease with the way that fisheries management institutions currently work. Conclusions were:

- Currently the CFP does not work well for fisheries for mixed demersal species.
- There are problems with compliance.
- There are problems with the scientific advice.
- There are problems of mutual trust.
- The divisions of responsibility between the EU and the Member States add to the institutional complexity and to short term thinking.

In short, while the fishing industry, managers and scientists have learned to work with or around the current system, it does not work efficiently or effectively!

Ecologically:

The most emphatic comments suggested there are still problems with over-capacity, discarding, recovery measures and concerns for the wider environment. Other comments suggested things might have improved for some stocks. Conclusions were:

- For many target stocks fishing mortality is still too high.
- Some spawning stocks are at low levels.
- There is the potential for damage to some non-target species
- The situation of some target species, notably haddock, had improved in recent years.

Thus, there are a number of ecological and fish stock situations that should still cause us concern.

Economically:

The clearest messages were that recently profitability has been affected by quota drops and by increased fuel costs. Presently the question of survival was important because of the shock that high oil prices had given the industry. Key points were:

- Recently fleets have become economically stretched
- Some have contracted sharply
- In a number of countries, transferable catch and effort arrangements exist and these are gradually encouraging economic goals at the expense of social goals.

Economic viability is a concern; currently there seems insufficient buffering against shocks like oil price hikes. There does seem a gradual move toward more economic management but the approaches adopted have often grown piecemeal and are only applied at national level. Economically, demersal fisheries do not seem to be in a comfortable state.

Socially:

Comments related to the current social situation in the fishing industry. Conclusions were:

- Socially, fisheries are in rapid transition; too fast to be comfortable.
- There is some (rather reluctant) move away from life style fishing in some countries but not all.
- In some fleets community ties with fleets may be lessening as crews are imported.
- The attitudes of fishers are changing towards management.
- The attitude of society towards fishers, traditionally positive, is becoming more negative.

There is no socially ideal situation that could last for all time. But where we are does not seem to be particularly comfortable.

Where Do We Want To Go?

Institutionally:

One comment was that fisheries may need to become integrated with other large uses of marine resources. A number of people suggesting that co-management or stewardship approaches should be used much more widely.

The first of the comments suggests that fisheries might be integrated institutionally with wider issues of marine management and so possibly become even more remote from fishers than the

current arrangements. This is not where we want to go but if it is to be avoided then fishers will need to set their house in order and be seen to address the concerns of other users.

Some suggestions are that fisheries institutions need to:

- As far as possible avoid top down “command and control” management.
- Adopt more bottom up “stewardship” approaches to management based on fishing fleets.

The challenge will be to provide the incentives and disincentives that will permit a stewardship system to work. These must be such that individual fleets behave in ways that not only benefit themselves in the longer term but also avoid, or at least moderate, behaviour that adversely affects other fleets or other users. Certainly a system is needed which is institutionally functional. It might be wise if it were also financial efficient since it is worth remembering that in the long - term the fishing industry may end up being told to pay the costs of management.

Ecologically:

Where should we go to ecologically was discussed at the NSRAC Focus Group in Schiphol (see section III) and the consensus view from the experts reflected the thinking there. However, there were some views that we should go further in reducing Fishing Mortality Rate. For example, that a low F is needed because we need to protect genetic diversity particularly for those stocks at the margins of thermal distributions. Conversely there were a number of concerns that single species based target reference points for Fishing Mortality Rate were too low. There were also comments that reflected the need to address wider ecological concerns.

Some suggestions as to where we should we go ecologically are that we should:

- Reduce fishing mortality progressively and by meaningful amounts.
- Build environmental, multi-species and density dependent considerations into our targets.
- Review targets from time to time, as they may well change.
- Preserve important habitat and mitigate non by-catch by appropriate measures.
- Acquire and use a better understanding of how fleets generate fishing mortality.

There are some serious scientific challenges here. One is to develop a description of ecological sustainability that is both fleet orientated and stock orientated.

Economically:

Where we want to get to economically will depend to what extent we wish to trade off number of jobs against total profit generated from a fishery. It also important to decide at what governmental level this trade off should be made. From the comments it was clear that some industries and some experts saw fishing as an economic activity rather than providing social benefits or supporting life style. Others would certainly take the reverse position. However, differences were perhaps more apparent than real since all agreed the need for economic viability while even the more profit-orientated felt that policies to give ITQ holders supernormal profits would prove equally unsustainable.

It was suggested that fishers want:

- To find a way to buffer the effects of economic shocks such as oil price rises.
- Economic resilience based on sustainable level of average annual profits. If need be, super-profits could be prevented through cost recovery or resource rent.
- To find ways to add value to catch and so increase revenue per tonne.
- To develop cheaper and more co-operative research programmes using industry based platforms.

Socially:

The main comments on socially desirable states were that changes should be gradual and related to specific contexts and lifestyle considerations. There was also a need to consider quality and well as quantity of jobs. Society is ever changing so there is no fixed point to achieve.

Suggestions are:

- Changes need to be made at rates that communities can absorb.
- It is important not just to create jobs but to create quality jobs, with due regard for safety and for career progression within the industry.
- Management needs to recognise and as far as possible accommodate the different attitudes to life style of different groups of fishers.

How Do We Get There?

A key difference between where we want to get to and how do we want to get there is that:

- The former – where we want to be - may still be rather vague.
- The latter – the direction we take to get there - should be clear.

