CabinetOffice

Prime Minister's Strategy Unit

Net Benefits

A sustainable and profitable future for UK fishing

March 2004

strategy unit

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Foreword by the Prime Minister

The fishing industry is an important part of the UK economy – in 2002 it landed over £540 million in catches and employed over 12,000 people. It is an industry that has shown itself to be adaptable in the face of tremendous upheaval over the last few decades.

But there is widespread concern about the future of the UK's fishing industry. That is why last March I asked the Strategy Unit to assess the issues facing the UK marine fishing industry, and recommend action to create a stable future both for the industry itself and for the communities that depend upon it.

The Strategy Unit team has met hundreds of individuals and organisations connected with fishing, and worked closely with industry representatives, scientists, environmentalists and colleagues around Government and the devolved administrations to produce this report.

And their report shows that the industry can have a sustainable and profitable future, although we face big challenges to achieve this goal. It is not an industry facing inevitable decline.

The Strategy Unit analysis maps out a long-term path to profitability and sustainability – both are essential if the industry is to survive. It is clear that:

- if fishermen cannot make sufficient profits they are more likely to over-fish;
- if they do so, fishermen damage both fish stocks and their prospects to make profits in the long-run; and
- the boom and bust cycles in the industry have blighted attempts to create a modern and appropriately-sized fleet.

The challenge is to find the best package of reforms that will enable the industry to be profitable and sustainable. This report contains a series of proposals on how this can be achieved.

Reform at European Union level, within the framework provided by the Common Fisheries Policy, will be a critical part of the package. Here I want the UK to give a lead in the way this report suggests – urging the EU to go further down the path of managing fish stocks on a regional rather than EU-

wide level. This will give our fishermen and other stakeholders more influence over the type of management regimes that apply to the waters of concern to us.

The report calls for all the key players to come together to manage the UK's fish resources – whether their interest is in scientific and environmental matters, the catching and processing industry, or in tourism and development. Urgent discussions are now needed which draw together these interests with Fisheries Departments across the UK to agree on the way forward. Already a new team has been assembled in the Department for Environment, Food and Rural Affairs to start this process.

I strongly welcome this report to Government, and look forward to a time when we can eat cod, hake, and other fish that have been harvested by a profitable and sustainable UK fishing industry working in harmony with the environment.

Tony Blair

1 Executive Summary

A strategy for the UK sea fishing industry

Following a meeting with fishing industry representatives in January 2003, the Prime Minister tasked the Strategy Unit with carrying out a review of options for a sustainable UK fishing industry in the medium to long term. The review was carried out from March to November 2003 and involved extensive consultation with all parts of the UK fishing industry and other stakeholders, including visits to over 20 fishing communities around the UK.

This report is presented as a set of recommendations to government, not as a statement of government policy. It is intended to form the basis for detailed discussions on future action between the UK Government and devolved administrations and all stakeholders.

A bright future, if well managed and competitive

The UK marine fishing industry is a valuable source of economic activity to the UK, and all sectors are potentially profitable and sustainable over the long term. Despite recent problems, the UK fishing fleet can and should continue to provide vital incomes and employment to communities all around the UK's coasts.

The most pressing problems in the fishing industry are limited to the whitefish sector (cod, haddock, plaice, etc) which is suffering from poor stocks and low levels of profitability. In contrast, over 60% of turnover in the UK catching industry comes from stocks of species such as mackerel, herring and shellfish that are currently sustainable and generating good profits for UK fishermen. However, all UK stocks are vulnerable to over-fishing in the future unless management is improved.

The fishing sector is not in a fatal long-term decline. It should not be compared to industries that have undergone major retrenchment due to low-cost global competition, such as textiles and shipbuilding. The UK mainly competes with developed countries such as Iceland, is seeing good market growth and is a strong exporter of fish products. Despite recent contractions, the fish catching sector alone provides at least 12,000 direct jobs, and an additional 14,000 jobs onshore are dependent on catches of UK stocks.

The perception of continuing decline has in part been driven by 'boom and bust' cycles in the industry during the 1970s–1990s, and the loss of UK access to valuable northern fishing grounds in the 'cod wars'. Some herring stocks collapsed due to over-fishing in the 1970s, but after closure of the fishing grounds they recovered to allow highly profitable levels of catching, albeit with much lower levels of employment. The whitefish sector saw a large boom in stocks and investment in the 1970s and 1980s, partly driven by government subsidies. When underlying stock fertility declined in the late 1980s the fleet was too large to be sustained economically, resulting in over-fishing and subsequent stock collapses and contraction in the industry in the last ten years.

If well managed, we estimate that the turnover of the UK fishing industry could expand by 15–20% in the next 10–15 years. However, if stocks are badly managed and the industry fails to modernise in order to compete, turnover could contract by 30%. The most pessimistic scenario of future prices and stock collapse would result in the loss of around 50% of UK catching sector employment, with associated knock-on effects in local communities. This negative scenario is unlikely, but decisive action must continue to be taken in order to reduce the probability of it occurring.

A future requiring both sustainability and profitability

The potential exists for a bright future for the UK fishing industry. But achieving it, and avoiding the mistakes of the past, requires industry and governments to work together in partnership to tackle two major challenges:

- **Achieving sustainable fisheries management.** Current systems of UK and EU fisheries management will not ensure long-term, sustainable commercial fish stocks without continuing reform. Action is needed to decentralise control, improve compliance and information, and ensure systems meet global best practice in environmental management. Many EU fish stocks are heavily over-fished and need time to recover to optimal and sustainable levels. The report concludes that sustainable management is most likely to be achieved inside a reformed and regionalised EU Common Fisheries Policy (CFP).

- **Creating a profitable and globally competitive industry.** Differences in national demand for different species means that the UK imports 75% of the fish we eat, while we export up to 50% (by value) of the fish we catch. The UK industry mainly faces global competition from sustainable and efficient fisheries in Norway, Iceland, Faeroes, New Zealand, Australia and Canada, as well as other fleets inside the EU. Future prices for most major UK stocks will be stable or fall as barriers to trade are reduced. The UK industry needs to earn adequate profits so it can invest and modernise to respond to this competition, and to ensure safety in a highly dangerous occupation. This can only be achieved by further consolidation and contraction in the catching industry, predominantly in the whitefish sector.

Sustainability and profitability are complementary long-term goals.

An unsustainable industry cannot be profitable in the long term because it destroys the stocks it depends upon. An unprofitable industry cannot be sustainable, because short-term economic pressures will tend to lead to over-fishing. The consultation process carried out for this report shows that all parts of the industry fully understand and accept this logic, but feel short-term economic pressures are a barrier to long-run sustainable behaviour. UK fishermen have experienced real economic pain in recent years as quotas have been reduced to allow endangered stocks to recover. Over £100 million of public money has also been spent removing excess catching capacity from the industry to assist this process.

Despite this substantial restructuring, many fishermen are earning insufficient profits to invest in new boats or technologies, and in some cases only breakeven by fishing illegally. As a result, the quality of UK fish products is declining, resulting in lower market prices. Strategy Unit analysis suggests that the UK whitefish fleet is too large to be profitable in the long term, even under the most favourable projections of prices and stock levels. We estimate that further reduction of at least 13% of whitefish capacity is needed to ensure long term profitability, and removing even more than this may be prudent. Achieving this necessary reduction in the short term will make stock recovery more likely and improve the overall performance of the UK industry.

Short-term sacrifices to recover stocks are only worthwhile if the 'boom and bust' cycles of the past are avoided in the future. Both the UK and EU fisheries management must continue to be reformed to ensure long run sustainable management and prevent a repetition of past failures.

Maintaining fishing's contribution to the UK economy and communities

Achieving these changes is a realistic but challenging task. But it is a challenge worth taking on because:

- the UK catching industry lands over £540 million in catches each year, resulting in between £800–1200 million of economic activity in the UK;

- it supports over 26,000 jobs around the UK: 13,500 in Scotland; 11,200 in England; 1,400 in Northern Ireland; and 700 in Wales. Many of these jobs are concentrated in remote communities with few alternatives;

- the total present value to the UK economy of maintaining access to healthy EU fish stocks is in the range of £11–19 billion, depending on future prices and stock levels;[1] and
- £90–£100 million of public money is spent on managing the industry annually, not including occasional spending on decommissioning, and this spending will continue even if some stocks remain low.

If the UK fails to achieve these changes, a substantial part of our fishing industry will remain in constant crisis, unable to respond to changing economic and biological conditions, with resulting negative impacts on communities and employment.

The report estimates that the net present value of preventing the most negative future scenarios resulting from poor management and/or a failure to modernise the fleet is between £400–£600 million.

A decisive short-term shift is needed in fisheries management and industry approaches to lay the foundations for a long-term profitable industry and stock recovery, and prevent potentially high damages from stock collapse and/or loss of UK competitiveness.

A package of reform measures

This report proposes a set of mutually supportive measures to achieve sustainability and profitability. The proposals aim to give a comprehensive and coherent basis for discussions between fisheries departments and the fishing industry:

Profitable and competitive industry: by reducing fleet capacity by a minimum of 13% in the whitefish fleet, introducing greater competition through individual transferable quotas[2] and working to promote growth in the inshore/shellfish sector around the UK.

Improved transparency and compliance: by introducing greater requirements for traceability and transparency, stricter administrative penalties and greater use of on-board observers, and potentially moving to effort control in some mixed fisheries in the medium term.[3] Methods to ensure tighter control of the growth of fishing capacity should be introduced in all sectors.

Modernised, responsive and inclusive management: by introducing a system of UK regional management, mirroring European Regional Advisory Councils (RACs), with devolved budgets for science and formal stakeholder participation. Moving to partial recovery of management and enforcement costs from the fishing industry, matched with their greater input into management decisions.
An evolutionary approach to developing regional management at the European level, beginning with enhanced informal co-operation and active support for RACs, and strengthening the European Commission's oversight role.

To deliver real change, fisheries departments must work with industry to ensure the regulatory environment promotes both environmental and economic sustainability, and helps the industry to compete on a level playing field with both imported products and other EU fleets.

Industry needs both the opportunity and the right incentives to play a responsible role in fisheries management. In return for this greater industry role in management, they should be expected to contribute to the costs of managing and enforcing fisheries policy.

The fishing industry and fisheries departments need to forge a closer partnership to achieve long-term UK objectives. Neither government nor industry can succeed alone in achieving sustainable management.

[1] That is, the total revenues generated over the next 50 years from UK fishing access rights (given the range of future prices and stocks forecast in this report) discounted back to the present.
[2] Individual transferable quotas allow fishermen to buy and sell fishing rights on the open market.
[3] Effort control involves limiting the amount of time fishermen can prosecute a fishery, rather than applying a quota to the number of fish they can catch, and is beneficial when many types of fish swim together (mixed fisheries) or when it is hard to measure the size of fish stocks accurately.

Government must also have clear social, environmental and safety goals

In addition to helping secure the commercial future of the fishing industry, government has other important roles to play in delivering sustainable development in this sector: supporting vibrant fishing communities, managing fisheries inside the broader marine environment, and promoting safety.

Social goals

Many UK communities are highly dependent on fishing: in some areas in Scotland up to 25% of total employment, and over 40% of private sector employment, depends on UK fleet catches. Most of these fisheries-dependent areas already receive UK Government and EU grants for economic development, and one of the best ways to support these communities is to maintain and improve their fishing opportunities, as well as encouraging economic diversification. Fishing is the most dangerous occupation in the UK. Over the last ten years, a UK commercial fishing vessel has been lost at sea on average every 12.5 days. These tragedies can have a major social and economic impact on small local fishing communities, particularly those involving multiple deaths in a single community.

Fisheries departments should have clear objectives for enabling the most vulnerable and fishing-dependent communities to maintain a local fishing industry where it can be competitive and profitable, including through active support for community quota schemes where needed.[4]

Safety issues must be addressed in the implementation of any long-term strategy. The relevant authorities most responsible for safety at sea should be consulted on the safety implications of proposed measures.

Marine environmental goals

Commercial fishing is only one use of the marine environment, but has the largest single negative impact on its environmental sustainability. The marine environment contains many valuable species and habitats – ranging from over 120 commercial fish species, to rare porpoises and sea birds. These are seriously affected by all economic activity and many resources have been heavily degraded over the years. The UK's coasts and seas are under increasing pressure from a variety of users, ranging from recreational sea anglers, offshore wind farms and shipping, to marine dredging, oil and gas exploration, and coastal tourism development. Most of these users are heavily regulated to reduce their environmental impact, and marine pollution from land is being dramatically reduced. Government has a responsibility to manage these, sometimes competing, activities to ensure the best value is made of the UK's marine resources and biodiversity is preserved. Fisheries should be fully integrated inside such a broader system of marine management.

The commercial fishing industry has a distinct and important role to play in the management of the marine environment, and must take on the same responsibilities, and have the same rights, as other users. As part of this, the UK Government and devolved administrations should introduce comprehensive environmental management systems in all fisheries, and promote their introduction at the European level.

Managing in an uncertain, complex and changing world

Government and industry must recognise the high level of uncertainty and complexity surrounding fisheries and marine management, due to:

- biological variation and interactions in stocks, especially in mixed fisheries;
- limits to scientific knowledge and funding for research;
- difficulty in measuring and managing fishing effort; and
- the problems of managing fish stocks shared between many countries.

The EU has the most complex fisheries management task in the world, in terms of numbers of species, countries, complexity of ecosystems and density of fishing effort. International surveys by the Strategy

[4] Community quota schemes allow local communities to hold fishing rights and lease them to local fishermen, therefore helping prevent fishing activity from leaving the area.

Unit have shown that no other region has solved a comparable fisheries management problem. Current international best practice has been developed in waters which are intrinsically easier to control, eg Iceland and New Zealand. There is no way to avoid this management problem, including through proposals to 'nationalise' fisheries management, as biological reality demands a shared management approach in each region of the EU.

Current EU management seems unnecessarily politicised given that all countries will gain from better management of stocks, and basic national interests are more often aligned than in conflict. This has diverted capacity and attention away from more co-operative approaches to management. While there will always be difficult allocation and negotiation issues in EU fisheries policy, most countries would see the biggest national gains by focusing on developing new and innovative management systems to ensure healthy, sustainable stocks in the long term.

The need to increase co-operation between EU countries and improve risk management and innovation will become even more important in the next 10–15 years as the effects of climate change increase, with unpredictable impacts on the mix and distribution of commercial species around the UK.

However, none of this will be possible unless the basic levels of compliance with fisheries rules and transparency of information are drastically improved in all EU fishing grounds. The UK should continue to work with the Commission and other Member States to improve enforcement and compliance in all its key fisheries.

Policy and organisational recommendations

A package of reforms at all levels

The key recommendations needed to begin the process of reform outlined above are summarised below. A full listing of all detailed recommendations is provided in Chapter 11.

Most aspects of fisheries management, industry support, regional development and environmental management have been devolved since 1999. This report proposes recommendations to the responsible authorities, and to the UK as a whole, where appropriate. However, the devolved settlement and complexity of national and local administrative arrangements means that the report does not contain a precise blueprint for administrative implementation.

They are intended to form a consistent and coherent package of measures and provide a starting point for discussions on future action between government and all stakeholders.

Clear objectives

Recommendation 1: Fisheries departments should all develop sets of fisheries management objectives with a clear hierarchy in order to promote better and more transparent decision-making (9.3).

Recommendation 2: The overarching aim of fisheries management should be 'to maximise the return to the UK of the sustainable use of fisheries resources and protection of the marine environment' (9.3).

Recommendation 3: Sub-objectives should also be established covering economic, social environmental issues, safety and good governance (9.3).

Creating a competitive and profitable UK fleet

Long-term profitability underpins sustainable fisheries management. Therefore fisheries managers need to understand the industry's long-term commercial strategies in each catching sector, with a view on future prices, competition, and market opportunities, and their implications for the size and composition of a sustainable fleet. Industry itself must be responsible for its own profitability, but government must lay the foundations by fostering transparent competition and helping remove overcapacity.

Recommendation 4: Fisheries departments should ensure a basis for both long-run profitability and stock recovery by considering funding the removal of a minimum of 13%[5] of the whitefish fleet (beyond the 2003 decommissioning scheme) as part of an overall

[5] This figure applies to the UK as a whole and does not imply that decommissioning is needed in every part of the UK.

package of management reforms. This could require between £40 million and £50 million in additional public spending. The fishing industry would benefit from tying up a further 30% of the whitefish fleet for up to four years to accelerate stock recovery, but this should not be supported by public funds (10.2).

Recommendation 5: Fisheries departments should promote competition by introducing individual tradeable rights for resource access, beginning in the pelagic and nephrops sectors (9.4.3).

Recommendation 6: Fisheries departments should focus on support for the development of the inshore/shellfish industry to take advantage of its large growth opportunities (6.1.2).

Recommendation 7: Fishing industry should maintain and enhance its market opportunities by aiming to achieve Marine Stewardship Council (or equivalent) certification for all stocks of major interest to the UK by 2015 (6.1.2).

Improving UK and EU information and compliance

A sustainable UK industry is only possible if the vast majority of the industry supports and obeys the rules. Currently, overall compliance in key stocks fished by the UK and many other EU countries appears low enough to undermine stock recovery and the information used to assess sustainable levels of Total Allowable Catches (TACs). Improving compliance is not just about increasing enforcement measures: the industry will continue to face high incentives for non-compliance unless it is profitable and fleet capacity is reduced to be broadly in line with available revenues. With stronger profits and a better fit between capacity and catches, a modernised system of management can ensure that it pays to obey the rules and the high-quality information is available to support sensible management measures. Cost recovery should be introduced for management and enforcement in a way that places the costs of non-compliance and poor data collection on the relevant sector or part of the fleet, therefore giving clear incentives for industry itself to work to improve compliance.

In some highly mixed fisheries the current TAC system may lead to non-compliance or undesirable by-catch discards, as allocated quota does not match the actual mix of fish caught. There is no perfect way to manage such complex fisheries, but switching to effort management systems would solve many problems and should be considered as a preferred option. Where this is not possible or desirable, quota management should be reformed to be more flexible and adaptable to biological reality.

Recommendation 8: Fisheries departments should introduce a high-transparency system where all catches and landings are traced through markets and processors; and enforcement focuses more on forensic accounting, on-board observers and risk profiling (9.4.2).

Recommendation 9: Fisheries departments should introduce simple administrative penalties and 'points' systems where the costs of infringements are transparent and predictable to the industry and most offences are decriminalised (9.4.2).

Recommendation 10: Fisheries departments should introduce progressive cost-recovery of management and enforcement costs from industry to give greater buy-in and incentives for compliance (9.4.2).

Recommendation 11: Fisheries departments should commission detailed technical analysis and plans on the practicalities of introducing effort-management systems in mixed North Sea, Irish Sea and Channel fisheries (9.5.3).

Recommendation 12: Fisheries departments should develop alternative adaptive TAC systems through discussions with the Commission and EU partners for mixed fisheries where effort control is either not achievable or appropriate (9.5.3).

Recommendation 13: The UK should continue supporting the European Commission in taking a stronger enforcement role to ensure a level playing field for all EU fleets, and collaborate more actively with European partners in major

UK fisheries to improve compliance and enforcement practices (9.4.2).

Decentralising and modernising UK fisheries management

All UK fisheries have unique biological and economic characteristics, so there can be no 'one size fits all' approach for management systems, especially in the inshore sector. The UK has some particularly complex mixed fisheries which will require the development of sophisticated and adaptive management approaches if they are to be sustainable in the long term. The UK has significant flexibility inside the Common Fisheries Policy (CFP) to tailor its management systems, but some areas will require changes at EU level. Achieving such fisheries management requires a focused and professional institutional structure, which involves all stakeholders and can evolve and innovate over time.

Recommendation 14: Fisheries departments should collaborate to create a system of UK Regional Fisheries Managers for the UK Regional Fisheries Managers for the waters West of Scotland, the North Sea, the Channel, the Irish Sea and Western Approaches, and Inshore/ Shellfish Managers in each nation, with the authority to draw up management approaches, and task/fund science (9.6.1).

Recommendation 15: Fisheries departments should reform inshore fisheries management and give a focus on developing the sector, including explicit management of recreational sea angling interests (9.6.2; 9.6.3).

Recommendation 16: Fisheries departments should give industry and other stakeholders clearly defined advisory roles inside the regional and inshore management structures in the form of a formal Stakeholder Advisory Group (9.6.1).