Institutionally:

No expert directly addressed how we should immediately modify institutions although many comments from those interviewed suggested a need for change. In the short run a start would be the development of fishing plans, that have industry “buy in”, that have less of a command and control attitude and have more of a co-management ethos.

Ecologically:

Some experts commented on the problem of larger species such as cod or plaice and other on how general reductions in mortality rate might be best brought about.

Suggestions are:

- Agree a time scale for reducing fishing mortality significantly.
- Choose the best years to make cuts by taking advantage of fluctuations in stocks.
- Make sure these cuts actually happen.

- Give special protection to vulnerable species by encouraging fishers to use avoidance tactics.

Economically:

There were a lot of comments that addressed this.

Suggestions are:

- If fleets have to be reduced, allow this to occur within the industry through natural economic mechanisms.
- Decommissioning may be required as back-up when profitability is low.
- Rationalise and harmonise various mechanisms, vessel quotas, days at sea etc.
- As far as possible, avoid regulations that make fleets less financially efficient.

Socially:

Many of the comments related to the need for co-management of fisheries and stressed the need for fishers' involvement and ownership.

Suggestions are:

- Change at a rate that can be absorbed by communities.
- Decide what it is socially that we want to preserve and what we do not.
- Use Co-management and Stewardship approaches as much as possible

The full text of this presentation is in Annexe 4.

6. TAC and days at sea management: Sarah Kraak

A study commissioned by the Dutch Ministry has been aimed at designing a system of effort management that can be used to complement current TAC management. In this study only the flatfish fishery by the Dutch beam trawl fleet has been considered.

The approach is, to quantify the relationship between days at sea and fishing mortality. This relationship (*i.e.* the catchability) can be quantified with the indicator F_{PUE} , which is the fishing mortality that is generated per day at sea.

This quantity can be calculated on a trip basis as follows. The total catch (C , here landings) of a species in a certain year can be split up by country. This country's catch can be split up further by fleet segment, and ultimately – based on the log book data – by trip. From the number of days in a trip, the average catch per day of that trip can be calculated (C_{trip}). Note that Dutch beam trawl trips are generally on a weekly basis (Sunday to Sunday). The fraction C_{trip} / C , multiplied by the total F that corresponds to the C (via the stock assessment), yields the F_{PUE} : the partial fishing mortality that is generated per day in that particular trip.

The factors that influence F_{PUE} can be broadly classified into two groups:

1. The efficiency of a vessel, e.g.
 - a. Gear (beam trawl, otter trawl, twin trawl, etc.);
 - b. Engine power;
 - c. Design of the vessel;
 - d. Other equipment (DGPS, etc.);
 - e. Experience skipper and crew.

2. The availability of the fish by
 - a. Season;
 - b. Area.

It has been found that the efficiency of a vessel is related to the effective engine power (horse power, hp) in the following way:

- For plaice: $F_{PUE} \sim hp^{0.5}$;
- For sole: $F_{PUE} \sim hp^{0.8}$.

If the exponent were equal to 1, the efficiency would be proportional, implying that fishing with 2000 hp generates twice the fishing mortality as fishing with 1000 hp. Exponents smaller than 1 mean that fishing with 2000 hp is less than twice as efficient as fishing with 1000 hp. Hence, hp-days overestimate efficiency, especially for plaice.

The F_{PUE} varies with area and season. Seasonal variation for plaice is about fivefold: F_{PUE} in winter is roughly five times higher than in summer. A time trend can also be discerned from the data: the F_{PUE} has increased over the 15 years' study period, implying that a 2000 hp beam trawler has become more efficient over time. This phenomenon is called "technology creep". The technology creep differs with type of vessel and by species. The percentage of technology creep is related to the vintage of the hull of the vessel and the vintage of engine of the vessel. Mutations in the fleet will therefore give rise to sudden jumps in efficiency (F_{PUE}).

Below a fictitious example is worked out for a possible direction of effort management, which will deal with the issue of mixed fisheries, *i.e.* the issue that if two species are caught together, fishing for one species continues when the quota for the other species has been exhausted.

	Sole	Plaice
Fagreed	0.40	0.30
Fagreed-NL	0.29	0.12
FPUE	1.00E-05	6.00E-06
Days at sea (10 ³)	28.9	20.4
#vessels	150	150
#days/vessel (IEQ)	193	136

Let us assume that the agreed TACs for next year correspond to fishing mortalities for sole and plaice respectively of 0.40 and 0.30 (via the assessments); note that these are landings-Fs. According to relative stability the Dutch portions of these fishing mortalities are 0.29 and 0.12 respectively. It was calculated that the average F_{PUE} (= partial fishing mortality generated per day at sea, averaged over the whole study period and all areas, standardized for 2000 hp) was $1 \cdot 10^{-5}$

for sole and $6 \cdot 10^{-6}$ for plaice. It follows from this that 28,900 'standard' days at sea are needed for sole, and 20,400 for plaice, to generate the fishing mortality allocated to the whole Dutch fleet. If we assume that the Dutch fleet consists of 150 vessels, the IEQs (Individual Effort Quota) allocated per vessel would be 193 and 136 'standard' days at sea for sole and plaice respectively.

However, we have seen that a day at sea will generate a different fishing mortality rate depending on the time of the year and the area where fishing takes place. In the table below it can be seen, for example, that a day at sea in Month 1 (January) in the South generates 1.7 times more fishing mortality on plaice than a day at sea in Month 1 in Central. A day at sea in Month 4 (April) in South, however, generates only half the fishing mortality on plaice of a day at sea in Month 12 (December) in Central.

The management system we propose, assumes that fishermen 'spend' or 'pay' e.g. 1.7 of their plaice IEQ when they fish a day in January in the South but only e.g. 0.5 of their plaice IEQ when they fish a day in April in the South. In both months they will 'pay/spend' 1.1 of their sole IEQ. The fishermen are free to fish where and when they want, as long as they do not exceed either of their annual IEQs, while 'paying' according to the table. In effect, one 'pays' more when fishing in an area at a time where high fishing mortalities are generated than when fishing in areas and at times where low fishing mortalities are generated. If the species-specific IEQs can be controlled in this way, the actual catches will correspond more closely to the respective agreed TACs in this mixed fishery.

In summary, F_{PUE} is a useful indicator of the efficiency of the fishery; predictable effects are found for season and area, as well as for engine power. A positive trend in efficiency was found (technology creep), of which >60% can be attributed to the effect of vessel (engine & hull); this will give rise to sudden changes. F_{PUE} can be used as an instrument for the management of a mixed fishery where fishing on the respective species needs to be decoupled to a certain extent. The proposed management system is very preliminary; sensitivity analyses will have to be conducted, drawbacks will have to be identified and dealt with.

month	Plaice				Sole			
	South	West	East	Central	South	West	East	Central
1	1,7	1,2	1,6	1,0	1,1	1,0	0,7	0,0
2	1,3	1,0	1,5	1,2	1,1	0,9	0,7	0,0
3	0,6	0,8	1,0	1,5	1,2	0,9	0,8	0,0
4	0,5	0,8	0,7	1,4	1,1	0,7	0,8	0,0
5	0,6	1,1	0,7	1,3	0,9	0,6	0,8	0,0
6	0,6	1,0	0,8	1,3	0,9	0,7	0,7	0,0
7	0,4	0,9	0,6	1,4	1,1	0,7	0,9	0,0
8	0,5	0,9	0,6	1,3	1,3	0,7	1,2	0,0
9	0,7	1,0	0,7	1,3	1,5	0,8	1,5	0,0
10	0,9	0,9	1,1	1,3	1,5	0,9	1,3	0,0
11	1,0	0,9	1,2	1,2	1,5	1,1	1,0	0,0
12	1,3	1,1	1,3	1,0	1,3	1,1	0,9	0,0

The full text of this presentation is in Annexe 5.

V. The Workshop for NSRAC and other Key Participants

The Workshop Programme

The Workshop on Long-term Management Plans for the North Sea Fisheries took place at the Menzies Belford Hotel, Edinburgh, on 2-3 March, 2006.

The Workshop programme was as follows:

DAY 1.

Welcome and Introduction to the Workshop	Barrie Deas
Various delegates gave short presentations in favour of their positions on long term management option	
Long-term options. Where do we want to get to and how do we get there?	John Pope
Open forum on long term management options	Chair: Barrie Deas
How have other countries developed long term management plans?	Diana Tingley; Simon Mardle
Achieving all aspects of sustainability; and risk management in fisheries	J-J Maguire
General Discussion – features of a long term management plan – areas of principle which must be agreed	Chair: Barrie Deas
Specific problems of the North Sea we cannot just ignore e.g. - cod recovery. Ecosystem Effects etc	John Pope
TAC and days at sea management: a direction for a possible solution	Sarah Kraak
General Discussion – how to arrive at a management plan; issues to overcome in developing a long term management plan for the North Sea fisheries	Chair: Barrie Deas

DAY 2.

The Case Studies	Tony Hawkins
Two Break-Out Groups develop the key elements of Long Term Plans, highlighting potential solutions to anticipated problems for two key North Sea fisheries (under the Chatham House Rule)	
I. The North Sea fishery for Flatfish	Chair: Simon Mardle
II The North Sea fishery for Haddock	Chair: Hazel Curtis
Presentations from each break out group	
General Discussion; Where do we go from here?	Chair: Barrie Deas

Discussions on Day 1.

What does long-term management planning involve?

Long-term management is about moving away from reactive crisis management and towards strategic management. A long-term management plan for a fishery sets out objectives for that fishery and then proposes measures to reach those objectives.

Where are we now?

North Sea fisheries are not as secure and stable as we would like. We have insufficient data to assess the economic sustainability of fisheries, but it is evident that in the North Sea the fishing industry is experiencing major changes. There has been a shift from share fishing to entrepreneurship and corporate employment. The numbers of vessels are decreasing, processing plants are being closed and the infrastructure which supports fishing is declining. It is evident that economic and social factors are not sufficiently taken into account in fisheries management. Institutionally, fisheries management is geared entirely towards bio-ecological aspects of sustainability. The responsible institutions are not well designed for achieving sustainability as they stand.

Where do we want to get to?

We want to move towards a more comfortable position; with stocks at low risk of collapse, profitable fishing fleets, a fishing industry that generates and supports a more positive society, and more participative and inclusive institutions.

How do we get there?

There are two key aspects to address:

How do we determine the direction we want to go in and how do we measure our progress in that direction?

When can we relax, knowing that our fishery has reached a sustainable state?