Recommendation 17: Fisheries departments should give the fishing industry a greater role in co-ordinating information priorities through more extensive use of co-commissioning of research. This should follow shortly after the appointment of regional managers in 2005 (9.5.1).

Recommendation 18: Fisheries departments should promote greater innovation and management-focus in fisheries science by regionalising the process of science tasking and introducing contested budgets for innovation in scientific and management approaches (9.5.1).

Recommendation 19: The UK should adopt a large-stock strategy and use this to guide its position in EU negotiations for its key economic species. This will entail reducing catch in the short term. Fishery managers should explicitly seek to maximise the value of commercial stocks and reduce the volatility of catch (6.2).

Recommendation 20: Fisheries departments should develop risk-management approaches to fisheries management, including by introducing tighter controls on capital investment to prevent future 'boom and bust' cycles (5.3; 9.5.2).

Progressively regionalise EU management under the CFP

The EU contains the most complex fisheries in the world, in terms of: the number and mixes of species; the number of countries sharing stocks; and the density of coastal communities with fishing heritages and interests.

The UK has no choice but to manage its stocks with European partners, as we share many of the same waters and stocks. International experience shows that multi-jurisdictional fisheries are intrinsically hard to manage, and the difficulties with the CFP are not unique.

Compared to other multi-jurisdictional fisheries, the EU has two assets which should help management, namely:

- a strong legal framework for making decisions; and
- a system of allocating access to stocks between Member States.

This strong legal framework is necessary for sustainable management, but not sufficient to achieve it. The current CFP has not managed many stocks well, especially in complex mixed fisheries, with increasing numbers being assessed as being in danger. However, CFP failures cannot be directed at

any one area or actor but are systemic and therefore require system-wide solutions. The CFP reforms in 2002 removed some of the largest blockages to sustainability, including by taking global leadership in agreeing an international ban on subsidies for new boats, but did not go far enough.

The European management system requires more decentralisation and flexibility and should more actively promote innovation and the best use of information. Given the complexity of European fisheries, they must have adaptive regional approaches which draw on the capacity and knowledge of all stakeholders.

This is best achieved through a progressive regionalisation of the CFP, building on the idea of Regional Advisory Councils (RACs) agreed in 2002, and more informal co-operation on management and enforcement between Member States in the same region. The devolution of technical management tasks to the regional level should be coupled with a stronger Commission role in auditing, enforcement, setting sustainability objectives, promoting innovation and ensuring full integration of environmental issues in Community fishing policy. The EU Fisheries Council should also develop stronger expert bodies for joint problem-solving, for example on developing the ecosystem approach, following existing examples in policy areas such as climate change.

Recommendation 21: The UK should adopt an aim of progressively regionalising the management functions of the CFP, while strengthening Commission oversight on audit, sustainability goals, compliance and enforcement and environmental issues (9.5.4).

Recommendation 22: Fisheries departments should begin to build the basis for regional management by increasing informal management co-operation with key EU partners, especially on scientific, technical and enforcement issues (9.5.4).

Recommendation 23: Fisheries departments and stakeholders should work together to strongly facilitate and support the development of Regional Advisory Councils (RACs) (9.5.4).

Recommendation 24: Fisheries departments should improve problem-solving and innovation capacity by proposing shared solution forums at EU level; for example, on ecosystem-based management, marine science, and the impacts of climate change on fisheries (9.5.4).

Recommendation 25: Fisheries departments should press for the implementation of Sustainability Impact Assessments of fisheries policy and practice at the EU level, following the Gothenburg Council Conclusions (8.3.5).

Setting clear social objectives in fisheries policy

The fishing industry provides valuable income and employment to remote communities which would otherwise make higher calls upon public funds. The primary way to ensure healthy fishing communities is to ensure a safe, well-managed and profitable industry, but it is also important to help smaller and vulnerable communities continue to have access to fishing opportunities which with increased competition may flow to larger ports and operators.

Recommendation 26: Fishery departments should consider the use of community quota in vulnerable and dependent fishing communities, looking to develop a system compatible with EU law. They should launch a feasibility study on designing a community quota system by the end of 2004 (7.2).

Recommendation 27: The UK Government and devolved administrations should ensure future reviews of EU State Aids/structural funds maintain opportunities to provide appropriate support to vulnerable fishing communities (7.4).

Recommendation 28: Fisheries departments should actively facilitate and co-ordinate access to UK and EU support funds for transition support, diversification and industry development (7.4).

Integrating the needs of the fishing industry with other uses of the marine environment

As pressures on the marine environment grow from economic uses and climate change, it will be increasingly important to better understand and manage human impacts on marine ecosystems.

Fisheries management is only one important aspect of this. Fisheries must operate to the same level of environmental controls as other users, taking a fair share of responsibilities for habitat, species and ecosystem protection. Fisheries management and the wider industry should take an active approach to developing marine management frameworks (eg including through possible Marine Acts). This should include the development of 'fishing friendly' approaches to achieving environmental objectives to avoid unsuitable or inflexible solutions being imposed upon the industry.

Recommendation 29: Fisheries departments should introduce Strategic Environmental Assessments of both inshore and offshore fisheries by the end of 2006, as the first stage of establishing comprehensive Environmental Management Systems (8.3.5).

Recommendation 30: Fisheries departments should ensure Environmental Impact Assessments are carried out prior to the introduction of a new gear to a fishery or the start of a new fishery (8.3.5).

Recommendation 31: The UK Government and devolved administrations should develop an experimental programme of Marine Protected Areas focusing initially on areas which provide benefits to multiple users (commercial fishing, tourism, environment, recreational fishermen, etc) (8.3.5).

Recommendation 32: Fisheries departments should provide incentives to improve environmental performance and encourage development of less damaging gear types (8.3.5).

Recommendation 33: In the medium to long term, the UK Government and devolved administrations should consider integrating fisheries management tasks inside a marine environment agency responsible for broader management tasks, if such bodies are established under other legislation (eg possible Marine Acts being considered in different parts of the UK) (8.3.5).

2 Introduction: Structure and Scope of the Report

This Chapter:

- explains the origins and terms of reference of this report;
- describes the process involved in developing the strategy, including the involvement of stakeholders;
- gives an outline of the focus, scope and structure of the report; and
- details the supporting analytical annexes and other related models, data and material available on the Strategy Unit website.

Summary

Following a meeting with fishing industry representatives in January 2003, the Prime Minister tasked the Strategy Unit with carrying out a review of options for a sustainable UK fishing industry in the medium to long term.

- This report develops a 10–15 year strategy for the UK sea fishing industry, and an indicative transition path for implementation.

- Strategic recommendations have been based on:
  - analysis of the current issues facing the UK fishing industry;
  - projections of future stock levels, prices and market conditions to determine a range of possible future sizes and compositions of the UK fishing industry, including employment and community implications;
  - analysis of the range of inherent and potential risks the industry faces; and
  - analysis of fisheries management systems, based on international experience and modelling of the UK situation, in order to develop and assess possible future UK and EU management options.

- The strategic approach aims to achieve the following broad objectives:
  - achieving adequate levels of long-term profitability in a globally competitive commercial environment;
  - ensuring sustainable and optimal fisheries management;
  - taking full advantage of fishing policy and existing public support for achieving regional and community objectives in fishing communities;
  - managing the interaction of commercial fisheries with other uses of the marine environment, including ecosystem services and biodiversity; and
  - ensuring a safe fishing industry

- The complexity of the fishing industry, and the different administrative structures of devolved authorities across the UK, has limited the specificity of recommendations in some areas.

2.1 Terms of reference

This report sets out the findings of a review of different options for achieving a sustainable UK fishing industry in the medium to long-term.

The review's terms of reference were:

'To develop a long-term strategy for the sustainable future of the UK marine fishing industry. The strategy should be based on the need for sustainable management of marine resources and ecosystems, and take account of the diverse and changing circumstances of fishing and related industries, and the social and economic development of communities which depend on fishing activity.'

'The strategy should provide a guide for policy development by the various fisheries departments, for the UK's approach to EU and international negotiations and for planning by the catching industry and associated sectors.'

Throughout its work the Strategy Unit reported regularly to a steering group made up of the UK Fisheries Ministers, Welsh and Scottish Ministers plus representatives of DTI, HMT, ODPM, No. 10 and Cabinet Office.

The Sponsor Minister for the project was Elliot Morley, Fisheries Minister in DEFRA. Following a ministerial reshuffle in June 2003, Ben Bradshaw

became Fisheries Minister in DEFRA, and also took over as Sponsor Minister.

2.2 Review Process

The review was carried out by a multi-disciplinary team with support from experts and many stakeholders. A wide range of consultation activities and visits were undertaken to gather information, and extensive analysis was carried out of current and future options.

The 13-person review team[6] consisted of Strategy Unit personnel, other civil servants and secondees from outside government. The details of the Strategy Unit team can be found in Annex A.

A stakeholder advisory group and an Expert Group assisted the team throughout. The membership of each group can be found in Annex A.

As part of the information-gathering process, 150 responses to a consultation paper were received from a wide range of individuals and organisations. A major stakeholder event was held in Newcastle on 1 October 2003 and was attended by over 80 people. Stakeholder workshops on the environment and inshore sector were also held. Interviews were carried out with 26 MPs/MSPs representing fishing constituencies. Details of organisations and individuals consulted can be found in Annex A. Visits were made to 20 UK fishing ports and five EU countries, plus Norway, Iceland, Faeroes, USA, New Zealand and Australia.

Extensive use was made of available literature and the Strategy Unit undertook its own analysis and modelling of key UK stocks, industry, communities, compliance, capital flows, management and transition policies.

Details of this modelling can be found in the analytical papers accompanying this report, and many of the models and data used are available on the Strategy Unit website. Meetings with government and external experts were also convened to discuss legal, compliance and risk management issues.

2.3 Scope and focus of the Report

The report provides a strategy for a long-run sustainable UK sea fishing industry, which is defined as:

- **the UK catching sector;**
- **primary and mixed processing dependent on UK catching;**
- **support industries dependent on UK catching eg boat building; and**
- **employment supported by the catching sector either through direct purchases or related income.**

All aspects of the seafood industry have been studied in the report, including processing, markets and aquaculture. The following terminology is used throughout the report to describe industry sectors:

- Catching sector: Catching of fish and shellfish.
- Aquaculture: Farming of salmon, trout, shellfish and other species.
- Service industries: All ancillary and service industries supporting the catching sector – boat building, maintenance, supplies, equipment, etc.
- Fishing industry: All aspects of catching, processing, retail, etc that rely on wild fish catch, including shellfish.
- Seafood industry: All commercial activities associated with seafood products, from catching to retail, and including aquaculture.

However, a detailed strategic framework has been developed only for the sea fishing industry. The rationale for this primary focus is to examine the UK economic activity supported by the exploitation of UK access to European fish stocks and dependent on the sustainable management of these biological resources.

This approach means that the report does not focus on the majority of the secondary processing industry, as this is generally profitable and is primarily dependent on imported fish stocks, which appear to be sustainable in the timescale under consideration.

[6] This number represents all those who participated in the project team, not all of whom were full time.

Since 1999, fisheries management has been devolved, and Scotland in particular has just under half the total amount of catching-sector employment. The need for consistency with the devolution settlement means that the report focuses on fundamental principles and rationales for change, and describes the basic actions and functions that this analysis suggests are needed. Institutional and policy design details are generally avoided as these are best developed in the implementation phase within the context of each administration's management structures.

2.4 Developing a strategy for the sea fishing industry

This report develops a 10–15 year strategy for the UK sea fishing industry. This timescale was chosen because it provided:

- a timeframe within which key stocks could be expected to have recovered;
- long enough for the possibility of significant changes to management structures in the UK and EU;
- a timescale which could be used to inform immediate policy making directions, without being driven by – or being made redundant by immediate issues and crises.

However, as well as developing a 10–15 year vision for the industry, the report also gives an indicative transition process for how this can be achieved, and in particular the sequencing and links between parts of the policy package. The transition path analysis is presented in Chapter 10 of the report.

The strategy has been developed through the following stages:

- **Analysis of the current situation and challenges:** systematic examination of the state of the industry and the challenges it faces.

- **Future industry potential:** projection of the possible future possibilities for the industry in 10–15 years including:
  - the state of UK fish stocks;
  - The market for UK caught fish, including prices, costs and competition;
  - the potential size of a profitable UK fleet under the different biological and economic futures;
  - the impact of future fleet changes on employment and communities.

- Fisheries management systems: analysing the necessary conditions for sustainable fisheries management in different UK fisheries, and developing different possible packages of measures to achieve this.

- Developing strategic options: based on the analysis of possible futures a set of strategic options was developed to achieve broad UK objectives. These options were assessed against UK objectives and a final set of strategic approaches was chosen.

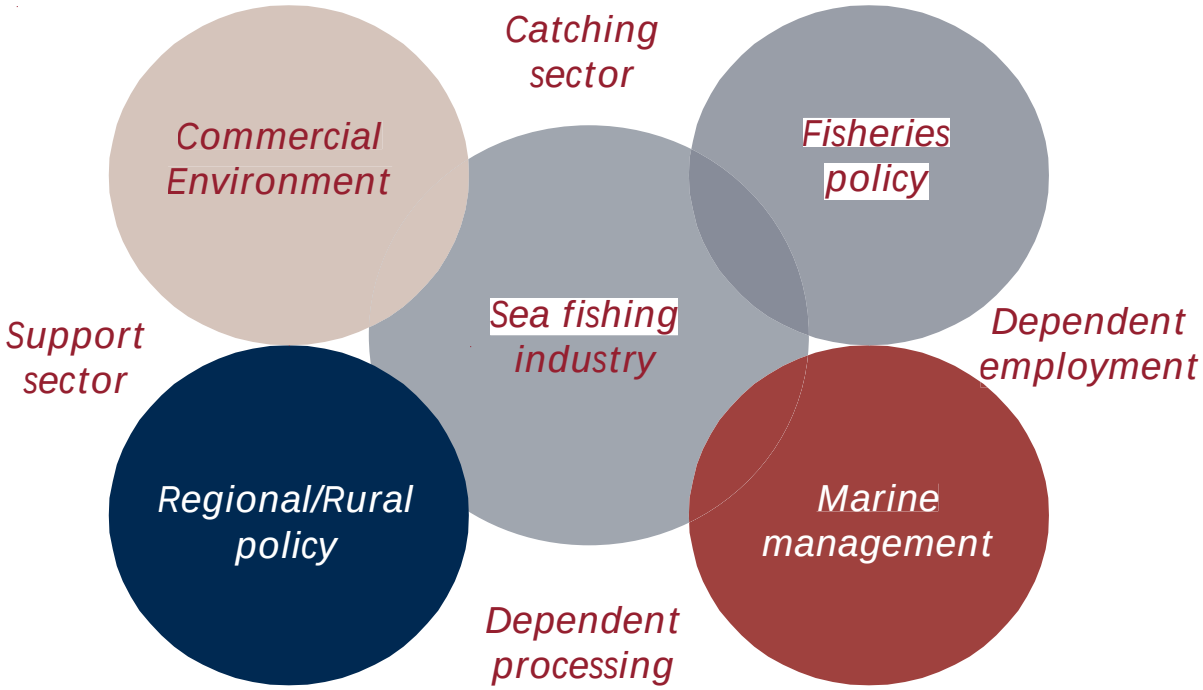
In many areas the lack of data, or the complexity of local and/or industry structure prevented detailed conclusions being drawn. The report attempts to clearly identify these areas and give concrete recommendations either for further, more detailed work, or an allocation of responsibility for action to the relevant level, for example the need for further detailed analysis of the vulnerability of individual fishing communities to changes in fleet structure.

2.5 Foundations of a sustainable fishing industry

A truly sustainable fishing industry needs to have firm strategic foundations in four related areas:

- commercial environment;
- fisheries policy;
- regional and social policy; and
- marine management

Figure 2.1: Foundations of a sustainable fishing industry



2.5.1 Commercial environment

A sustainable industry needs commercial strategies to ensure it is profitable and competitive inside EU and global markets for fish products. Long term profitability requires returns adequate to: allow investment in new boats and equipment; pay wages high enough to attract high quality skippers and crew; ensure safety; and provide sufficient reserves to enable survival through natural downturns in stocks and prices.

2.5.2 Fisheries policy

Fisheries policy must be designed to: ensure sustainable stocks are available at economic levels; give continuing access for the UK fleet to EU stocks; produce high levels of compliance from the industry; and follow the principles of good governance. These include proportionate regulation, clear and fair allocation of rights and responsibilities, industry involvement in setting regulations and recovery of public costs.

2.5.3 Marine management

Commercial fisheries are only one user of the wider marine environment, alongside recreational activities (including fishing), mariculture, oil and gas extraction, wind farms, dredging, and habitat and biodiversity protection. A strategy is needed to integrate fisheries inside a framework of broader marine management which aims to: maximise the overall value of using the marine environment; ensure ecosystem health and resilience, and fulfil the UK's international obligations on marine biodiversity and species protection.

2.5.4 Regional and rural policy

Most fishing communities are covered by regional and rural policy objectives that aim to stimulate economic growth, promote vibrant communities, retain employment and reduce social exclusion. Maintaining a sustainable fishing industry can contribute to all these objectives, but it requires a strategic approach to ensure maximum impact and support from available mechanisms.

2.6 Report structure

The report is structured as follows:

Chapter 3: reviews the current situation facing the UK fishing industry.

Chapter 4: analyses the future challenges facing the industry and calculates the range of possible fleet sizes under different biological and economic scenarios.

Chapter 5: explains why all fisheries policy must explicitly incorporate risk management principles and tools in order to be effective.

Chapter 6: develops a strategic approach to commercial issues for the UK fishing industry.

Chapter 7: develops a strategic approach to social and community issues associated with the fishing industry.

Chapter 8: examines how the fishing industry can best be incorporated into broader marine management.

Chapter 9: develops a strategic approach and detailed recommendations for changes to fisheries management at the UK and European Level.

Chapter 10: proposes an approach for implementing the report's recommendations.

Chapter 11: summarises the strategic recommendations in the report.

Annexes cover:
- details of the project team, sponsor minister and advisory group;
- a glossary of terms used in the report; and
- analytical papers covering:
- stock stability analysis; and
- fisheries incentives and management analysis.

The following analytical papers are published on the Strategy Unit website:

- a strategic regulatory impact assessment of the recommendations;
- stock modelling and projections;
- industry analysis and modelling;
- community analysis and mapping;
- environmental analysis;
- dynamic fleet modelling
- risk management background papers

The response to the Strategy Unit consultation paper, the records of various stakeholder events and additional analytical material can also be found on the Strategy Unit website at www.strategy.gov.uk.

3 Current situation and challenges

This Chapter

- describes the current state of the UK seafood industry, including trends in demand, prices, global competition and the state of major EU stocks of interest to the UK;
- describes the profitability of different sectors of the UK catching industry and the distribution and extent of dependent employment;
- gives a critical assessment of the current system of fisheries management in the UK and EU, and assesses its success at managing fish stocks of interest to the UK.

Summary:

- The UK seafood industry exists as part of a global and European-wide market and 75% of UK demand is met through imports. These imports are mainly from sustainable stocks outside the EU which are fished by unsubsidised, modern, profitable and competitive fleets.
- The UK catching industry had a turnover of £546 million in 2002 and supports over 12,000 direct jobs resulting in £800–1200 million of economic activity in the UK. Around 50% of UK catch (by value) is exported. The processing sector employs over 22,000 people, including those processing imported and farmed fish, and the primary aquaculture sector employs around 2,000.
- The fishing industry is a critical employer in remote and disadvantaged areas, particularly in Scotland, supporting up to 24% of jobs in some areas. Nearly half of all employment is in the under-10m boat sector. Direct catching employment has shrunk by 30% in the last seven years.
- Most of the catching industry is profitable, and in some cases profit margins are very high, but the whitefish sector (cod, plaice, haddock, etc) is suffering from low stocks due to over-fishing, possibly combined with adverse environmental factors.
- Larger UK processors not dependent on domestically caught whitefish are doing reasonably well, though further consolidation is likely as smaller processors face cost and supply-chain pressures.
- Only 13% of stocks (by value) to which the UK has access in EU waters are classified as being in danger, although another 23% can be considered at risk. These stocks are concentrated in the whitefish sector and have highly skewed age structures, making them volatile and unpredictable from year to year.
- The fishing industry has a large negative impact on the wider marine environment, including habitat quality and populations of other marine species (eg mammals), but faces looser environmental controls than other marine users eg the oil and gas industry, offshore wind farms.
- UK and EU fisheries management lag behind global best practice and, despite promising reforms, are as yet unable to ensure sustainable long-term management of stocks. The UK spends significant public funds on managing the fishing industry £90–100 million in 2002 compared to gross industry operating profits of around £130 million.
- Problems with UK and EU management stem from perverse incentives generated from the interaction of the whole system, and not from a single problem either at the EU or UK level. Low levels of compliance are endemic throughout the EU, including in the UK. These are often driven by economic and institutional factors and cannot simply be solved by increasing enforcement activity though this is a critical component.