Key Principles

- We should manage fisheries so that we do not compromise the future and with an eye to the management of risk. Long-term management is tied to the concept of sustainability.
- To be sustainable we need a fisheries management system that can absorb ecological, political and economic shocks and change effectively. Long term management plans must be adaptable and flexible.
- Sustainability has bio-ecological (target species and non-target species and habitats), economic, social and institutional aspects. Prioritising one to the exclusion of the others – for example a high biomass or profit maximisation – will not achieve sustainability. Long-term management needs to take a holistic approach.
- Any management plans for the North Sea must be developed in the context of fisheries which take a mix of species

- It is necessary to be aware of and avoid conditions which are unsustainable.
- Management plans have to be developed case-by-case for particular fisheries or fishing fleets.
- There will have to be trade-offs and compromises – for example, between profit, catch and employment. It is impossible to exclude politics from long-term planning.
- It is important to determine the direction of progress, rather than setting abstract targets – for example, if a stock is improving, do not reduce fishing effort to meet a pre-defined objective. We have to accept that sustainability is a moving target.
- Long-term management will be a learning process: monitoring and evaluation are important.
- Effort reduction is not the only tool in the box: objectives will need to be achieved by a suite of different measures if we are to address the complex issues of the mixed demersal fisheries of the North Sea.
- Success in long-term planning requires buy-in from the fishing industry.
- Fishers should be given incentives to adopt sustainable practices
- We must beware of seemingly simple objectives. Inter-relationships with other aspects of sustainability will make simple objectives more complex.
- Management must take account of social issues.

Possible benefits of long-term management plans

- Successful long term management will shift emphasis from the tactical to the strategic and will limit the involvement of political actors to the development of long-term objectives, rather than day-to-day, or year-to-year, tweaking with the details and responding to the noise.
- If we have long-term objectives/targets and we are moving in the desired direction, then the immediate worries of scientists and managers become less important.

The practical context

- A political commitment has already been made to long term planning: for example through the WSSD Declaration and the EU Commission's non-paper on "Implementing sustainability in EU fisheries". However, there is concern that a commitment to the biological objective of MSY will not by itself lead to long term social and economic benefits.
- Several management plans are already in existence and scheduled for review. However, a distinction needs to be made between transitional measures and genuine long term management plans, produced with the co-operation of stakeholders.
- Bilateral agreements with Norway mean that there are two distinct institutional contexts in operation. The Norway-EU negotiations have traditionally been highly politicised, with little opportunity (on the EU side) for industry or other stakeholder groups to take part.
- The NSRAC needs to develop plans of its own, rather than react to Commission proposals.
- The North Sea demersal fisheries exploit a mixture of species. Individual species cannot be managed in isolation from each other, and it will not be possible to achieve MSY for all target species simultaneously. The long-term objectives must relate to the sustainability of the ecosystem-fisheries system rather than the individual sustainability of each of the exploited components of the ecosystem.
- Capacity building is a key issue in a North Sea context – time and specialist resources are scarce.

- The RACs, the Commission and third party states like Norway need to get together to implement a co-management approach in the development of long-term management plans.

Long term management and sustainability

Bio-ecological

There are sound reasons for not setting strict targets for individual fish stocks – for example, for fishing mortality (F) or spawning stock biomass (SSB). Fish stocks themselves cannot be precisely managed. The preference is to set a minimum warning threshold and an acceptable comfort zone as suggested by the NSRAC Focus Group. Immediate and necessary reductions in F or effort need to be distinct from long-term targets. Discards, by-catches and the protection of habitats and non-target species will have to be addressed; otherwise other actors will set the agenda.

We should not get hung up on MSY just because it is the only long-term management approach on the table. MSY has major shortcomings, including its inability to take account of interactions between species. This means that MSY targets **cannot** be met for all stocks. The important feature of most fisheries is that higher fishing mortality (F) is usually linked with a lower biomass (SSB); while lower F is linked with a higher SSB.

Economic

We must avoid reducing efficiency through regulations. We must rationalise and simplify the regulations we have so that they do what we want. Regulations should enable profitability not hamper it. We must move away from a situation in which annual cuts in fishing capacity are required.

Social

Social issues and priorities will be very context specific. We need to decide what social facilities we want to preserve. As far as possible, change must take place at a rate that can be absorbed by communities.

Institutional

We have had an integrated and holistic concept of sustainability for twenty years; but the fact that sustainability has not been achieved suggests our institutions are inflexible and unfit for the purpose. Bio-ecological sustainability has been the main focus of fisheries management in the North Atlantic and explicit consideration has not been given to the other, non-biological aspects of sustainability.

Our institutions need to change. We must move away from confrontation (between scientists and fishers and fishers and managers); we are pursuing the same objectives. We need institutions that will help us work cooperatively to meet our common goals.

NSRAC must think about its long-term institutional development: a key objective is to be responsible, functional and efficient in advice provision to the Commission and other recipients, so that they both accept it and act on that advice. Communication and collaboration with actual

fishers and other stakeholders at the grassroots level will be essential to promote the legitimacy of the NSRAC and enable more successful implementation of measures. Dealing with uncertainty requires value judgements and the RAC provides legitimacy because of its international basis and because of the ability of the stakeholders involved to make judgements about how we deal with uncertainty.

Participative institutions, rather than hierarchical ones, involve creativity and collaboration between the different actors in fisheries management. For example, a new innovative management approach is being developed at RIVO in the Netherlands that enables a spatial weighting of the value of days at sea (Kraak, the meeting; Rijnsdoorp *et al.*). This *Fpue* concept could be an instrument for the decoupling of species in a mixed fishery (plaice and sole, also cod).

Important Questions

- Who will carry the costs of management in the future? Examples from abroad involve industry accepting at least some of the costs of management and implementation. This, and the provision of credible advice, can reinforce the capacity of stakeholder organisations to take on decision-making roles. Or should Member States be picking up the tab? How can costs be divided equitably between States/groups?
- What will the time scale of long-term management objectives be? The pace of change is as important as the nature of the change.
- How can we manage uncertainty? By finding middle ground between concrete targets and the acceptance of uncertainty?
- What will be necessary to achieve industry buy-in or commitment to all aspects of long-term management objectives?
- What trade-offs are acceptable? And where will the decision-making responsibility lie on this question? For example, which species do we prioritise? Do we aim for social objectives or do we give priority to the profits of individual fishers? How do we address the mixed fishery question?
- Can we adapt the existing management plans? Or are they too simplistic?
- What can we learn from other fisheries management contexts where long-term management is already established? For example, the Canadian Fisheries Sustainable Development Strategy; Australian Fishery Management Plans; Effort management in the Faroes; ITQs in Iceland.
- What can we learn from more stable fisheries in our own seas – for example the northeast Atlantic pelagic fisheries.
- Do we need to know exactly where we are for us to decide where we want to go? It is possible to argue that we only need to know the direction in which we want to go.
- Is it easier to introduce measures that keep us where we are than to introduce measures to move us forward in a particular direction?
- While a general direction for fishery development should be agreed, do we also need to decide the speed of progress? How do we measure progress? Can we set bio-ecological, economic, social and institutional indicators? How do we decide our priorities?

Conclusions from Day 1

- Management plans should address all four aspects of sustainability and their associated objectives.
- We need a clear time scale; a broad management direction; ideas about economic objectives; interim objectives that can be evaluated; and rules for participants to follow.
- NSRAC should take the necessary time to address long-term management issues and to develop appropriate, consensual, well-informed and balanced management plans. It should not be rushed by the Commission's existing time schedule.
- Long term management plans can be amended and developed over time.
- It is not clear how the different aspects of sustainability can be integrated or what kind of balance between the four pillars of sustainability will be acceptable to all interests. In particular there is tension between having a strong biological basis for setting management objectives, or a strong economic basis.
- A new interpretation of MSY is required that takes into account the four aspects of sustainability. MSY does not have to be a static one-dimensional concept or target. Alternatively, although we can buy into the idea of integrated sustainability, we do not agree with MSY as a credible objective.
- Institutional reform is necessary, although it may be difficult to achieve. The current management regime makes us go backwards in terms of sustainability and does not integrate stakeholders and their views to a sufficient degree. The industry has to be involved in long term planning in terms of consultation, definition of the objectives, progress reporting and process review. It is also important that long-term management planning is aimed at particular fisheries and not fish stocks.

Day 2. Case Study I: A Long Term Management Plan for Plaice and Sole Fisheries in the North Sea

Background

There is already a Proposal for a Council Regulation establishing a management plan for fisheries exploiting stocks of plaice and sole in the North Sea – COM(2005) 714. The Proposal points out that:

Plaice and sole have been fished together using beam trawls for many decades in the southern North Sea. ICES ACFM and STECF have advised the European Commission and Member States that plaice and sole are caught together in mixed fisheries and that the stock of plaice is at risk of reduced reproductive capacity; is at risk of being harvested unsustainably; and is over-fished in relation to the highest yields that can be taken from the stock. A very large proportion of the plaice caught are discarded. In 2003 the Committees advised that a recovery plan for plaice was needed. In 2004 the advice was that the stock should be rebuilt to above 230,000 tonnes in 2006 (a 24% increase). Similar advice was provided in 2005.

The same Committees advised that sole in the North Sea are at full reproductive capacity at present but are at risk of being harvested unsustainably. The stock is over-fished with respect to the highest long-term yields that could be taken from the stock. ICES further advised a reduction in catch by 36% in order to maintain the sole within safe biological limits in 2007. At current levels of fishing mortality the North Sea sole stock will fall outside safe biological levels in 2007.

Advice on long-term management from ICES indicates that at low target fishing mortalities (considerably lower than the present level), low risk to reproduction and high long term yields are achieved simultaneously. The general pattern is that there is no conflict between the two objectives. A low fishing mortality will lead to high yield simultaneously with a low risk to reproduction that is lower than the 5-10% risk which has generally been considered acceptable by managers. Target fishing mortalities in the range 0.3 to 0.4 are considered appropriate. However, a fixed-TAC management method would eventually lead to lower yields and higher risks.

The stated objective of the Commission's management plan is:

to ensure exploitation of North Sea plaice and sole that provides sustainable economic, environmental and social conditions.

Group Discussion

The Group's long term objectives for the North Sea plaice and sole fisheries were to achieve:

- sustainable fishing fleets and sustainable fish stocks,
- profitable fisheries,
- stable fisheries, which can be maintained over years of poor recruitment, and
- a small ecological foot-print, with minimal by-catch of sensitive species and minimal damage to habitats.

Proposals for a long-term management plan for the fisheries have already been published by the Commission. These proposals suggest procedures for setting the TACs for sole and plaice, complemented by a system of fishing effort limitation based on geographical areas and groupings of fishing gears. The Group wondered whether such a simple plan can be implemented effectively. There are problems with the institutional arrangements, which offer few opportunities for fishers to engage in dialogue with the Commission over the plan, although much progress has been made in discussing management arrangements within some Member States.

The fisheries concerned are mixed fisheries. The starting point for long term management of the fisheries is sole, a smaller but higher priced species. The sole fisheries are not a problem in themselves. The sole stock is not threatened and has been relatively stable for decades. The sole fleet was viable and economically sound until the large increase in fuel costs occurred from 2004. However, the small mesh fisheries for sole create problems for plaice, with large numbers of juvenile, undersized plaice being discarded.