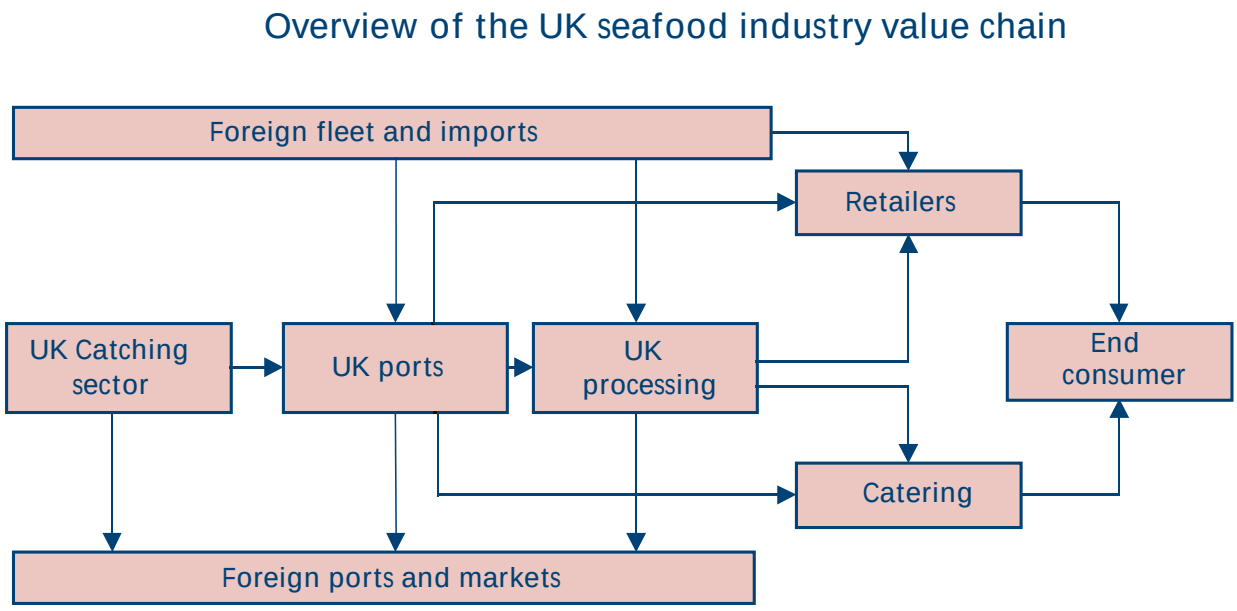
- The UK whitefish fleet has too many boats for current available catches. This is not just because of current stock decline but because of past levels of investment during the 1970s and 1980s which were fuelled by UK government subsidies. All sectors of the fishing industry are still vulnerable to future damaging 'boom and bust' investment cycles, even in the absence of government subsidies.

Key challenges facing the UK fishing industry:

- ensuring conditions exist for the UK fishing industry to compete effectively on EU and global markets for fish products;
- rationalising and modernising the whitefish sector on a long-run sustainable basis, while ensuring stock recovery is successful;
- maintaining sustainable and profitable fishing opportunities for remote and dependent communities;
- providing a clear framework for balancing the different uses of the marine environment and preserving long-run ecosystem integrity;
- ensuring management systems create the correct incentives to supply accurate information and produce a high level of compliance;
- reforming UK and EU management systems to ensure long-run sustainability, including prevention of future 'boom and bust' cycles.

3.1 The UK seafood industry

Figure 3.1: Overview of UK fishing industry value chain



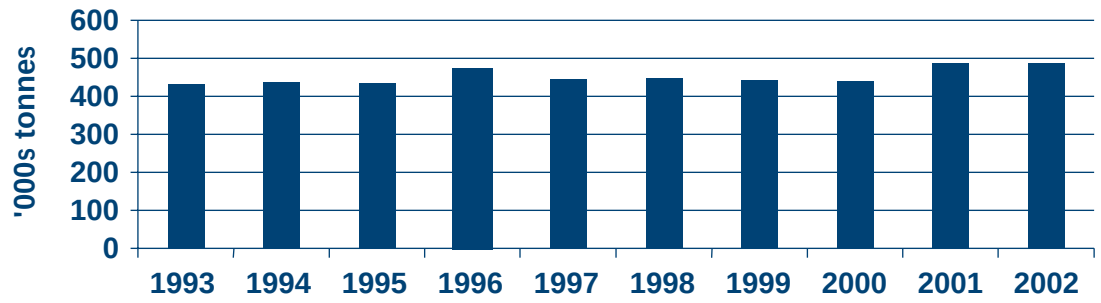
3.1.1 UK seafood market demand

Demand growth is good but not explosive

The UK catching sector is one part of the broader UK seafood industry, which itself forms part of a wider European and global industry. The most successful catching sectors are export-led, and the majority of domestic consumption is dependent on imports of fish products.

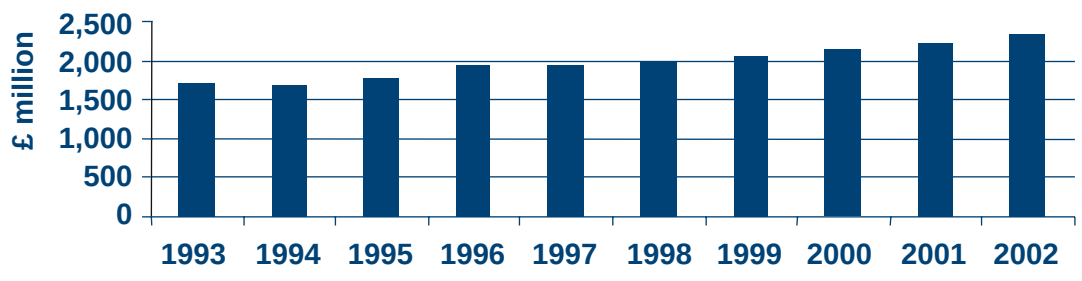
Demand for fish in the UK has been increasing slowly but steadily over the past ten years. Total household expenditure was £2.4billion in 2002, up from around £1.7billion in 1993 (Figure 3.3). The average person in the UK consumed around 160g of fish per week in 2002 – an annual increase of 1.3% since 1993 (Figure 3.2). Expenditure on fish products as a proportion of the food wallet has remained steady at around 4% over the last ten years.

Figure 3.2: Household consumption of fish



Source: DEFRA, 2003

Figure 3.3: Consumer expenditure on fish



Source: DEFRA, 2003

Consumer preferences are shifting away from whole fish

Retailers report increasing consumer resistance to whole fish, especially for smaller flatfish where processing options may be more limited.[7] While there will continue to be a place for wetfish on the market, this sector is continuing to lose market share (currently less than 25%) to processed and frozen product. More generally, the foods that are succeeding are those that can match people's needs, particularly in terms of light meals, easy meals, quick meals and snacks. These trends will fuel demand for quality, highly fresh fish which forms the base for premium chilled products (eg fresh fish portions) which compete with other 'healthy' proteins (eg chicken or pork) and are the fastest growing section of the UK market.

The demographic forecasts do not appear to present any threats to seafood consumption. Fish consumption amongst the older population tends to be higher than for the population more generally. The health benefits associated with eating fish are becoming better understood and should expand demand in this increasingly wealthy cohort.

3.1.2 Global markets

Global supplies have continued to rise and the market for fish has become increasingly globalised

UK supply represents less than 1% of total global fish production. The UK's output, whilst fluctuating, has remained relatively steady in value terms over the past 30 years. In contrast, global supply has increased, fuelled by the exploitation of new fisheries in developing countries and global advances in aquaculture production. Historical growth in the global supply of fish (wild plus farmed) has been approximately 3% per annum[8] over the past 40 years.

The trade in fish and fish products has increased steadily over the past ten years. Fresh fish is being air freighted into the UK from all parts of the world to meet consumer demand. For example, less than 20% of the UK's cod consumption is supplied by the UK catching industry; the rest is imported from Iceland, Russia, Denmark, Norway, China (processed) and the Faeroes.

The UK is a net importer of fish products

The UK has consistently been a net importer of fish products over the last decade (Figure 3.4). Imports are mainly of bulk whitefish from large, sustainable sources in Iceland, Norway, New Zealand, etc. The UK exports 40–60% of its catch by value. Most of this consists of high value shellfish exports to the EU (mainly France and Spain), exports of other minor species to the EU, and low price pelagic fish destined for countries outside the EU.

UK landing prices are under increasing pressure from imports

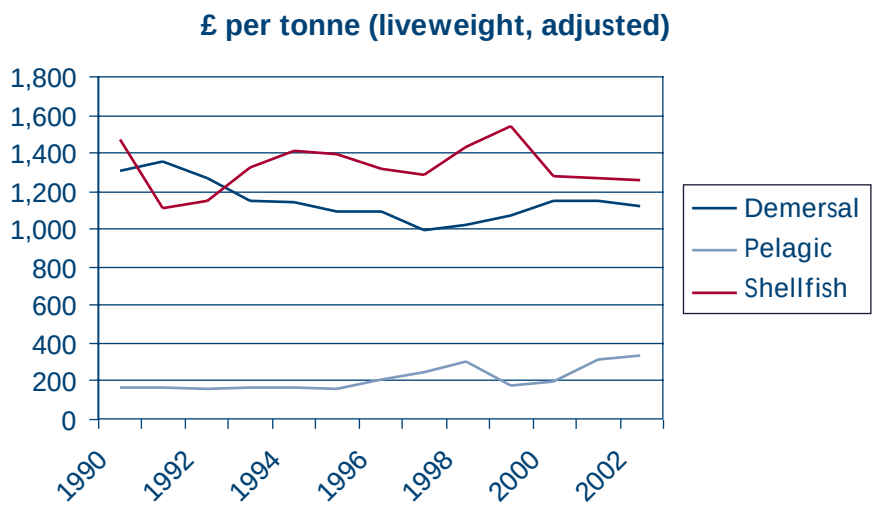
Overall, the real price of fish has fallen slightly over the past ten years. At the industry level, real average price declines among the whitefish and shellfish species have been offset to some degree by significant real price increases in the pelagic sector (Figure 3.5).

Supply chain pressure drives processor consolidation and imports

The increasing domination of the supply chain by multiple retailers has accelerated the rate of consolidation amongst processors in their attempts to maintain profit margins. Supply chain pressure from multiples has forced processors to increasingly source their product from abroad, where they can obtain the supply reliability and quality consistency demanded by retailers. Multiples are also demanding higher levels of traceability from suppliers, and some have preferential purchasing policies for fish which have been certified as being from sustainable stocks.[9] Whilst niche markets exist for high-end quality products, the mass-market supply of fish is coalescing around a handful of large processors and retailers. Smaller processors are finding it difficult to adapt to meet changes in consumer demand or to undertake innovative marketing of new products.

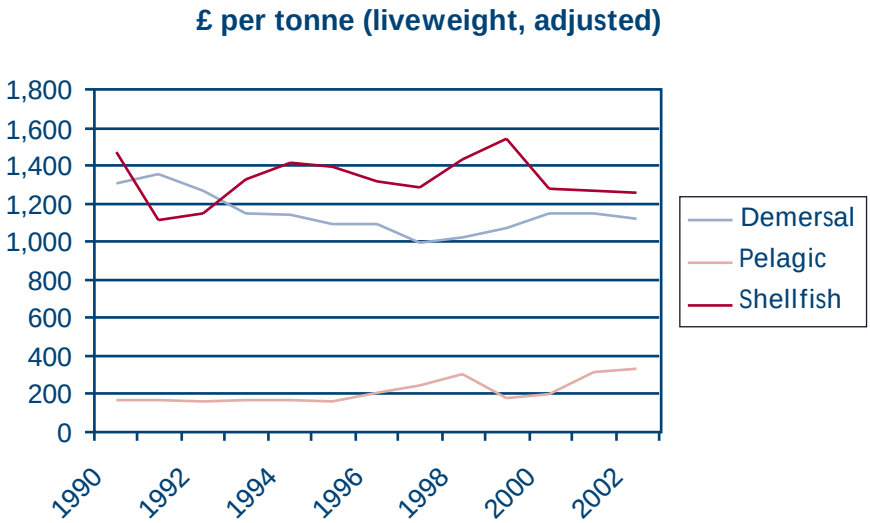
[7] Mogan, T. (2003). The UK Seafood Market Five Years Hence. August 2003.
[8] FAO statistics (2003)
[9] For example, Sainsburys has a vision of sourcing 100% of its fish products from stocks certified as being sustainable by 2010.

Figure 3.4: UK balance of trade in fish



Source: DEFRA, 2003

Figure 3.5: Price of UK fish by species group



Source: DEFRA, 2003

3.1.3 Aquaculture

Aquaculture forms an increasingly important part of the UK seafood industry but faces strong competition from imports.

Aquaculture provided 8% of global fisheries production in 1984 and this figure had risen to 22% by 1996. Most of this increase occurred in low-income, food-deficit countries such as China. Generally, the geographical distribution of aquaculture output is skewed towards Asia. Produce from aquaculture appeals to processors given the regular supply (compared to irregular wild-fish landings) and the ability to stipulate size.

Most of the UK aquaculture industry is based in Scotland, with just under 2,000 direct jobs and 8,000 in supporting sectors. The Scottish industry in particular has experienced considerable structural changes since its inception. In 2000, there were 90 companies (compared to 120 in 1995) and, of these, 15 accounted for 74% of production. Production in 2002 was some 145,000 tonnes of salmon, over 5,000 tonnes of rainbow trout, and over 3,000 tonnes of cultivated shellfish, worth some £275 million. Welsh aquaculture production is worth £3.6million per annum and employs 100 people. Production stands at around 800 tonnes for finfish and 6,000 tonnes for shellfish. Currently, pressure on the aquaculture sector from lower cost imports is very strong and undermining profitability.

Techniques to farm alternative species for which there is high demand in the UK, such as halibut and cod, are now reaching commercial fruition. The industry is keen to diversify, given that growth in the salmon market has slowed sharply. However, it seems unlikely that significant quantities of these species will be farmed in the next five years. New ability to deal with algal toxins suggests that there could be good prospects for expanding shellfish culture.

3.2 UK catching sector

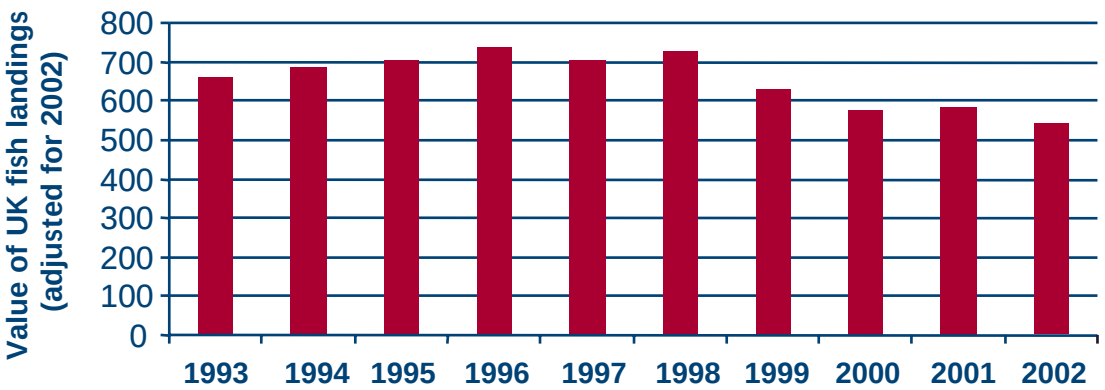
3.2.1 Landings and fleet structure

The economics of the UK catching sector are sector-specific

The economic situation across the UK fleet is currently very mixed. Poor stock levels and increased competition from imports in the whitefish sector has reduced landing volumes and has lowered prices significantly. The pelagic and shellfish sectors, with good economic and stock levels, are currently healthy.

The UK catching sector generated approximately £546m of landings in 2002. Figure 3.6). This figure has been in decline since the mid-1990s, reflecting poor stock levels and increasing pressure on prices. The industry has some highly cyclical characteristics, driven both by the underlying volatility in stocks as well as the economic incentives to over-fish and over-capitalise.

Figure 3.6: UK catching sector landings (£million)

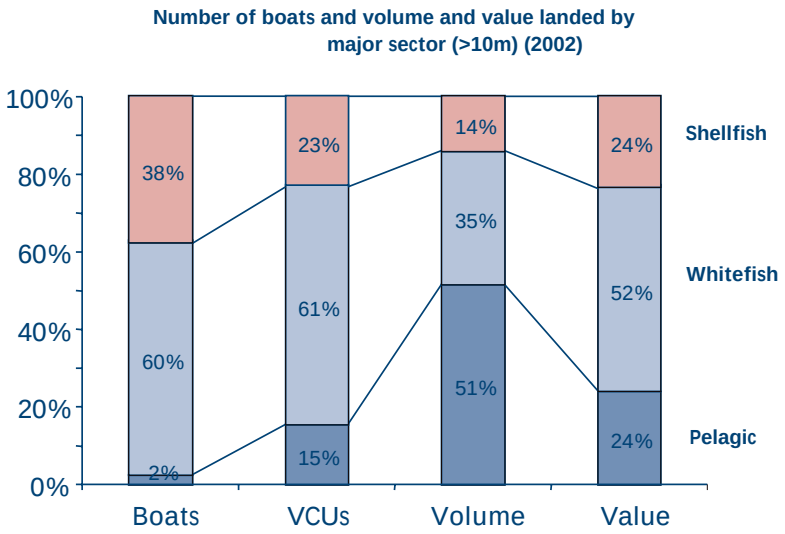


Source: DEFRA, 2003

The catching sector consists of many different industries

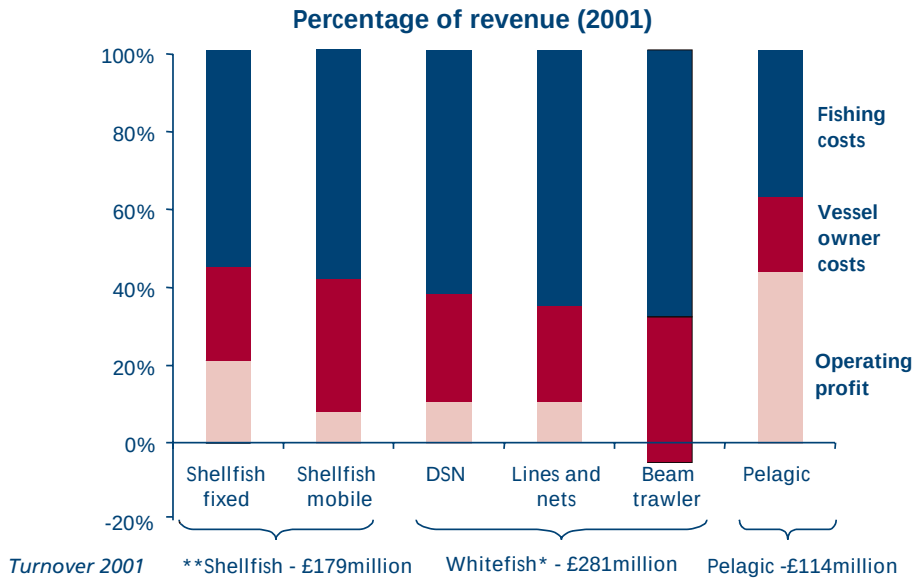
Different fleet segments are highly differentiated from one another in terms of their vessel numbers, physical capacity and contribution in terms of volume and value landed (Figure 3.7). The fluctuations in total value mask much higher variations in financial performance across the sectors. This reflects the different business models, including species focus, consumer market, economies of scale, technology and economic drivers, associated with each sector (Figure 3.8).