Analysis suggests that small and gradual reductions in fishing mortality (by 5% per year) for sole would provide some protection for plaice and cod. Sole catches would initially fall and it is not clear whether this would be compensated by a price increase. A reduction in fishing mortality rate of 10% per year would however generate significant short term losses in both catch and revenue for sole.

For plaice, reducing fishing mortality would increase the size of spawning biomass and bring benefits for the stock. Reducing effort at 5% or 10% per year will initially reduce landings slightly in the early years but these will soon recover.

In the case of plaice, changes in selection, which might be achieved by changing the distribution of fishing effort back to more traditional patterns, would create some benefit to the plaice stock. Such changes would not create a short term loss of landings or revenue for either plaice or sole. Clearly, the rate at which effort is to be reduced, and the area over which effort reduction is to be applied, should be considered carefully. Reductions in days-at-sea are currently forcing vessels to fish closer inshore which creates poor selection patterns and consequently significant discards for plaice. Tradable spatially-designated allocations (as suggested by Sarah Kraak) may bring benefits without introducing anomalies. The issue of how fishing mortality is to be reduced is an important one which requires dialogue.

Increasing mesh size does bring long term benefits to plaice stocks and reduces discards. For sole, the biological benefits of increasing mesh size are small but the economic losses of a significant increase could be high and therefore full compliance would be difficult to achieve. Currently fishing experiments are underway to obtain further information on the advantages and disadvantages of different mesh sizes. The results of those experiments are important for the long term management plan.

There are several anomalies and perversions which have arisen from current measures. Long term management measures must be chosen carefully to avoid these. The wish for exemptions by some Member States for particular fleet sectors creates distrust and confusion. NSRAC involvement is important to create discipline amongst all parties and to straighten out anomalies.

The cod recovery plan is currently affecting the fisheries for plaice and sole by requiring reductions in days-at-sea. Cod are caught as a by-catch within the fisheries. Fishers maintain that the cod by-catch is very small for some sectors of the flatfish fleet. Dutch fishers are now including cod in their own voluntary discard programme. Where there is a cod by-catch problem

then the long term management plan will need to include technical measures aimed at allowing cod to escape (an example of such a measure is lowering the beam height).

Juvenile plaice are caught and discarded in some other fisheries (for example the *Nephrops* fishery). Such fisheries should be considered in long term management plans for plaice and sole.

The Group considered that the objective of reducing the ecological footprint of the fishery, in terms of damage to the benthos, should be addressed by requiring the best available, and most appropriate, gear for a given substrate.

The Group concluded that there is a good basis for dialogue with the Commission in the development of a long term management plan for the plaice and sole fisheries. Although it may prove difficult to establish an end-point for any plan, we know the direction we wish to move towards. A slow and gradual approach will be necessary at a rate, however, consistent with keeping stocks at safe biological levels. Currently, there is little information about the process to be adopted for reaching agreement. The NSRAC is aiming for an adaptive process, where we learn from the measures adopted.

Day 2. Case Study II: A Long Term Management Plan for Haddock Fisheries in the North Sea

Background

The ICES ACFM advice for haddock is for a single stock. It is based on the precautionary approach and classifies the stock as having full reproductive capacity and being harvested sustainably. There has been a decline in fishing mortality over the past three years, reflecting reductions in fishing effort under the cod recovery plan, and confirming that measures previously adopted have had an effect. Spawning stock biomass for haddock is in a healthy state but is declining. The stock has been characterised by very low recruitment in the last few years and although there may have been an improvement in 2005 at the moment the fishable stock now largely consists of a single year class. The objective of the current management plan, agreed with Norway, is to restrain fishing mortality to ensure continuity of supply in the context of low recruitment. Currently, the fishing mortality is not inconsistent with the general region of MSY. In the longer term, a fishing mortality of <0.3 gives a low risk of F falling below the Blim biomass

In 1999 the EU and Norway agreed to implement a long-term management plan for the haddock stock, which was subsequently updated in 2004. The plan consists of the following elements:

- Every effort is to be made to maintain a minimum level of Spawning Stock Biomass (SSB) greater than 100,000 tonnes (Blim).
- For 2005 and subsequent years fishing will be on the basis of a TAC consistent with a fishing mortality rate of no more than 0.30 for appropriate age groups.
- Should the SSB fall below a reference point of 140,000 tonnes (Bpa), the fishing mortality rate referred to above shall be adapted in the light of scientific estimates of the conditions then prevailing.
- Such adaptation shall ensure a safe and rapid recovery of SSB to a level in excess of 140,000 tonnes.
- In order to reduce discarding and to enhance the spawning biomass of haddock, the exploitation pattern shall, while recalling that other demersal species are harvested in these fisheries, be improved in the light of new scientific advice.

The management plan for haddock is to be reviewed by the Commission & Norway before 31 December 2006.

Break-Out Group Discussion

The group discussed a possible framework for a long-term management plan for haddock (illustrated in Figure 3).