Figure 3.7: Sector fleet characteristics in terms of 2002 boat numbers, VCUs, volume and value of fish landed



Source: DEFRA, 2003; Strategy Unit analysis

Figure 3.8: Financial performance breakdown by major gear type (vessels over 10m in length) as a percentage of total revenue



Source: SEAFISH Cost and Earnings Survey 2001

3.2.2 Economic performance of the main UK catching sectors

The pelagic sector is in robust health: The pelagic fishery (herring and mackerel) is a highly consolidated and capitalised sector making good profits and returns on capital. The sector turned over approximately £110million in 2002, with operating profit margins in excess of 40%. The sector is comprised of just over 40 boats and operates largely out of Fraserburgh and the Shetlands. The concentrated schooling behaviour of pelagic species has enabled significant economies of scale to develop, which have been exploited over recent years. The sector is export-led with a high demand for products in Eastern Europe and Asia. The fleet is modern and crews are highly professional.

The whitefish sector is suffering greatly: The whitefish sector turned over approximately £260million in 2002 and lands the bulk of household name fish species. Cod, haddock, sole and plaice are all caught by this sector. These species are under most biological pressure and so volumes have fallen significantly in recent years as a result of quota cuts. The sector has also been hit hardest by the increase in competition from imported fish. Capacity in the sector far outstrips the opportunity that currently exists, in large part due to over-investment during the gadoid outburst of the 1970/80s. The fleet is ageing and many skippers are finding it hard to attract skilled young people into the industry. The whitefish sector is said to have experienced a significant growth in illegal landings, which puts further strain on stock levels. The mixed nature of the whitefish fishery does not allow for the same scale economies as the pelagic sector, and so there is a limit to the level of economic consolidation that can occur.

The shellfish sector is strong: The over-10m fixed and mobile gear shellfish sector turned over approximately £60million in 2002. The major species in the sector are nephrops, scallops, crabs and other high-value species. Profitability appears strong. There is intrinsically low biological volatility and there is greater economic flexibility to manage these fluctuations due to lower levels of invested capital and smaller fixed costs. The sector has grown significantly over the last ten years, in large part driven by the growth in the nephrops fishery. The export market for the higher value species within the sector has also been important in driving profitability.

The under 10m/inshore-sector picture is varied: The inshore/under-10m sector contains the bulk of employment in the fishing industry, located along the entire coastline of the UK. The profitability picture is mixed and there is not enough data to paint a truly accurate picture. The key advantage that the sector has is the ability to provide local fresh produce. In line with the shellfish sector, there is also greater economic flexibility with lower levels of invested capital, less requirement on crew labour and lower fixed costs.

Most of the catching industry is profitable, and in some cases profit margins are very high, but the whitefish sector (cod, plaice, haddock, etc) is suffering from low stocks due to over-fishing, possibly combined with adverse environmental factors.

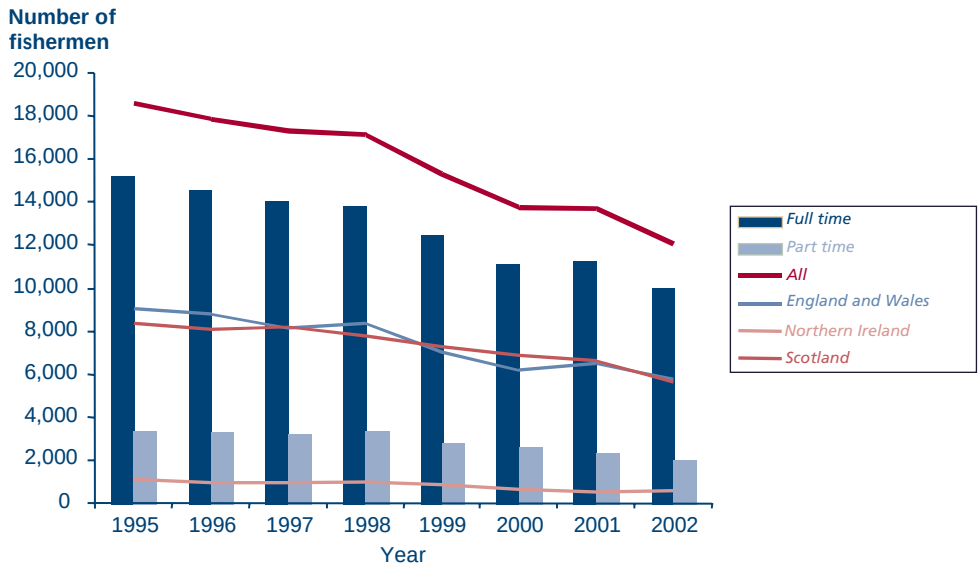
3.3 Fishing communities

3.3.1 Catching-sector employment

Numbers of fishermen are declining, but employment is still significant In 2001, there were over 14,000 fishermen in the UK of which 45% were in Scotland, 51% in England and Wales and 4% in Northern Ireland (DEFRA, 2001); we estimate that employment has since fallen to 12,000. The number of fishermen in the UK is a little greater than the number of people working in the coal industry.[10] Figure 3.9 shows how catching-sector employment has declined over time, with a 33% drop in number of full-time fishermen and a 39% fall in part-timers since 1995. The decline has been more severe because the gadoid outburst supported a much larger number of fishermen than would otherwise have been possible.

[10] According to the DTI website, the UK coal industry currently employs just over 11,000 people. The majority of jobs are in England (over 8,000 employees); Scotland has over 1,700, and Wales about 1,000.

Figure 3.9: Change in UK fishing employment, 1995-2002



Source: DEFRA, 2003 (direct communication)

3.3.2 Employment dependency

Fish-catching employment is very important to some communities

While fishermen account for a small percentage of the national workforce (0.2% in Scotland and 0.1% in England and Wales), they make a significant contribution to local economies as they tend to be regionally and locally concentrated. Around 20% of UK fishermen are located in the south west of England and 13% in Aberdeenshire, and at a more local level, there are over 700 fishermen in the Fraserburgh Travel to Work Areas[11] (TTWA), 650 in the Peterhead TTWA and 575 in the Penwith TTWA.[12]

From a local and regional economic development perspective, it is more relevant to look at employment dependency, that is, the percentage of total employment that is in fish catching. Dependence on direct fish-catching employment is presented in (Figure 3.10) for TTWAs. This shows the proportion of people employed in the area who are working as fishermen.

It does not include the indirect and induced employment in each TTWA that is associated with these fishing jobs. For example, jobs in processing that depend on local landings, jobs in firms supplying goods and services to the fishing vessels, or employment resulting from the spend of people working in the fishing industry and associated sectors.

Estimates of the indirect and induced employment associated with fish catching and dependent fish processing in each TTWA are shown in Figure 3.11. In 2001, total fisheries dependency was as high as 24% in the Western Isles, and 20% in Fraserburgh and Dartmouth[13] TTWAs.[14]

The inshore sector is significant in terms of employment, but geographically dispersed and poorly measured

The fishing sector also has a large inshore sector, estimated to employ 5,500 full-time fishermen, many of whom operate small boats under 10m in length. This sector is also thought to be associated with

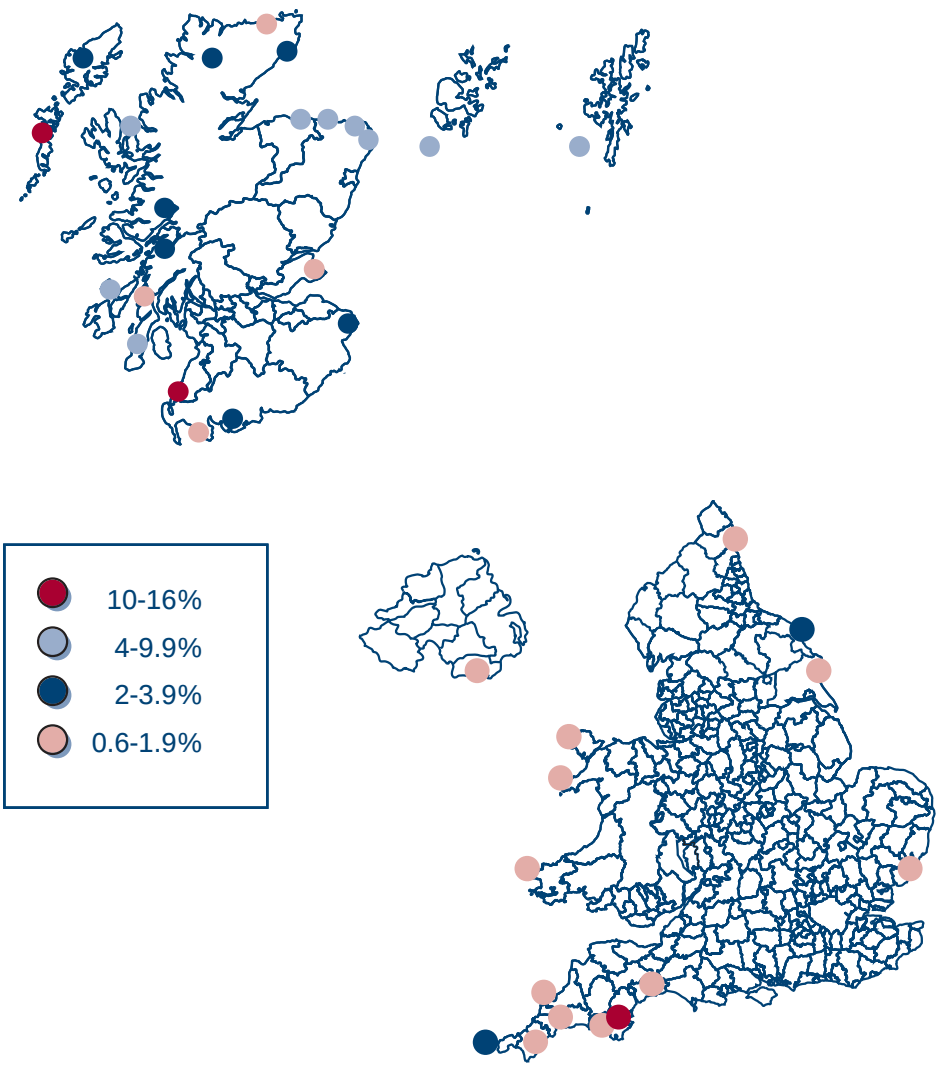
[11] TTWAs are the best representation of the local labour markets around fishing communities.
[12] The Penwith TTWA includes Newlyn.
[13] The Dartmouth TTWA includes Brixham.
[14] To estimate total employment dependent on fish catching, employment in dependent fish processing (taking processing to be dependent on local catching if it currently supplies its fish from within the same region) was included. Existing studies of multipliers for the fishing industry and government guidance on multipliers for regeneration appraisal were used to determine appropriate 'Type II' multipliers for the fishing industry at the travel to work level.

substantial additional levels of informal labour for example, the work put in by other family members to support the business, and occasional fishermen who use fishing to supplement the household income. This sector is much more geographically dispersed, and less easily recognised in fisheries and regional policy. Nevertheless, it is a sector of local cultural and tourism value, with the potential to provide high value fishing jobs into the future.

An active fishing industry brings other benefits to communities

The responses to the consultation and meetings with MPs and MSPs undertaken for this project revealed that many people believe other benefits are associated with an active fishing industry in at least some fishing communities. These include its contribution to the local social fabric, culture and the image of the area, use in marketing an area, its services and products. These impacts are hard to quantify but should be considered in policy-making.

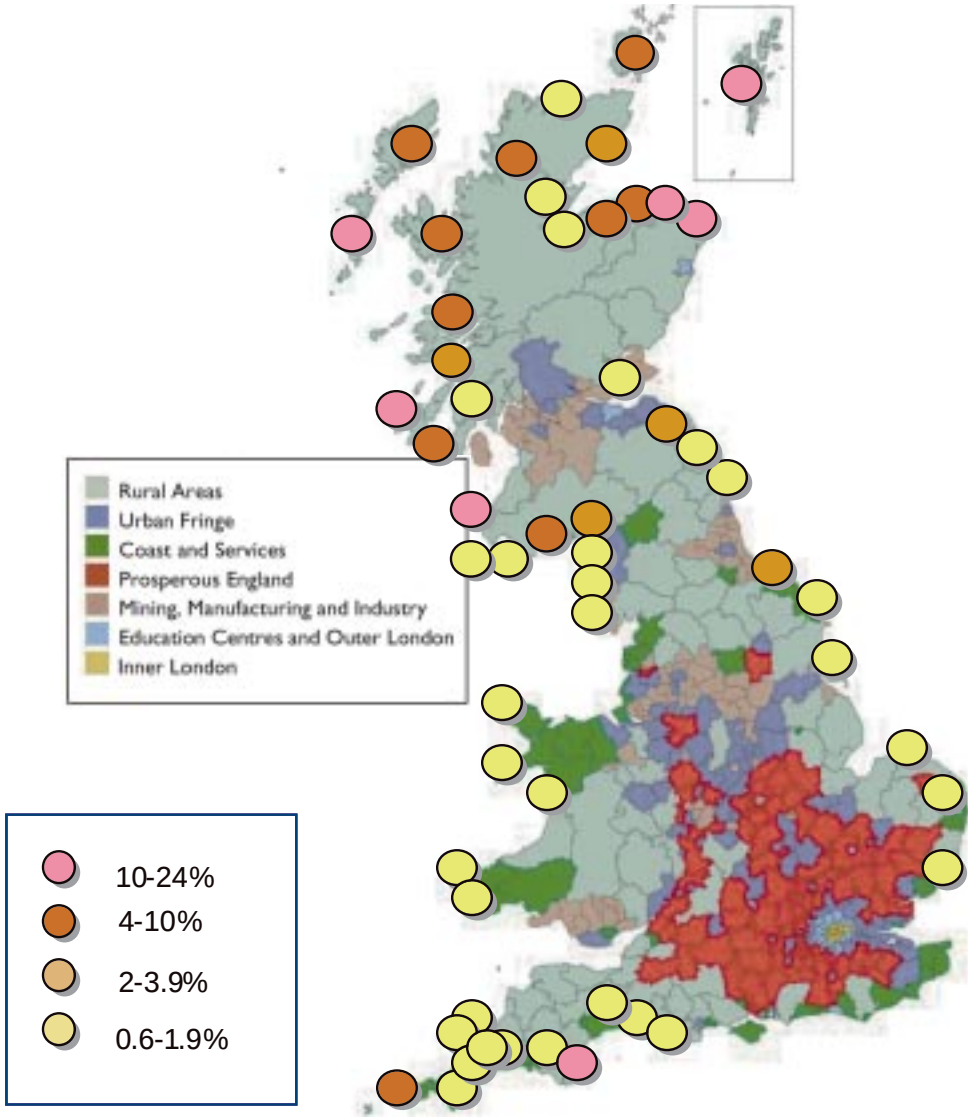
Figure 3.10: Dependence on fish-catching employment by TTWA



Source: Strategy Unit analysis, DEFRA, Annual Business Inquiry[15]

[15] Strategy Unit analysis of dependency using the number of fishermen by home port for 2001 provided directly by DEFRA, employment by TTWA for 2001 from the Annual Business Inquiry, accessed via the NOMIS website.

Figure 3.11: Total fisheries employment dependency by TTWA[16] on a map of local authorities by socio-economic family type



Source: Strategy Unit analysis using data from DEFRA, Annual Business Inquiry data on total number of employees, Seafish (2000), English Partnerships (2003)[17] and ONS (1999)

[16] Note: Dependency is the percentage of employment in the local labour market or TTWA that is related with fish catching, including direct, indirect and induced employment.

[17] See the Communities Analytical paper for a full explanation of the analysis undertaken and data sources used.

3.4 Stocks and the environment

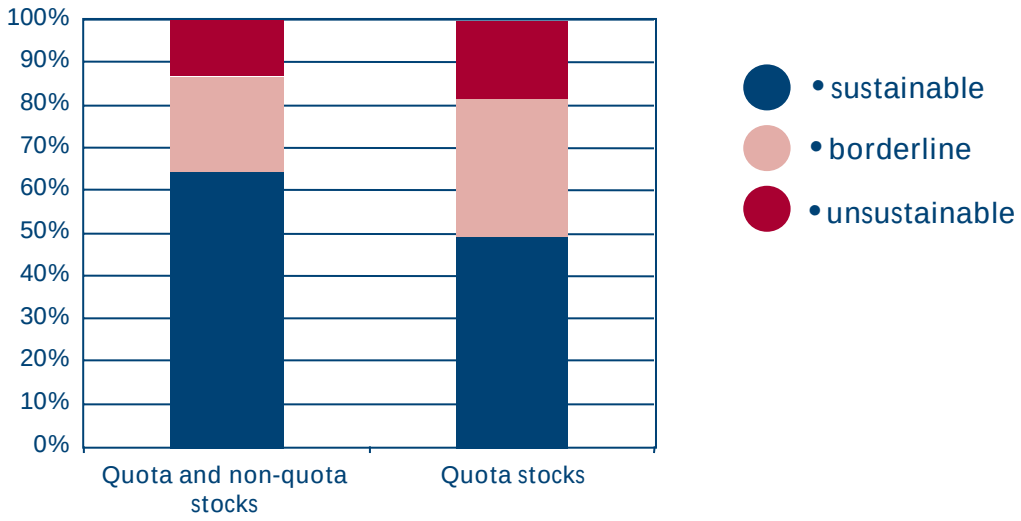
3.4.1 Commercial fish stock health

Fish stocks around the UK are frequently referred to as being in crisis, but the detailed picture is much more mixed.

Whitefish species, including cod, sole, haddock and anglerfish, are in a poor condition. Populations of cod, for instance, are at a historical low, but many other valuable stocks including herring, mackerel and nephrops, are in good condition. Figure 3.12 shows that, 50% of the UK catch (by value) from stocks managed by quota are in a healthy condition. Many commercially valuable species, including most shellfish, are not subject to EU quotas; and if these are taken into account, over 60% of the value of the UK catch in 2002 was from healthy stocks.

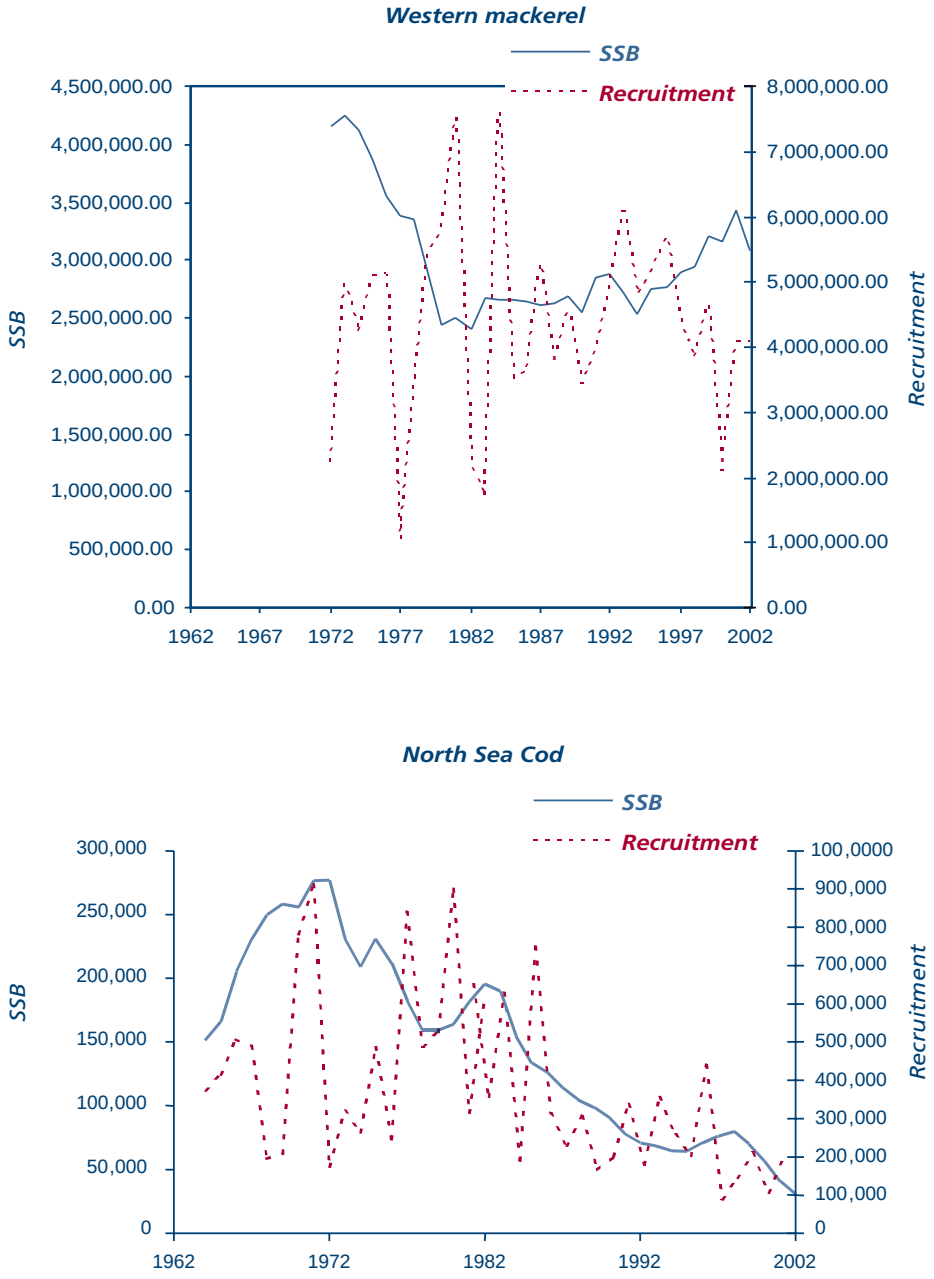
Whitefish stocks make up the majority of those in a poor condition. As recently as 1998, UK vessels landed £137 million of cod and haddock (about 25% of UK landings by value), but this fell to just £70 million in 2002. Such a drop in value of landings causes real hardship for individual fishermen and the communities and allied industries they support. The drop in North Sea cod stocks compared to the relative stability of mackerel can be seen in Figure 3.13.