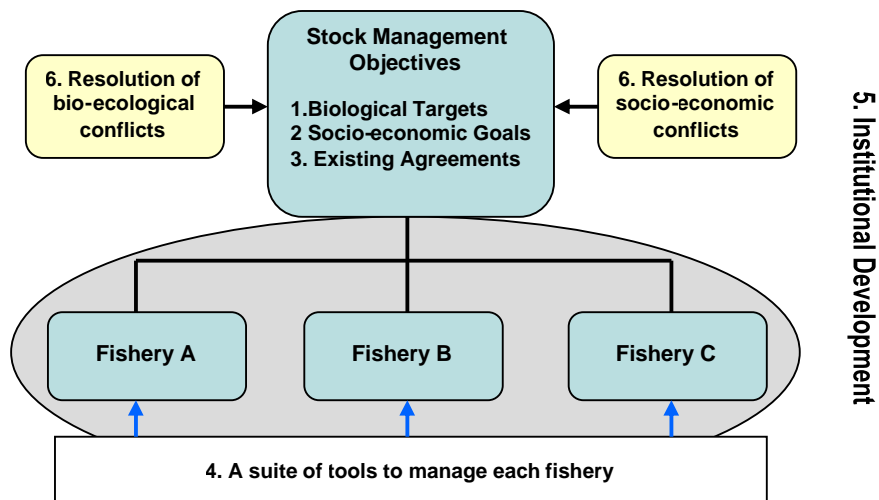


Figure 3. Framework for long-term management of North Sea haddock

Making such a framework operational would require stakeholder agreement on the following:

1. Clear biological objectives for the stock or stocks affected.
2. Clear economic and social objectives agreed at the North Sea level through discussions within and between Member States and their respective industries. Specific aspects of these are likely to vary between different fisheries on the same species.
3. The draft framework would operate in the context of commitments made within the existing international institutional and political arrangements – for example, the precautionary principle, the ecosystem approach to fisheries management and the commitment to long-term management of fisheries.
4. Management measures/regulations appropriate to particular fisheries or fleets.
5. Clear institutional arrangements, with the NSRAC's role envisaged as both representing and informing stakeholders
6. Given the mixed nature of North Sea fisheries, it will also be necessary for such a framework to take account of potential areas of conflict: for example, ecological aspects such as multi-species interactions and predator-prey relationships, and, socio-economic issues such as fishery interactions and overlaps between fisheries. The group acknowledged that a certain level of compromise would be required to develop an acceptable balance of these aspects.

The Group agreed that the existing management plan adopted by the Commission for haddock is very basic. Any future long-term management plan for haddock must take into account the strong fluctuations in recruitment which characterise the species. The assessments for haddock may show some variability, especially when recruitment has been low for some time. There is a need to build in some recognition of uncertainty.

Stock objectives

The Group considered the eco-biological objectives for a long term management plan for the haddock fisheries;

- The primary bio-economic objective is for haddock to stay in the region of MSY, where it is now, with a low risk of collapse.
- In addition, it is important to make the most of good recruitment – to decide how much to bank for the future. A stable future includes retaining a good age structure, bearing in mind sporadic recruitment, giving the fishing industry flexibility and stability and protecting it against risk.
- It is not appropriate to set a biomass target for haddock, as that is outside our control.
- Finally, it is important that all stocks exploited by the fishery remain within safe biological limits.

Fishery regulations

It is possible to distinguish between the various haddock fisheries in the North Sea. For example, using particular criteria, three specific Scottish haddock fisheries have been identified by scientists:

1. In the southern North Sea, with a low by-catch of other species;
2. In the northern North Sea, with a medium by-catch of other species; and
3. On the Fladden Ground, a joint *Nephrops* and haddock fishery.

A further fishery is the Danish industrial fleet that lands a by-catch of haddock. Other fisheries may also be partially reliant on catches of haddock.

In managing haddock, it will be important to take account of the different gear types/métiers which are used to catch haddock in the various fisheries. This is one reason why it is important to develop fishery-specific regulations that work collectively to meet the overall stock objectives.

The fishery in the southern North Sea was taken as an example for implementation of a long-term management plan. A number of tools are available for the management of this fishery: including changes in technical measures, effort controls, TACs, trawl design, licensing, etc. Problems with this fishery include:

- Capture of juvenile fish, discarding and problems defining catch composition
- Lack of industry buy-in: requiring better understanding between countries – greater equality, transparency and commitment
- Poor communication: requiring dialogue between fishermen/scientists/managers in particular to promote understanding that with good year classes fishers will catch the same, with less fishing.

Potential solutions to long term management of this fishery include:

1. A long-term commitment to increase mesh size for the directed fishery
2. General reductions in discards in line with best demonstrated practice
3. The NSRAC to be instrumental in promoting communication between the stakeholders and all actors in fisheries management (governments, federations, scientists, Commission, etc)

Other issues, concerns and reservations of the Group with respect to haddock include:

- Is a species specific management plan approach not a retrograde step, when we have been moving towards the management of mixed fisheries?
- The industrial fisheries need to be factored into any long term management plan for haddock fisheries
- Fleet size and fleet profit – who takes decisions on the economic and social aspects?

Discussions on Day 2

General conclusions from the Break-Out Groups

1. Each long term management plan is likely to be multi-annual, regularly reviewed and based on clear analysis of the state of each fishery. It will not just be based on F & SSB but will take account of the economic health of the fishery and market considerations. A long term plan is not the quick fix which is required for stock recovery. Long-term management can provide us with a framework within which management can react to signals, rather than noise.
2. A key question will be how often a long term plan needs to be reviewed and action taken. The review period will in fact depend upon the fishery and the stocks being exploited. In some cases annual review will not be necessary.
3. Transitional plans may be required to allow managers and stakeholders time to agree on the current position and future objectives
4. The views of industry of how stocks are faring should be taken into account by the management system. Fishers are able to observe the state of the fisheries from day to day. Their knowledge, supplemented by up-to-date surveys, sentinel fisheries and fast-tracked information from scientists, could provide more accurate picture of the current state of the stocks.
5. It is evident that stakeholders can broadly agree on the characteristics of long term management plans; the devil will be in the details of specific plans.

Essential features of any long-term management plan

A series of features emerged from the Group discussions which were regarded as essential to the success of any long term management plan:

1. Stakeholders, and especially fishers, must be involved in the formulation and agreement of both the objectives of the management plan and the means of achieving those objectives. Stakeholders must not simply be consulted on proposals which are already agreed in advance between other parties.

2. The stakeholders concerned must be clearly defined. There is a role for national forums and for the RACs here
3. Buy-in by fishers is necessary if a management plan is to succeed. The concept of Stewardship is important. Involving fishers in the details of implementation may help here.
4. The objectives for any management plan must be clearly stated, and must be achievable. The objectives must address all the components of sustainability; bio-ecological, economic, social and institutional.
5. Although general principles or guidelines for management plans may be set out and agreed by stakeholders, an actual management plans must be specific to a particular fishery, with regulations appropriate to the individual gear types or métiers. One size does not fit all.
6. The management plan for a particular fishery must not be for one stock only; it must take account of all the stocks taken by the fishery.
7. A wide range of management tools/instruments should be considered within the management plan. The plan should not just be based on the TAC.
8. The changes proposed in a long term management plan must be gradual, evolutionary and adaptive
9. The need for a degree of flexibility for vessel businesses must be respected
10. The management plan must take account of uncertainty and must accept that stocks cannot be completely controlled or predicted.
11. The management plan must agree the actions which should be taken if the stock moves outside the safety zone.
12. Flexible rather than fixed rules should be developed within the management plan.
13. Space must be allowed within a management plan for its review and revision

VI. Final Discussion: Where do we go from here?

The material presented and the discussions at the Workshop provided a richness of material which will be invaluable for future action. This project report for DEFRA will be forwarded to the Demersal Working Group of the NSRAC. The NSRAC may then be able to develop and take forward its views on long term management, defining the key fisheries and then setting out timetables for developing its own plans for particular fisheries.

There are several ideas which require further consideration or development:

1. There is a need to look again at the 'use it now or bank it for the future' idea. Is it applicable to all fisheries, or simply to those like the haddock which are characterised by strong recruitment within a particular year followed by periods of poor recruitment?
2. The concept of tradable spatially designated effort allocations is currently largely theoretical but should be further developed as it might provide a useful methodology in the future.
3. We are dealing with complex issues. Institutional problems and failure in governance cut across all of them. A meeting is needed between the Commission and the RACs under the Chatham House Rule to begin a dialogue on future improvements in governance.
4. How are the RACs going to participate in the development of long-term management plans? The NSRAC has made considerable progress in developing its ideas, but is still a long way from taking part in the preparation of actual long-term plans together with the Commission and

Norway. What kind of institutional arrangement between RACs, Commission and scientists is going to facilitate the participation of the RACs in the elaboration of the plans? .

5. A deadline has already been set by the EU and Norway for developing a long term management plan for the fisheries for plaice and sole and management plans for haddock and herring. Plans for these fisheries will have to be in place by the end of November 2006. Interim proposals will need to be lodged with the Commission by July. If not, the negotiating position of Norway with respect to the EU will be strengthened. However, the plans currently under consideration by the Commission are very basic and do not fit the criteria laid down by this Workshop for a long term management plan. They can only be regarded as transitional plans, and the RACs will need to emphasise that in any discussions with the Commission.
6. It will be important for the RACs to take their constituents with them, rather than behaving like a surrogate Commission. A broader dialogue with the grassroots will be necessary and this will take time.
7. On the question of speed, it will not be possible for the NSRAC to propose sensible long term management plans on the time scales envisaged by the Commission. It will be better for the NSRAC to move at its own speed and set its own priorities.
8. It was noted that a policy day has been set aside at the IIFET conference, Portsmouth, on Wed 12 July 2006. This may provide a further opportunity to discuss and debate long-term management plans.

VII. Participants in the Workshop

* first day only

** second day only

*** observer

1. Hazel Curtis	Sea Fish Industry Authority
2. Kate Graham	Sea Fish Industry Authority
3. Jenny Hatchard	North Sea Women's Network
4. Euan Dunn	BirdLife International
5. Geert Meun	Dutch Fisheries Organisation
6. Gerard van Balsfoort	Dutch Fisheries Organisation
7. Simon Dryden*	Scottish Executive
8. Frank Strang**	Scottish Executive
9. Lachlan Stuart**	Scottish Executive
10. Anna Zaradna	DEFRA
11. Poul Degnbol	European Commission
12. J-J Maguire	Halieutikos Inc.
13. Sarah Kraak	RIVO
14. John G Pope	NRC (Europe) Ltd
15. Michael Andersen	Danish Fishermen's Association
16. Flemming Kristensen	Danish Fishermen's Association
17. Erling Skåtøy	Norwegian Fishermen's Organisation
18. Barrie Deas	NFFO
19. Arnold Locker	NFFO
20. Lothar Fischer	German Fishermen's Association
21. Alan McCulla	North West Waters RAC***
22. Iain MacSween*	Pelagic RAC***
23. Michel Goujon	CNPMEM
24. Chris Darby	CEFAS
25. Stuart Reeves	CEFAS
26. Nick Bailey	FRS
27. Spike Searle	Invest in Fish South West***
28. Diana Tingley	CEMARE
29. Simon Mardle	CEMARE
30. Nigel Proctor	European Angler's Alliance
31. Tony Hawkins	Loughine Ltd