Figure 3.12: Proportion of UK catch by value by state of stock health



Source: Strategy Unit calculations based on data from ICES and UK landings

Figure 3.13: Stock biomass (SSB) and recruitment for Western mackerel and North Sea cod



Source: ICES, advisory committee on fisheries management reports

The UK has large fish imports, particularly of species that have traditionally been caught by UK fishermen, such as cod. While the majority of stocks in the world are in poor condition, the stocks that the UK most relies upon (Norwegian and Icelandic cod and skipjack tuna) are in a healthy and sustainable state; the sustainability of imported prawn and of some minor species is less certain.

UK imports mainly come from sustainable stocks and are unlikely to fail in the future, and high competitive pressures are likely to persist for many parts of the UK catching sector.

3.4.2 Commercial stock volatility

Over-fishing has exacerbated natural stock volatility

Stock volatility is not a new phenomenon. It arises in large part because of:

- natural variability in stock recruitment[18], and
- heavy fishing pressure resulting in a skewed fish age distribution. If there are proportionately more young fish in the stock, this results in greater year-to-year fluctuations in stock size.

Some stocks experience large annual fluctuations for environmental reasons that are incompletely understood. Mackerel and herring populations tend to swing dramatically and have benefited from good recruitment periods in the past to recover from substantial collapses. Haddock in the North Sea had a very good year class in 1999, ten times higher than in previous years.

Fishing pressure is the other main cause of stock volatility. High levels of fishing mortality have resulted in a highly restricted age structure for most commercial species. Cod can live to around 40 years of age – however, because of high fishing pressure, 90% of cod in the North Sea are presently aged one or two. Less than 0.5% are more than five years old. This truncated age structure for cod has existed for some 30 years. Even in 1963, the proportion of one and two-year-old fish was 86%, and the proportion aged above five just 1.3%. This skewed age structure is increasingly being seen in other species. In 1969, 33% of Channel (Area VIIe) sole were aged above five year. By 2001, this figure had dropped to 13%. Figure 3.14 displays the large variations in recruitment seen in recent years for key UK species.

A highly skewed age structure is damaging to stocks and fishermen

- **Older fish are larger, have more eggs than young fish and may be more fertile, improving levels and reliability of recruitment.**
- **Older fish are usually more valuable in the market place.**
- **Annual catches are likely to vary greatly from year to year to match the recruitment pattern. A more balanced age structure will buffer annual TAC against annual variations in recruitment.**

3.4.3 Commercial fisheries and the broader marine environment

Fishing pressure impacts upon non-target species and marine ecology

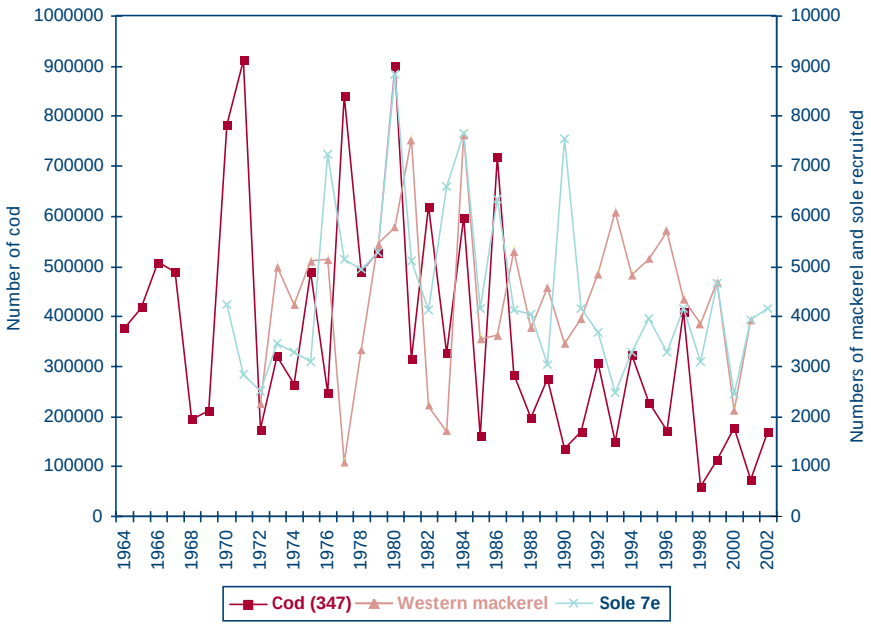
Globally, about 26% of fish that is caught is subsequently discarded. In the North Sea in 1990, around 260,000 tonnes of roundfish, 300,000 tonnes of flatfish, 150,000 tonnes of bottom-dwelling invertebrates and 15,000 tonnes of rays, skates and dogfish were discarded[19]. Many rays and skates are long-lived species and have low fecundity and this by-catch represents an unsustainable pressure on these stocks. The numbers of harbour porpoises caught in nets is falling, but in 2000, around 600 were caught.

Fishing has many effects on vulnerable marine habitats. The size of the impact depends very much on the type of gear being used – in general lines and nets are less disruptive than bottom trawls. Trawling can cause permanent damage to vulnerable habitats, such as the 4,500-year-old cold water corals in north-west Scotland known as the Darwin Mounds, but may have relatively little effect on other habitats, such as sandy sea floors. An assessment of the most important pressures upon the north-east Atlantic environment by the intergovernmental OSPAR

[18] Recruitment occurs when a fish becomes fisahble for the first time – ie it has 'recruited' to the fishable part of the stock

[19] ICES 2001, Report of the working group on ecosystem effects of fishing activities . ICES CM 2001/ACME:09

Figure 3.14: Variation in recruitment for key stocks fished by the UK



Source: ICES 2001Report of the working group on ecosystem effects of fishing activities . ICES CM 2001/ACME:09

Commission (international scientific panel) decided that three of the six most important pressures arose from sea fishing.

Top human pressures on the marine environment

1. **Fisheries: removal of target species**
2. Input from land: organic micro-pollutants
3. **Fisheries: seabed disturbances**
4. Inputs from land: nutrient
5. **Fisheries: effects on non-target species**
6. Shipping: inputs from anti-fouling substances

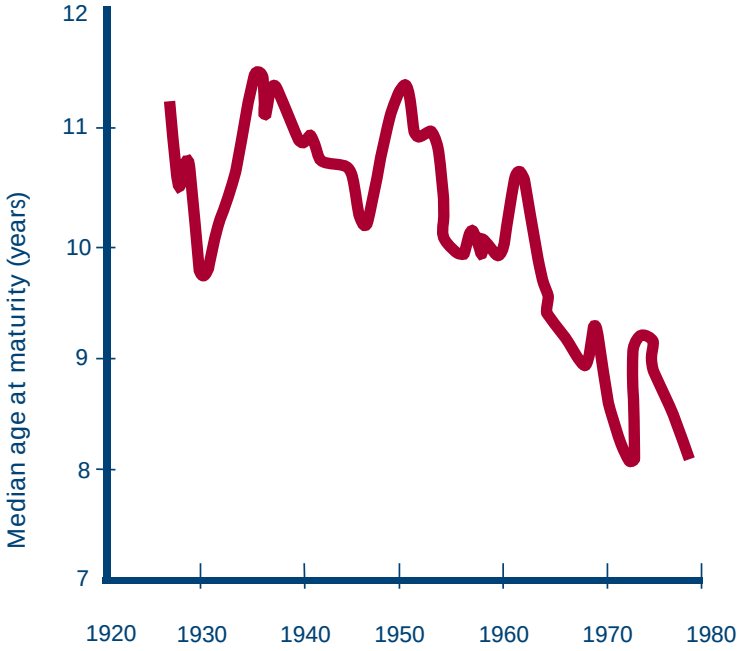
Source: OSPAR, 2000

Fishing changes the mix of species in the sea and this can have a significant impact upon the ecosystem structure. Fishing has the potential to selectively kill large animals from species like cod, and removing them may allow the expansion in numbers of smaller species which they previously ate. Analysis of the catch in north-east Atlantic fisheries suggests that the average trophic level of the catch (the average number of links in the food chain) has dropped from 3.6 to 3.4 over the past 40 years.

Fishing pressure is changing the genetic composition of wild fish by preferentially selecting smaller, faster maturing individuals, as shown in Figure 3.15. The long-term effects of such genetic drift are not known but might well reduce resistance to any future environmental changes, including climatic change, which could increase temperatures in southern England by up to 1.5°C in the next 15 years (Hadley Centre, 2001).

Commercial fishing has a large impact on marine ecosystems, affecting commercial species, valuable habitats and biodiversity, which are protected under UK and international law. Current knowledge of the workings of marine ecosystems is low, and the long-term costs of such damage hard to assess and calculate. However, it is a reasonable assumption that they will reduce the resilience of the ecosystem to future environmental perturbations and climate change.

Figure 3.15: Mean age at maturity for North Sea cod (both sexes)



Source: Law, 2000, after Jorgensen,1990

3.4.4 Other uses of the marine environment

Sea fishing is one amongst many uses of the marine environment. Many of the other uses of the marine environment are, or, economically more significant than sea fishing; for example, amenity value and off shore wind farms.

The value of other uses of the marine environment is greater than that from sea fishing. With careful management, there are no irreconcilable long-term trade-offs between different users and the fishing industry.

Recreational anglers spend around £1 billion per year on their sport (Strategy Unit estimate). Off shore oil, gas and aggregate extraction is worth over £14 billion per year. Over the next two decades, £48 billion may be invested in off-shore wind-power installations. As well as these direct uses of the marine environment, the sea provides many indirect benefits that are at least as important. The sea is a major reservoir of biodiversity-UK waters are the habitat of 44,000 species. The seas are a major store of the greenhouse gas CO2, helping regulate the climate. Organisms in the sea also play a vital role in nutrient recycling, returning nitrogen, phosphorus and sulphur to the terrestrial ecosystems.

Most users of the sea operate to high environmental standards. Dredging has been subject to environmental impact assessment since 1989; the oil and gas sector has a sophisticated system of regulatory checks to ensure environmental performance before, during and after fields are in production. Fishing is presently exempt from many of these standards and licences are not required to prosecute a new fishery.

In some cases, different uses of the environment are complementary. Coastal tourism, especially in south-west England, relies on fishing to sustain the character of villages. However there is also conflict between the different uses, particularly at local level. Management to maximise opportunities for recreational anglers means reducing commercial fishing pressure to allow species such as bass, favoured by sea anglers, to grow to much larger sizes.

Management for multiple uses is possible. For instance fishing using lines and nets has less impact upon the sea floor than trawling and avoids many of the environmental disadvantages of sea fishing. At present, there is no clear framework for resolving these conflicts, and synergistic solutions are hard to promote and realise.

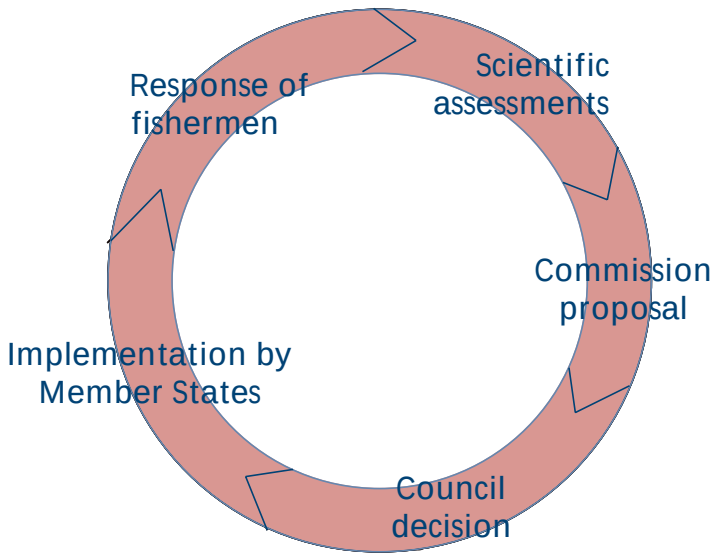
The need to accommodate different uses will grow in the future, as will concerns about the environment. Fisheries policy will need to be more sensitive to environmental pressures, and management systems will need to promote ecological resilience and incorporate a wider use of risk management and the precautionary approach.

3.5 Fisheries policy

3.5.1 Background

The UK, as a member of the EU, participates in the Common Fisheries Policy (CFP). The Member States of the EU agree to collective decision-making in this area of policy to fulfil a common objective: 'to provide for sustainable exploitation of living aquatic resources and for aquaculture in the context of sustainable development, taking account of the environmental, economic and social aspects in a balanced manner'[20]. The motivation for the reforms agreed in 2002 was the failure of the CFP to meet its objectives. The reasons for this failure are examined in detail below by examining each part of the CFP decision-making cycle described in Figure 3.16.

Figure 3.16: CFP decision-making cycle



[20] Council Regulation 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

3.5.2 Scientific assessments

The management system assumes that fish stocks can be accurately measured, but results are often highly uncertain

The scientific work underpinning CFP decision-making is world class. However, the data that is fed into assessments is often poor and has deteriorated over time, and the modelling of many mixed stocks has high inherent uncertainties. The International Council for the Exploration of the Sea (ICES) has expressed grave concern about the quality of catch and effort data from the important fisheries in the ICES area. As an immediate consequence, ICES cannot provide reliable estimates of current stock sizes and forecasts that are used to set TACs for some species. Even with good data, models have a minimum range of uncertainty of 20–30% for key stocks, and this can be higher. Some degrees of uncertainty have been incorporated into advice in recent years by setting 'precautionary' quotas, based on probabilistic modelling. However, the sources and range of uncertainty used in this modelling are non-transparent, and management options for reducing and managing uncertainty are not addressed directly.

3.5.3 Commission proposal

The Commission has an enormous task each year to provide detailed recommendations for the large number of EU quota stocks and recovery plans required, and relatively few resources to carry out this work compared to Member States' fishing administrations.

Following the publication of scientific advice in the autumn, the Commission prepares its proposals for TACs for the following year. This is a mammoth task involving recommendations on over 200 individual stocks. The preparation and decision-making process dominates proceedings in the Commission and in Member States' fisheries departments in the period from mid-October (when the scientific advice is published) to mid-December (when the Agriculture and Fisheries Council decides on the fishing opportunities for the following calendar year). Clearly, the scale of the task puts a significant strain on the Commission's modest resources.

3.5.4 European Council decision

The European Council is criticised in its decision-making, often being blamed for current stock declines; however, this is mostly unjustified.

The Agriculture and Fisheries Council considers the Commission's proposal for TACs for the following year at its December meeting. The Agriculture and Fisheries Council has been criticised for ignoring scientific advice and setting TACs too high as a result of domestic political pressure. The evidence suggests that Fisheries Councils have historically set TACs at levels higher than the scientific advice would recommend, however decisions have followed the scientific advice more closely in recent years. The exception to this would be the decisions related to cod recovery, which have departed from the advice to close the fishery.

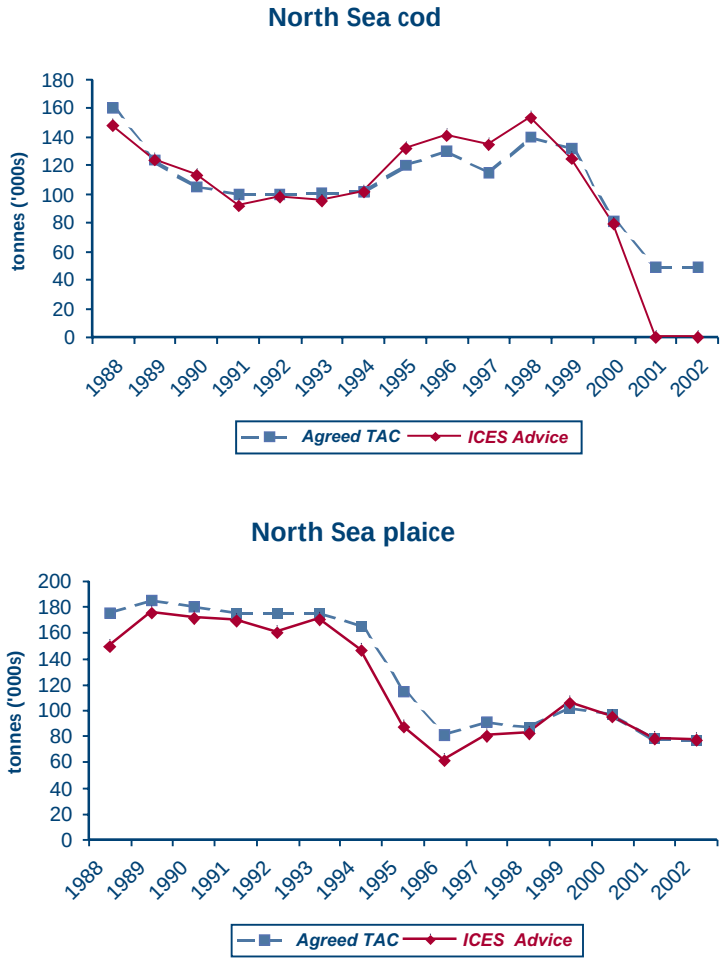
The deviation for most stocks, however, has been relatively insignificant in comparison to the natural stock variation, modelling error and scale of misreporting. For example, for major North Sea species the average range of variation of final TACs from the largest sustainable catch recommended by ICES was between +13 to–8% between 1988-2002 (see Figure 3.17 for graphical examples). The Council has often failed to implement other ICES suggestions for restrictions on fishing effort, systematic inflation of TACs does not seem to be the most serious cause of stock decline.

3.5.5 Implementation by Member States

Member States have significant flexibility in implementing CFP rules. However, there is patchy and inconsistent implementation across the EU. Strengthening Commission oversight would help counter this.

Member States are responsible for the enforcement of CFP rules in waters under their jurisdiction or sovereignty. Implementation is not uniform and leads to a lack of trust in the enforcement efforts of others. There is a viewpoint, widely expressed in the UK, that the UK implements the rules of the CFP diligently while other Member States are less enthusiastic. It is argued that this leads to UK fishermen being forced to operate on an 'un-level playing field'. The recent decision of the European Commission to instigate infraction

Figure 3.17: Agreed EU TAC and ICES advice regarding North Sea cod and plaice



proceedings against the UK and Spain for failure to implement the rules of the CFP should mitigate against such a simplistic view. The evidence would suggest that levels of non-compliance are significant in the EU, and the UK is probably in the middle range of EU practice. Recent government audits show that, despite the best efforts of the enforcement authorities, the chances of being caught breaking the rules are too low to act as an effective deterrent.[21]

The fisheries sector receives a high level of public support in all EU countries, in the form of state-funded science (in part for purely environmental purposes) and enforcement, decommissioning grants, administration costs and some modest market support measures. Total public spending on the UK fishing industry is between £90-100 million, which should be compared to the £130 million profit earned by the industry in 2002.

3.5.6 Response of fishermen

The current EU an d UK management system does not have the trust of the UK fishing industry, and non-compliance is a major issue.

There are strong incentives for fishermen to fish illegally or misreport landings, especially in a period when quotas are being cut and there is a large capital overhang from previous investment decisions. The Strategy Unit has made over 30 visits to the major fishing areas in the UK and has interviewed over 200 people involved in the fishing industry. Interviewees have confirmed that the amount of

[21] National Audit Office 2003, Fisheries Enforcement in England

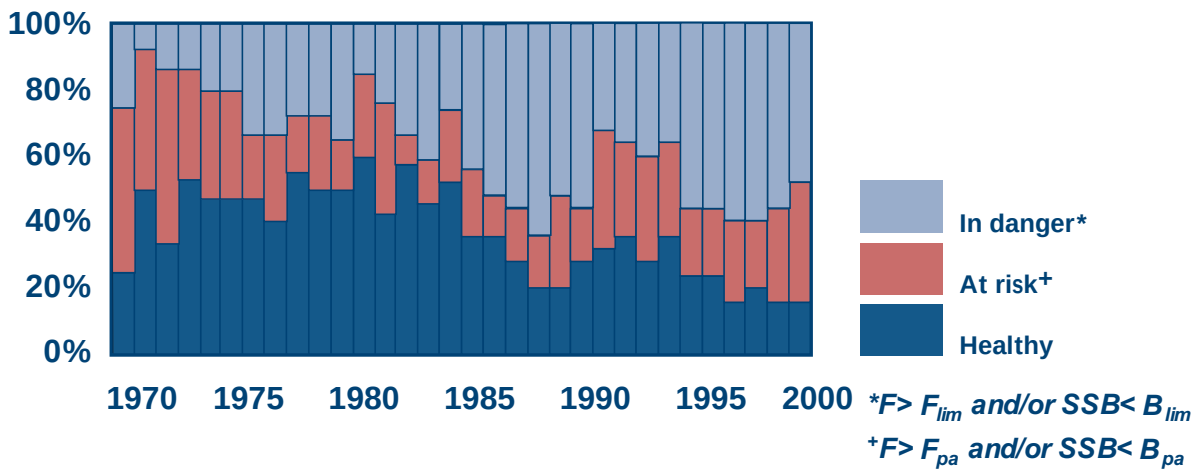
illegal landings in the UK is a problem, and so too is the lack of trust in the system. This evidence is strengthened by the results of economic analysis of the various sectors of the fishing industry. In some sectors, notably whitefish, analysis suggests that if businesses were following the agreed catch limits a large number would go out of business unless their income were supplemented in some way. These visits, and responses to the Strategy Unit consultation paper, showed no high large levels of bankruptcies in the industry, and so many fishermen are supplementing their legitimate fishing income with illegal fishing and/or returns from other sources of finance in order to make ends meet. That illegal fishing occurs is supported further by a recent survey, albeit smallscale, of English fishermen within a particular region in which only 20% claim they never illegally land fish. Almost 30% said they illegally land fish 'quite often' or more frequently. The evidence presented to us does not suggest that illegal landings of fish are in any way confined to whitefish.

3.5.7 Summary and conclusion

The UK and EU fisheries management system is not presently meeting its primary aim of rational and sustainable exploitation of fish stocks. This is highlighted in Figure 3.18, and this overall failure was recognised in the 2002 CFP review process

The status of EU quota stocks has deteriorated over the past 30 years. The proportion of healthy stocks has gradually declined while the proportion of 'in danger' and 'at risk' stocks has increased.

Figure 3.18: Status of EU quota stocks over time



Source: Strategy Unit calculations based on ICES assessment of state, aggregated by value of stocks

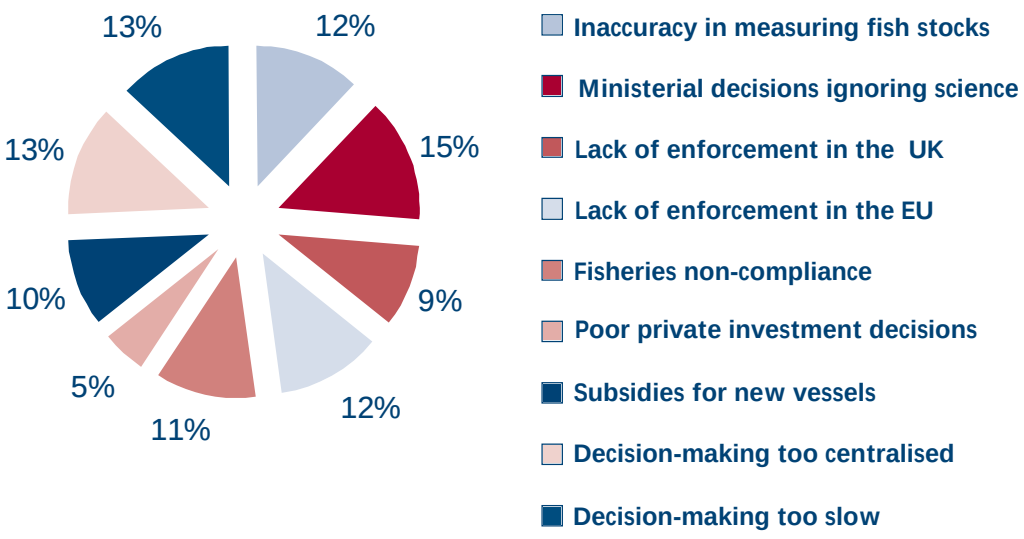
The reason for this is that the system is broken in many places. The analysis above shows that at each stage of the policy formation process there are weak points, and these interact to produce perverse incentives and behaviour. For example, unavoidable catches of non-target species can result in illegal behaviour by fishers who land more than their quotas, further increasing the inaccuracies in setting TACs, reducing trust in the system and lowering community support for enforcement activities.

Simple command-and-control policies will not work in complex, multi-jurisdictional, mixed fisheries. Currently, the quota control system implicitly assumes that stocks can be measured reasonably accurately and that the capacity exists to develop appropriate management measures and plans for all EU stocks centrally in the Commission. It assumes that the Fisheries Council can and will take the necessary detailed decisions to manage stocks. Furthermore, it is assumed that Member States can enforce the rules and that fishermen will obey them. This set of assumptions is for the large part flawed and does not reflect the reality of fisheries management in the EU.

The Strategy Unit consultation paper responses reflected these systemic problems. Figure 3.18 shows that respondents were relatively evenly split in identifying the most important failures in the 'decision cycle'. The reforms to the CFP agreed in 2002 were a significant step forward, but not adequate to address all these systemic problems. The abolition of subsidies for building new vessels, the shift towards a multi-annual approach to fisheries management and the enabling of legislation for TACS are helpful. Their impact, however, will depend on active and vigorous implementation of the often general proposals and will take some time to produce results.

There is no single, simple solution to make UK and EU fisheries management effective, and action needs to be taken on a system-wide basis. Risk management approaches must be used to deal with the inherent uncertainty in the system, and ensure that both positive and negative incentives placed on fishermen are sufficient to encourage long-run compliance and sound business practices.

Figure 3.19: UK stakeholder views on the source of problems with the CFP



Source: Strategy Unit consultation paper response

3.5.8 Over-capitalisation and the legacy of the 'gadoid outburst'

EU fishery managers have long identified over-capitalisation in some fleets as being a primary concern. This arises because there is no natural tendency for industry to manage common access 'renewable' natural resource sustainably. Since revenues earned from healthy stock generate excess profits (supernormal profits[22]), fishermen always have an incentive to invest more and increase their catch. The stock condition deteriorates to such an extent that it impairs the growth and maybe even the recruitment of fish. Quota management systems are not strong enough to prevent this increase in capacity leading to increased fishing mortality.

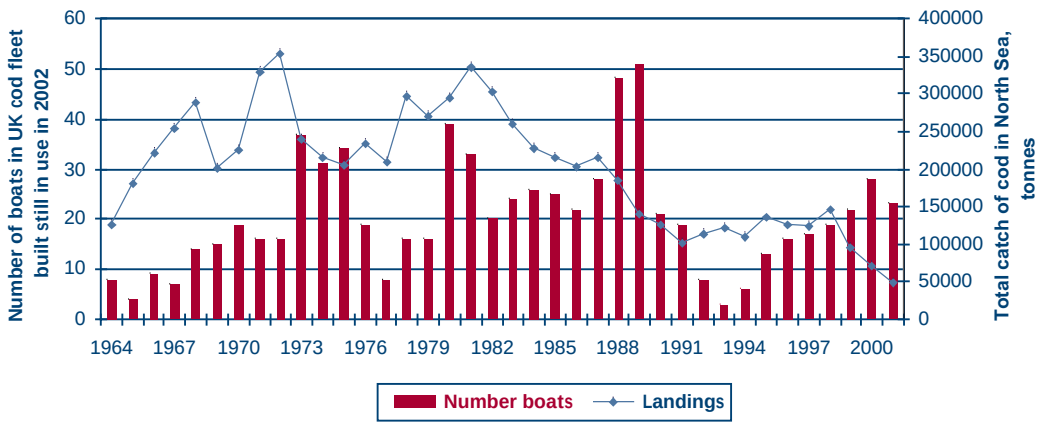
Over the past ten years there have been successive EU co-ordinated programmes to decommission vessels in order to reduce this 'capital overhang', resulting in significant capacity reductions in many fleets, including that of the UK.

Over-capitalisation tends to reduce the profitability of vessels, inhibits modernisation and puts pressure on stocks. In part, the UK Government contributed to over-capitalisation in the UK fleet through providing investment grants in the 1970s and 1980s when whitefish populations were at atypically high levels (the 'gadoid outburst' or explosion). Other EU nations also provided similar support for new boats. Once built, fishing vessels remain in operation for 30 years or more. Figure 3.20 displays how the legacy of this policy continues to affect the UK catching sector today, through the continued activity of cod boats built during the 'gadoid outburst'. International experience shows that, until the fleet capital is roughly consistent with the available revenues from sustainable harvesting, other fisheries management measures will have little impact on fishing behaviour.

The shift to more sustainable fisheries management in Faeroes, Iceland, New Zealand and Australia was in each case accompanied by a dramatic reduction in capitalisation. In some cases this was driven by one-off government restructuring grants (eg in Australia), in others there were significant foreign fleets which were excluded from the fishing grounds (eg New Zealand and Iceland), including the UK distant water fleet which fished off Greenland and Iceland until the 1970s when it was expelled.

The CFP review in 2002 has made a key step forward in dealing with some of the drivers of over-capacity by eliminating government subsidies for new boats or modernisation by 2004. The World Trade Organisation is also looking to introduce worldwide restrictions on damaging fisheries subsidies in the current round of negotiations.

Figure 3.20: Whitefish (cod) fishing boats built and North Sea cod catches by year



Source: Number of boats from Defra licence database landings from ICES official declarations

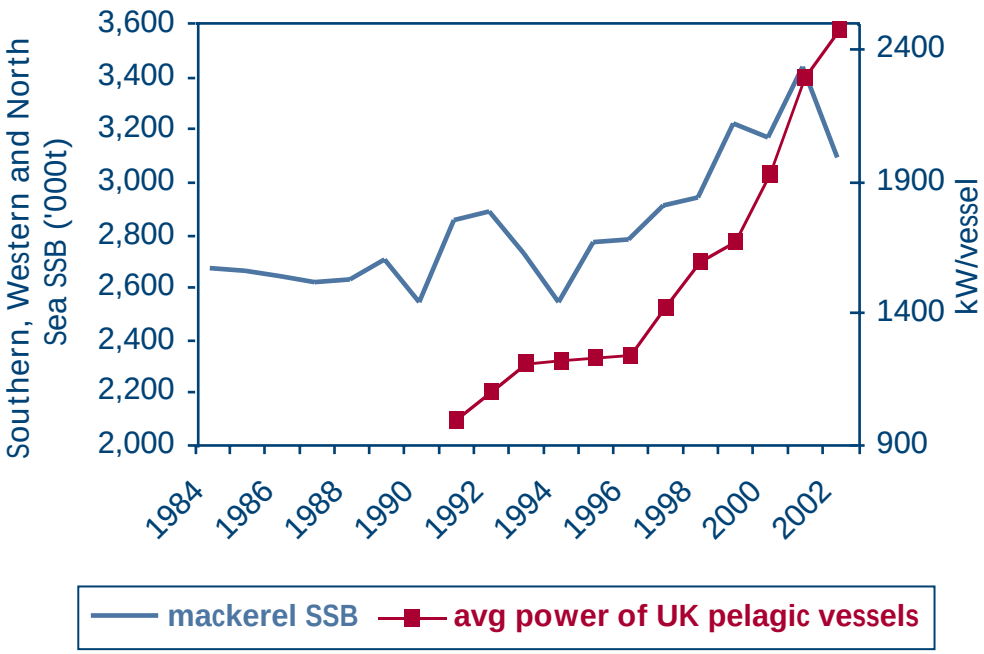
[22] Investors consider profits to be 'normal' according to the rate of return on invested capital often between 5-15% for low to medium-risk industries.

However, even without subsidies the fishing industry is structurally prone to 'boom and bust' cycles driven by biological fluctuations in stock availability. This tendency is exacerbated by the increase in the killing capacity of the fleet, arising from improvements in technologies like gear and detection.

The pelagic sector is currently showing gross margins of at least 40% and has seen significant new investment. Figure 3.21 shows the dramatic 60% increase in the average power of UK pelagic vessels as the industry invested in response to increased stock levels, beginning only three years after the stock recovery began. Some estimates show current pelagic capacity to be at least 50% more than necessary to exploit the available resources. The concentrated nature of the industry currently seems to be preventing strong competition and a damaging 'race for fish'. However, any future downturns in pelagic stocks could trigger damaging over-fishing in order to maintain capital repayments.

All segments of the fishing industry have been, and can again be, highly profitable, and as in most resource-based sectors (eg oil and gas) the available profits are far higher than needed to cover the normal costs of capital. This makes the fishing industry vulnerable to future 'boom and bust' economic cycles, even in the absence of government subsidies.

Figure 3.21: Increase in UK pelagic fleet power 1984-2002



4 Future scenarios for the UK sea fishing industry

This Chapter:

- explains how a future picture or vision of the UK fishing industry in the next 10–15 years was generated;
- develops detailed economic (competition, markets, costs and prices) and stock scenarios, and examines how the size and composition of the UK fishing fleet may change under these future scenarios, and their possible impacts on employment and communities.; and
- calculates the discounted value of future earnings from the whitefish sector under different economic and stock futures.

Summary

- The overall size and composition of the future UK fishing industry will be driven by future trends in stocks, prices and costs. The continuing presence of a profitable catching industry in the UK will also be driven by business performance, good infrastructure and competition from EU fleets. The net impact of these trends must be modelled numerically if the size of a profitable UK fishing industry is to be assessed.

- Depending on the strength of the whitefish stock recovery, total UK sustainable catches in 2013 could generate revenues in a range between £550million and £625 million at 2002 prices. Including possible changes in future prices widens the range of possible future revenues to between £380million and £650 million. Taken as a whole, future prices are a more significant factor in determining UK fishing revenues than the level of stock recovery; however, the relative impact of prices and stocks varies sharply between fleet segments.

- The main factor influencing future fish prices will be competition not stock recovery, as global markets continue to open up and tariffs reduce. Prices for major stocks are unlikely to rise much in future, and could fall by between 10%–50% depending on the stock concerned and applied tariffs. A sustainable vision of the UK fleet needs to be robust in the context of future competitive pressures, irrespective of the level of stock recovery.

- Competition will not be primarily on input costs, as the UK's main competitors are mostly high labour cost countries, and all already face some cost recovery for management and quota costs. However, the UK fleet will need to match the high productivity levels existing in these fleets.

- The UK fishing industry will face competition for both customers and quota. Processors and retailers will increasingly look to satisfy their need for supply quality and reliability through further overseas sourcing. It is also possible that better financed (including through government subsidies until 2004) EU companies will try to buy up available UK quota in some sectors.

- The UK fleet can remain competitive in international markets, but it must invest significantly in modernisation, including improvements in marketing, supply chain management, product quality and supply reliability. A sustainable UK fleet must make long-run profits adequate to invest in new boats, improve safety levels, pay good wages for skilled staff and be able to survive years when stocks are poor. This implies that profits per vessel must increase well above current levels in order to be sustainable.

- To make adequate long-run profits the UK fleet will need to reduce capacity in the whitefish sector under all future scenarios. Even if stocks recover strongly and prices remain broadly constant (giving increased overall revenues) a reduction of least 13% will be needed. This rises to around 42% if prices continue to fall (figures include the 2003 decommissioning round which removed 8% of whitefish capacity). Under the less favourable price and stock scenarios the pelagic and shellfish sectors

would also need to contract to ensure adequate profitability.

- Based on this modelling the UK whitefish fleet appears to still be above its long–run maximum size, despite past decommissioning rounds. Fears that further capacity reductions from current levels will permanently disadvantage the industry when stocks recover appear misplaced, Though issues of skill retention and training are important to address. On the contrary, failure to reduce overcapacity in the fleet will prevent investment and reduce UK competitiveness in both product and quota markets, potentially leading to long-run permanent reductions in industry revenues.

- Estimates of future reductions in all fishing industry employment vary between 12% and 22% under the strong stock recovery and price scenario, and between 45% and 59% if stocks collapse and prices are weak. The pessimistic scenario is also likely if the UK fleet fails to modernise, as fishing opportunities may go abroad.

- Employment losses will not be evenly spread. Some communities will lose some or all of their fishing activity, while others will see increases in activity, profits and turnover as the fleet concentrates in fewer ports. Those likely to suffer most are small, highly dependent and remote communities and medium-dependency ports that are not well enough equipped to sustain highly productive fleets. In the lower price scenarios it is likely that many of these ports will lose all their fishing activity.

- The cost of a long-lasting stock collapse (possibly as a result of poor management), a leakage of whitefish quota abroad and/or a fall in fish prices as the fleet fails to modernise is high. Modelling of these possible negative scenarios suggests a minimum reduction in discounted revenues of between £350million and £600 million, as well as employment losses of around 50%. Therefore, there is a strong economic and social case for continued government action to reduce the likelihood of collapse and move the UK fleet onto a sustainable commercial basis.

4.1 Building a futures framework for the UK fishing industry

4.1.1 The need for systematic futures analysis

Developing a strategic approach to the UK sea fishing industry requires a good understanding of how the sector will develop over the next 10–15 years.

This requires examination of the likely impact of different industry drivers and trends on the industry eg competition, prices, costs and stocks.

Many of the responses to the Strategy Unit consultation paper contained assumptions about the future state of the industry. There was a strong view in many parts of the catching sector that the current UK fleet has dropped below its minimum size. Any further fleet reductions could result in a loss of capital and skills which would make UK fishing opportunities vulnerable to purchase by other EU fleets. Other respondents asserted that sea fishing is in the long run an unprofitable industry in the UK, and imports would supply UK bulk demand in the future, leaving only small-scale niche and artisanal activities available for any UK catching industry.

The importance of the UK catching industry to communities was also disputed by respondents, with widely differing views about the extent of fisheries dependence and community vulnerability to changes in the catching sector. While many respondents wanted fisheries opportunities to be retained in small communities, others argued that this would not be economically viable and the fleet must concentrate to survive commercially.

These differing stakeholder visions of the future UK fishing industry imply radically different approaches to fisheries policy and management. However, they are obviously not compatible and form the extremes of a wide continuum.

Though the future can never be predicted with accuracy, a likely range of futures can be constructed over the timescale being considered. Narrowing down the range of possible outcomes requires both descriptive analysis of trends such as competition, and numerical analysis of how changes in stocks and prices may affect the size and composition of the UK fishing fleet.

This section explains how a consistent approach to analysing these futures was undertaken and the results of both descriptive and numerical modelling. As with all numerical projections these results are only as good as their assumptions, and all the inputs and models have been carefully checked with stakeholders and experts, and are available on the Strategy Unit website.

4.1.2 Building consistent futures from underlying drivers and trends

A comprehensive list of potential drivers of the future UK sea fishing industry was drawn up with the help of experts and stakeholders. The importance of these was then assessed analytically and through the Strategy Unit consultation process and a smaller set of key drivers/trends chosen. Three 'future worlds' were developed to define the possible economic and political environment inside which the sea fishing industry will need to operate: Market World, Green World and Fortress Europe. These worlds are outlined below

Market world	Continued expansion of free trade inside WTO and other organisations results in the removal of tariffs and subsidies on fish products and product markets become truly global, coupled with a rapid application of technology to fishing and aquaculture.
Green world	Growing impact of climate change drives an increase in environmental values, raising transport and fuel prices, increasing demand for sustainable and local produce and raising restrictions on the environmental impacts of fishing and aquaculture.
Fortress Europe	Continued security threats and failures in international institutions result in managed trade regimes with high tariffs and subsidies, low investment in technology and aquaculture and, high competition for protected resources.

The impact that these different 'worlds' have on the key drivers and trends identified in the study is detailed below in Figure 4.1.

Figure 4.1: Impact of future "worlds" on key seafish industry drivers

Key Drivers	Green World	Market World	Fortress Europe
Tariffs	L	L	H
Non-tariff barriers	H	L	H
Transport Costs	H	L	H
Fuel Costs	H	L/M	L
Environmental Views	H	L/M	M/H
Global aquaculture	L	H	L/M
Subsidies	L	L	H
UK supply chain	L	H	M
Europe integration	H	L	M

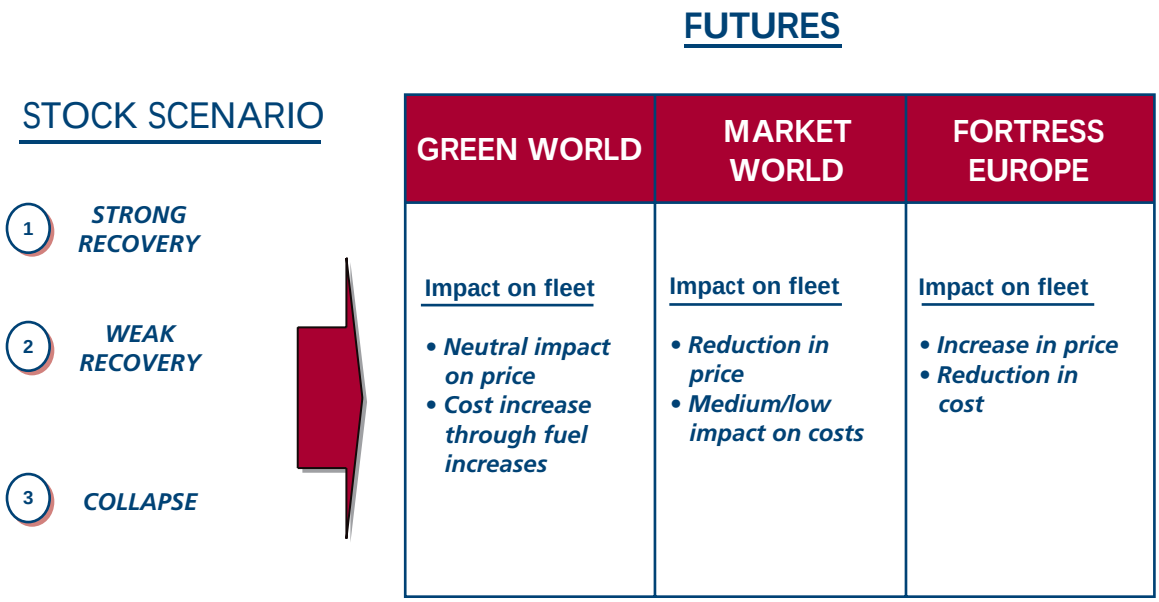
H= High level M= Medium level L= Low level

The Strategy Unit also considered possible shocks which would affect the industry; possible events which would have a high impact on the future but may or may not happen, eg widespread farming of key whitefish species. Of all the shocks examined only climate change was considered both serious and likely enough to be included throughout the analysis.

4.1.3 Linking 'future worlds' to sea fishing industry fleet modelling

These worlds provide the boundaries for both the general descriptive analysis and the numerical modelling work done on the UK fleet. Figure 4.2 shows how the different future worlds impact the key price and cost drivers facing the fleet.

Figure 4.2: Link of future worlds to modelling



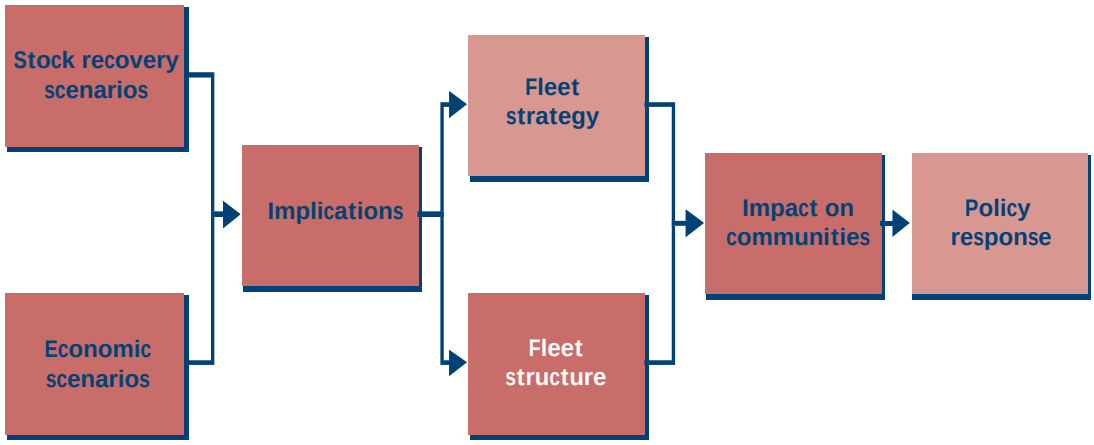
During the fleet modelling the futures framework was used to assess the impact of the different price, cost and volume drivers on profitability and the sustainable level of capacity in the different sectors of the UK fleet.

4.2 Sea fishing industry futures

The framework for analysing the industry futures is illustrated below in Figure 4.3. The approach combines the biological modelling of stock recovery with the economic trends (driven by the futures analysis) in order to get a range for the likely structure and size of the sea fishing industry. The following sections of this chapter go through each stage of this process except for defining fleet strategy and the policy response; these are dealt with in the next chapters.[23]

[23] Details of all the industry research and modelling in this section can be found in the Industry Analysis Issue paper on the Strategy Unit website.

Figure 4.3: Framework for analysing future fishing industry structure



4.2.1 Stock recovery scenarios

Fifteen of the UK's most important fish stocks[24] were modelled under three different scenarios: collapse, strong recovery and weak recovery. Because cod stocks have been so important to the UK historically, the scenarios were named based on their impact on this fishery. Stocks were modelled using existing CEFAS single species models run with assumptions as given below; the long-run results of this modelling is not affected by assumptions over current levels of non-compliance. Details of the stock modelling can be found in the stock modelling analytical paper on the Strategy Unit website.

Table 4.1 shows the key assumptions made under each scenario. The main drivers included in each scenario were based upon assumptions about the level of gadoid recruitment (particularly of cod), extent of North Sea warming and level of compliance. Some ecosystem interactions were also considered.

A key assumption in this modelling is that the 1970/80s gadoid outburst appears to have been a unique episode in the 20th century (see Figure 4.4). It may occur again, but it is likely to be a once-a-century phenomenon rather than a once-a-decade phenomenon. Therefore, within the timescale of the analysis (10-15 years) it was considered unlikely to reoccur

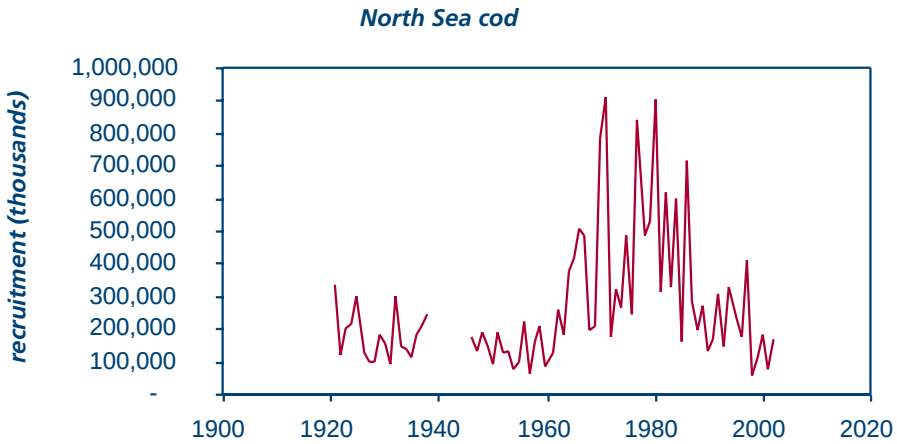
Table 4.1: Key assumptions for each stock scenario

Scenario	Key assumptions
Collapse	• Cod stock recruitment is very low causing collapse • North Sea continues to warm steadily • Compliance is not perfect
Strong recovery	• Cod recruitment recovers to 1980s levels • North Sea environmental trends reverse • Compliance is perfect
Weak recovery	• Recent (since 1999) cod recruitment levels continue • North Sea continues to warm steadily • Compliance is not perfect

Some stocks have become so depleted that it is quite likely that their future recruitment will not follow historic patterns. In the face of this uncertainty the scenarios used conservative levels of recruitment for gadoid stocks, particularly cod. The collapse scenario assumed that cod recruitment was very low, the weak recovery scenarios assumed that very recent levels would repeat, and strong recovery that 1980s levels would reoccur.

[24] North Sea, West of Scotland and North-east Arctic cod; North Sea haddock, plaice, whiting and herring; Western mackerel, Northern hake; North Sea, West of Scotland and Irish/Celtic Sea nephrops; anglerfish from the North Sea and West of Scotland; anglerfish from Area VII; and sole from the East and West Channel areas.

Figure 4.4: Long-term cod recruitment in North Sea



Source: Pope, J.G and Macer, C.T. (1996) and recent ICES reports

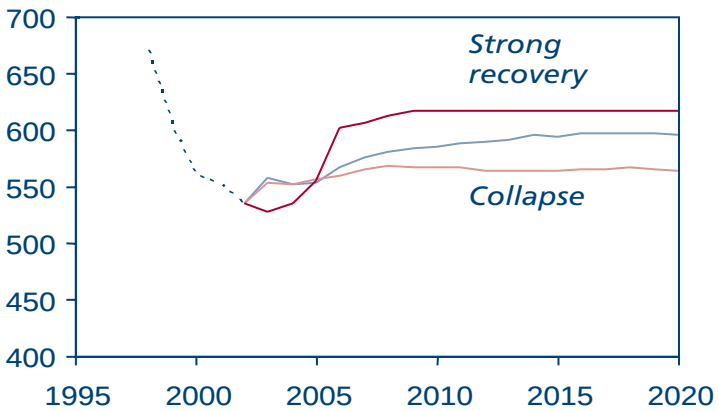
The collapse and weak recovery scenarios assumed that North Sea warming would continue. In this event it was assumed that cod and plaice recruitment would decline, but recruitment of valuable warm water species such as sole and hake would increase.

In all scenarios it was assumed that the EU would attempt to recover all over-fished stocks, and this would be achieved within the next five to ten years. It was then assumed that fisheries managers would aim to keep stocks at a level where there is a high probablity that the stock will not collapse. If stocks fell below this level, it was assumed that action would be taken to recover them. However, the collapse and weak scenarios assumed that compliance levels were not perfect, resulting in less effective, or slower, recovery of stocks than was intended by managers.

Nephrops stocks have increased markedly since the decline in cod stocks in the late 1980s. This is suggested to be due to an ecosystem interaction, ie cod eat nephrops. Therefore, it was assumed that nephrops stocks would reduce if cod stocks recover. However, no evidence was found to support the view that the cod fishery is limited by sand eel availability and so this possible ecosystem interaction was not included in any future scenarios

Figure 4.5 shows the projected value of UK landings between 2002 and 2020 for all stocks at real 2002 prices; no economic scenarios for changing prices and costs are included in these figures[26]. In all scenarios revenues from the catching sector continue to decline or remain at a low level until about 2005. At this point, effort reductions result in recovering catches.

Figure 4.5: UK catch value (£million at 2002 prices) under stock scenarios



[26] Includes potential value of modelled stocks in addition to value of stocks that were not explicitly modelled.

Figure 4.6: Changes in catch tonnage of major species modelled between 2002 and 2015

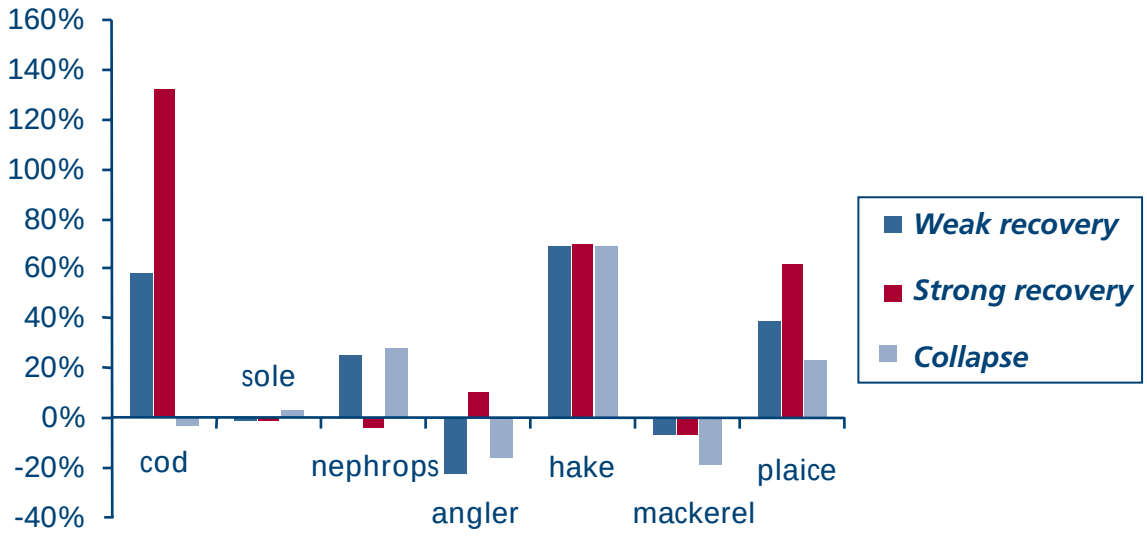


Figure 4.6 expected change in catch weight of particular species under each scenario between 2002 and 2015. There is a modest drop in mackerel catch as the recruitment falls back to lower historical levels.

Though several stocks do recover, even in the strongest scenarios the impact on total revenues is dampened by reductions in other areas. The assumptions used in the modelling perhaps err on the cautious side in terms of recruitment in the weak recovery scenario, but are consistent with observed data.

Stock modelling suggests that full stock recovery is unlikely until 2008 or later. Total industry revenues may return to around £625 million under the strong recovery scenario, which is lower than the returns seen in the mid 1990s of £650 million to £700 million when prices were higher.

4.2.2 Economic scenarios

Types of competition

The UK catching sector will face a number of competitive threats in the future. Competition will come from two directions.

Import competition: Consumer preferences, further development of fishing grounds abroad and an increasingly global supply chain will drive the level of imports that come into the UK. This will place increasing pressure on prices faced by the UK catching sector. Many of the UK's main current or future competitors in Iceland, Canada, Norway and New Zealand have reformed their fisheries management systems, and have or are actively seeking independent certification of their sustainability under the auspices of the Marine Stewardship Council (MSC).[27] Their greater levels of sustainability, reliability and quality will continue to provide high competition for the UK catching industry.

Competition for quota: Foreign fleets are increasingly recognising the importance of modernisation and cost reduction and are investing in their fleets to be competitive. Many EU fleets are taking advantage of government subsidies until they are banned in 2004, particularly the French and Irish. The impact that this will have on the UK industry will largely depend on its own response. If the industry fails to modernise and rationalise, then quota may be bought by foreign owners of UK-flagged vessels, as EU internal market laws prevent any discrimination on the grounds of nationality.

[27] The Marine Stewardship Council is an independent charity which sets standards for certifying and labelling sustainable sea food globally (www.msc.org).

Sources of competition

Table 4.2 below indicates the source and type of competition that the UK catching sector is currently facing, or will increasingly feel in the future. Cost/price competition is a function of stock sustainability, management efficiency, technical efficiency and labour costs. Product variety refers to the import of species that the UK is not able to catch in sufficient (or any) quantity and for which there is demand in the UK. Supply reliability refers to the long-run sustainability of the stocks, and product quality refers to the quality of the actual fish in terms of handling and grading, etc and will be affected by investment in fleet modernisation, supply chain infrastructure and any quality/sustainability certification.

Table 4.2: Type and source of competition for the UK fishing industry

		Cost/Price	Product Variety	Supply Reliability	Product Quality
European	Southern EU (France/Spain)	○	◑	◑	◑
	Northern EU (Neths/Ireland/Denmark)	◑	○	◑	●
	Norway	◑	○	●	●
	Faeroes / Iceland	●	○	●	●
Global	Developed Global Aus ./NZ/Can/US)	◑	◑	●	●
	Developing Global (S.Am/Asia)	◑	●	◑	◑

Key: Strong threat ● Medium threat ◑ Weak threat ○

Source: International benchmarking, consultation responses, SU analysis

The most significant sources of competitive weakness in the UK catching sector will be on the basis of product quality and supply reliability. Faeroes, Iceland and Norway, due to better management of their stocks, good quality product and demand from UK consumers for their products, are likely to continue to pose the largest competitive threat to the UK catching sector. Indeed, Norway announced in January 2004 that it intends to seek MSC certification for some key cod, haddock and saithe stocks which account for 600,000 tonnes of landings each year; an amount equal to all UK fish imports.

Other drivers of competitive pressures

Aquaculture: Produce from aquaculture appeals to processors given the regular supply (compared to irregular wild-fish landings) and the ability to stipulate size. In future, the overall growth in the global supply of fish will be driven predominantly by the growth in aquaculture.

However, availability and sustainability of feed, effects of climate change, and high labour and production costs could all work against the aquaculture industry, although cheaper production costs (eg in the Far East) could impact on important export markets for UK wild fish, especially pelagics.

Analysis of the cost of future aquaculture in major whitefish species, especially cod, shows it is unlikely to make a significant impact on wild fish markets in the next decade.

Increasing pressure to reduce tariffs: The EU has 357 tariff lines for fisheries products. Of these, 10 are duty-free, 6 less than 3%, 127 in the 5–9.9% range, 60 in the 10–14.9% (high tariff) range, and as peaks (duties over 15%) 72 in the 15–19.9% range and 82 in the 20–26% range.

The EU recognises that community supplies of certain fisheries products currently depend on imports from third countries and currently suspends in part or in whole the customs duties for certain amounts of the products in question (Autonomous Tariff Quotas).

As a major fish importer from outside the EU, and an exporter to global markets, the UK as a whole would gain from lower overall tariffs and barriers to fish products. Even under a strongly liberal scenario, it could be some considerable time before third countries will be able to sell fish products into the EU without any barriers. However, the direction of change is firmly towards easier access, especially as fish products are linked to broader liberalisation of all industrial sectors in trade negotiations.

Increasing supply chain pressure: Consolidation of the secondary processing sector, together with the continued dominance of the multiples as the main channel to market, will put pressure on the catching sector's terms of trade with its customers. Processors and retailers are concerned about product, quality, reliability and price and are increasingly able and prepared to source their produce from abroad, where this is economic.

Future costs

The main costs experienced by UK fishing fleet are labour costs (approx. 30%), fuel (approx.10–30%), fixed costs (insurance, etc) and capital cost repayments. In the future, the purchase of quota may form an added important cost component. The relative cost base of UK fishing is not expected to rise significantly in the future relative to its main competitors, the majority of whom are in high cost, developed countries which have significant and increasing levels of cost recovery for management costs (EU, Norway, Iceland, New Zealand, Canada, etc).

Fuel costs are set globally and are as likely to fall as rise over the next 10–15 years. The biggest rises would stem from environmental restrictions to address climate change, as fuel used in the industry is currently not taxed. However, this would also be likely to increase transport costs for imported fish and so would probably have marginal impacts on future competitiveness.

Real labour costs will rise in the future, as all UK regions with active fishing industries see steady economic growth. Fishing is a dangerous and difficult occupation, and requires a premium to encourage good workers. In many UK regions foreign labour is already being used to crew vessels, and at current levels of profitability crews have been reduced on many whitefish boats. The modelling used here keeps labour costs constant over time, which gives a slight optimistic bias in the results.

Existing fixed costs and interest payments are unlikely to vary too much over the next decade, beyond normal movements in interest rates, which should be less dramatic than in the past given the current international economic environment.

The most likely area for increasing costs is from fishing policy, including quota costs and management costs, which are discussed later in the report. The UK's principal competitors either already have some cost recovery of fisheries management and/or are beginning to charge for quota/resource rents from fishing. These costs are not included in the modelling.

4.2.3 Conclusions

The UK catching sector has no option other than to become competitive in the long run. The external pressures from foreign imports, supported by the development of aquaculture and the likely reduction in tariffs, will put significant downward pressure on prices. To remain profitable and competitive the UK catching sector must improve the quality and reliability in supply of its product as well as invest in efficiency measures and improve its capacity utilisation rates.

4.3 UK fleet futures modelling

4.3.1 Summary

The principal objective for modelling the UK fleet is to arrive at a likely range for the number of boats that can be economically sustainable in the long run, here assumed to be 2013. The futures and trends

analysis outlined in the previous section provided the basis for the assumptions within the model, while the data was based on the best available sources from DEFRA, SEERAD, CEFAS and Seafish.

The need for long-run profitability as a driver of economic and biological sustainability is the cornerstone of the modelling analysis. The number of boats viable in the long run is based on the assumption that those that remain are able to be profitable and competitive in a global market in the long term. It can be argued that under simple break-even scenarios (that is, zero annual operating profit) more boats could be supported. However, the reduction in profits per vessel inferred by such an increase in capacity would prevent the investment necessary to remain competitive and would increase the probability of illegal over-fishing, particularly in poor stock years, leading to further stock crises.

By separating out the different sectors of the catching industry, the modelling process acknowledges the fact that the sea fishing industry is not homogenous and that there are very different economic fundamentals underlying each sub-sector. Furthermore, the economic performance of these sectors will have disproportionate effects on different geographic regions. For example, certain parts of the whitefish sector are located heavily in north-eastern parts of Scotland.

Given the uncertainties surrounding price and stock scenarios, in addition to the possibility of strong impacts from fuel shocks or climate change, it is impossible to predict exactly how many boats will be viable in the long run. However, the model estimates the range of possible impacts of the economic and biological scenarios previously described. It is highly unlikely that the fleet will be outside the range of scenarios modelled here.

The fleet modelling does not depend on assumptions around current catch rates or 'black landings', but uses robust projections of stocks from biological models and future input costs. Any biases in the model are likely to overestimate the number of profitable boats, as future real wages do not increase.

Methodology and assumptions

Segmentation: Given the differing economic fundamentals underlying different elements of the fleet, the model separates out sectors and sub-sectors from each other. The different sectors are detailed below:

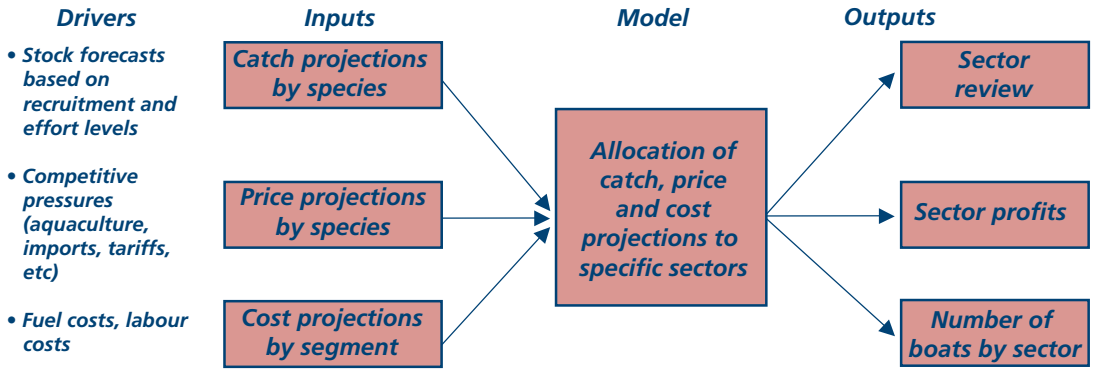
Sector	Sub sector modelled
Pelagic	• Pelagic gears
Whitefish	• North Sea demersal trawl • West of Scotland demersal trawl • Irish sea demersal trawl • English channel and South-west demersal trawl • Beam trawl
Shellfish	• Shellfish mobile gears • Shellfish fixed gears
Other	• Under 10m vessels • Nephrop trawl

The model uses individual cost, price and catch data for each of these sectors in order to provide a picture for how each sector may be affected by changes in prices and stock levels in the long run. For some sectors such as Nephrop trawl and under 10m vessels we have modelled revenues and not costs since the data was not considered to be sufficiently reliable.

Different sectors are dependent upon different species and are subject to different commercial pressures impacting prices.

Model structure:

The key variables in the model are catch volume by species, price by species and the costs associated with fishing by sector. The box below illustrates the drivers, inputs and outputs of the model.



Modelling input assumptions

Catch projection: The total catch data for species representing 70% of the UK industry was taken from the stock modelling detailed above. This modelling used three stock recovery scenarios, namely a strong recovery, a weak recovery and collapse. A key assumption in the model is that long-run catch data is based on what we can expect to catch within safe biological limits under different recruitment and effort assumptions.

The output of each scenario is a projection, by species, of the tonnage that can be caught by the UK catching industry in a given year. The allocation of this tonnage across the different sectors is based on the share mix of 2002 landings. For example, if the pelagic sector caught 90% of the mackerel that was landed by the industry in 2002, the model would allocate 90% of what the industry can catch in 2013 to the pelagic sector.

The model assumes that the UK catching industry maintains hold of its entire quota in the long run and that none of it 'leaks abroad to foreign vessels and sectors. Given the often better capitalised fishing companies abroad and the probability of increased cross-border quota trading, allowed under single market rules, the assumption of zero quota leakage is an optimistic one.

Price assumptions: While stock and catch levels are often focused on as the key drivers for the industry's economic performance, price levels are also very important.

The model sets out price projections for the 33 most important species to the UK industry. The starting point for the projections was the price recorded in 2002 by species within a given segment. This was to reflect the fact that the same fish might reach a different price when caught by an under 10m vessel versus a demersal trawler (because of quality changes due to the number of days it has been stored before landing, etc).

The base line or best guess rate of change in prices from 2002 onwards is based on projecting forward the historical data (1990–2002) from DEFRA and SEERAD. These trends were identified and projected forward to 2013 for each species. The optimistic and pessimistic scenarios are driven by the relative impact of the different exogenous drivers such as tariffs and aquaculture as well as the competitive responses from the industry in relation to quality and supply reliability.

Tariff retention and increased emphasis on quality and reliability by UK fishermen drive high price scenarios. Aquaculture potential only applies to a limited amount of stocks, and would only be viable if prices were high. More rapid tariff liberalisation produced lower price scenarios, but generally only in cases where it was clear that the stock concerned could be sourced from other fisheries such that imports would have an effect on prices.

Prices for major stocks (eg cod, haddock, nephrops, mackerel, herring, monks and anglers) are generally stable or slightly rising in the optimistic scenario, and fall by between 10–50% in the pessimistic scenario.

Cost assumptions: The 2002 cost structure for each sector are taken from the SFIA costs and earnings survey published in 2001. While there are some gaps in the data, especially in the under 10m segment for which we only model revenue and not costs, this is the best available data.

The costs are divided into variable costs associated with fishing and fixed costs associated with being in the industry. The cost structures are different for each of the different segments. The model projects costs to remain constant over the forecast period with the exception of fuel, which as a key driver of costs (10–30% of revenue) can fluctuate significantly.

Profit assumptions

The requirement for adequate profitability is the key assumption in the model. In order to know how many boats the industry can support in the long run, there is an inferred profitability requirement for those vessels that remain.

The inferred long-run operating profit is estimated as the amount of money required to cover capital cost requirements and allow the owners to invest in their vessels and deliver products that will be competitive in the global fish market. This will vary by segment and is detailed in the accompanying technical paper 'Industry Analysis and Modelling' on the Strategy Unit website.

If the operating profit requirement for a vessel in a given sector in the model is reduced, then the number of boats that can be supported by the industry will increase. A reduction in profitability requirement such that boats merely 'breakeven' from an operating profit perspective, will have implications for vessels' ability to compete as they will not be able to make the investments required to improve product quality and reliability. The increasing pressure on prices, caused by the lack of investment, will encourage vessels to non-comply in order to cover costs, thereby putting added pressure on stocks, leading to probable future crises.

The UK industry must make higher profits in the future in order to be biologically and economically sustainable.

Model outputs

The key output of the model is a range for the possible number of boats that can be sustainable economically in the long run under different price, cost and stock recovery scenarios.

In order to understand the policy implications of different fleet structures, the model has been used to deliver upper and lower limits on the possible size of the fleet under the most optimistic and pessimistic sets of catch, price and costs assumptions. 'Best guess' scenarios were also modelled, taking mid points in the ranges for stocks and prices under the optimistic and pessimistic scenarios.

Under the upper limit scenarios we combined a strong stock recovery with static or slightly increasing prices (depending on species) and a reduction in the cost of fuel of 10%. Under the lower limit scenarios we combined a stock collapse scenario combined with declining prices and an increase in the cost of fuel of 10%.

The tables below indicate the impact of the upper and lower limits on the fleet under the most optimistic and pessimistic scenarios.

4.3.2 Upper limit scenario

If stocks recover strongly and the industry is able to withstand the competitive pressure through investments and increased focus on quality and reliability, the total industry value could reach almost £650 million in 2013. Reductions in the whitefish fleet would still be necessary, however, in order to make enough money to be profitable enough to invest and survive fluctuations in the levels of stocks and prices.

	Pelagic	Whitefish	Shellfish	Total Revenue
Sector revenue (over 10m. vessels)	£111m	£341m	£86m	£647m*
Sector profits	£40m	£75m	£19m	
Pre current decommissioning vessel numbers	43	1,012	415	
Long-run sustainable vessel numbers	40	801	357	

* Includes under 10m data, Nephrop trawl and minor species not captured in modelling

Source: SU Analysis

4.3.3 Lower limit scenario

With declining prices and a stock collapse, the total industry value falls to £377 million. There is a need for significant rationalisation across all sectors of the fleet in order for those fishermen left in the industry to remain competitive.

	Pelagic	Whitefish	Shellfish	Total Revenue
Sector revenue (over 10m. vessels)	£57m	£170m	£67m	£377m*
Sector profits	£19m	£37m	£14m	
Pre current decommissioning vessel numbers	43	1,012	415	
Long-run sustainable vessel numbers	19	405	264	

* Includes under 10m data, Nephrop trawl and minor species not captured in modelling

Source: SU Analysis

Structural adjustment in the whitefish sector: The results of the modelling suggest the need for a structural adjustment in the whitefish sector. A failure to match long-term capacity to opportunity will have the twin impact of creating incentives to over-fish and will provide no opportunity or incentives for the investment required to make the fleet competitive.

The order of magnitude of the restructuring is around 211 or 21% in the upper limit scenario and around 607 or 60% in the lower limit scenario. These figures do not include the reductions from the 2003 round of decommissioning which are currently estimated to reduce capacity by 8% (as defined in this model), reducing the **minimum** amount of restructuring necessary to around 13%.

4.3.4 Industry futures conclusions

- **Competition is key:** The external environment will become increasingly competitive. An inability to become competitive will have serious consequences for the long-run sustainability or viability of the fleet. The industry and government need to introduce greater competitive pressures in the short run in order to make the fleet fit for the future.
- **Profitability, investment and modernisation:** The fishing industry needs to generate enough profits in order to be sustainable in the long run. Only through profits will the industry be able to invest and modernise its fleet in order to compete with its competitors and be able to sustain the volatility in stocks and prices.
- **Structural adjustment is required in the whitefish sector:** Even under the most favourable scenarios, a contraction in the whitefish sector will be required in order to bring opportunity and capacity into line and generate enough profits to sustain the industry. A failure for the industry to restructure will significantly increase the probability of future crises.

4.4 Costs and benefits of different industry scenarios

Fisheries are a renewable resource and decisions made now have implications for fishing revenues and communities stretching decades into the future.

The following section quantifies the value of investing in good management and a competitive industry, by assessing the cost of extreme scenarios arising from poor management of vulnerable stocks.[28]

The cost of poor management is assessed against a 'business as usual' scenario which uses the 'best guess' stock and medium price forecast detailed earlier in the report. As such these costs are relatively conservative. Costs are expressed in terms of annual real costs and the net present value (NPV) over a 40-year time horizon. The three scenarios modelled were:

- 'Collapse scenario': cod collapse (and an increase in sole)
- Demersal TAC leaks to other countries as a result of profitable non-UK fishermen registering in the UK and buying UK quota. Revenue and profits accrue to other countries
- 'pessimistic price' the prices of vulnerable species fall 2% per annum more than the base case between 2002-2012.

The 'collapse' scenario is most likely to arise if the fleet remains structurally too large to fish profitably given the level of TACs. Rising economic pressures will increase the risk of over-fishing and illegal landings, raising the probability of stock collapse. Each of the above scenarios becomes more likely if stock is mismanaged, though it is impossible to say how much more likely.

The possible costs arising from poor management of vulnerable EU stocks, or continued lack of profitability of the fleet, could cost the industry revenues with a net present value of between £350 million and £600 million. The negative scenarios outlined above are also not independent of one another; several of these options might plausibly occur simultaneously.

The high potential costs arising from poor management of UK stocks mean it is worthwhile investing in activities which reduce the likelihood of these risks arising; buying 'insurance' against stock collapse or industry failure.

It is impossible to calculate accurately the likelihood of these events arising, or the impact of better management in reducing these risks. However, the potential costs of inaction can be measured and are in the range £350-£600 million.

4.5 Community impacts of fleet changes

This section considers how employment in fish catching may change under the scenarios described above, and how different types of fishing-dependent communities are likely to be affected in the next 10 to 15 years. A profitable fishing industry is important for the communities that depend on it. However, in moving to a more competitive and profitable industry, some communities will lose some or all of their fishing activity.

Table 4.5: Revenue earned for selected years and net present value, for vulnerable species (£m)

	2005	2010	2020	NPV (2002-2043)	Change from BAU
Business as usual (BAU)	219	191	180	4,219	
BAU, with stock collapse	195	166	156	3,728	-491
20% demersal TAC sold to overseas fisherman	182	176	174	3,857	-362
Pessimistic price, further 2% pa fall 2002-2012	206	162	147	3,637	-582

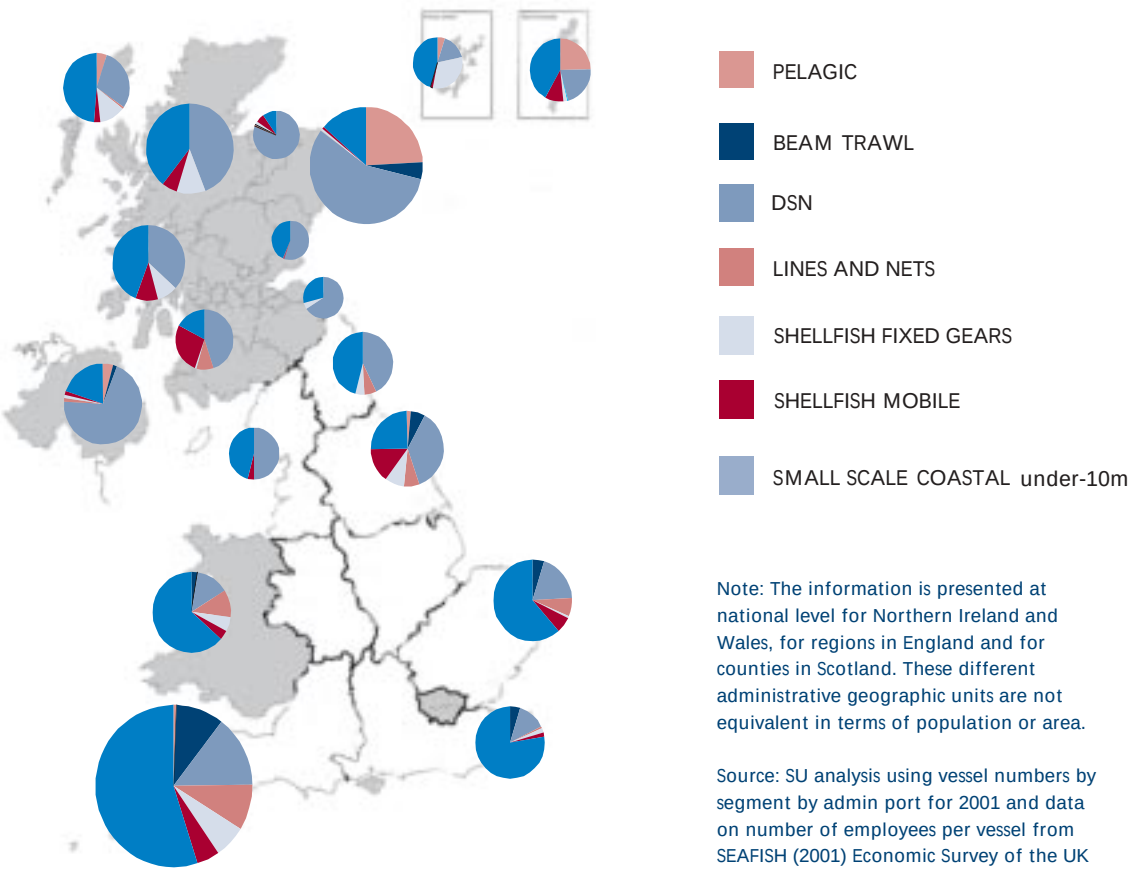
[28] Cod, haddock, plaice, hake, angler, whiting and nephrops.

The costs to society of moving to a sustainable, profitable fishing sector will depend on which communities are affected and to what extent.

4.5.1 The mix of fleet segments varies by region

Fish catching employment is regionally and locally concentrated. The mix of types of fishing activity also varies by region. For example, 63% of the UK pelagic fish segment is in Aberdeenshire, whereas 55% of the UK beam trawl fleet is in the south west of England. Figure 4.7 illustrates the distribution of employment by fleet segment across the UK.

Figure 4.7: Direct employment in fish catching by region and fleet segment



Note: The information is presented at national level for Northern Ireland and Wales, for regions in England and for counties in Scotland. These different administrative geographic units are not equivalent in terms of population or area.

Source: SU analysis using vessel numbers by segment by admin port for 2001 and data on number of employees per vessel from SEAFISH (2001) Economic Survey of the UK Fishing Fleet.

Source: DTI, Strategy Unit analysis using DEFRA and ABI data

Vulnerability to change is not the same as dependency

The most fisheries-dependent areas are also geographically concentrated as shown in Figure 3.10 above. However, dependency is not the same as vulnerability to change. Vulnerability increases as economic diversity and opportunities for alternative economic activity decrease. Vulnerability varies greatly according to the location of fishing activity. Figure 3.11 above shows the UK's most fisheries-dependent Travel To Work Areas, against a map of local authorities categorised by socio-economic type, produced by the Office of National Statistics (ONS 1999). The most fisheries-dependent areas are all in rural areas. Most fall into the 'Rural Areas' family group. Some in England are in the 'Coast and Services' family. Within these families, local authorities are categorised into groups and clusters. All of the most dependent areas are in rural groups or clusters. The rural groups and clusters differ in their characteristics. The most dependent communities in Scotland are in 'Remoter Rural' areas, with low population densities. Like the 'Traditional Rural Coast' areas, including Newlyn, they have populations that are at best growing very slowly and in many cases declining. Brixham on the other hand is in a 'Rural Amenity' area, which has higher population growth and a more affluent profile and lower agricultural employment than other rural areas.

The SU modelled how the number of fishermen employed might contract in the scenarios modelled above for the different regions of England and Scotland, and for Northern Ireland and Wales as a whole. The lower bound estimate for the loss of regional fishery employment varied between 12% and 22% under the strong stock recovery and price scenario, and between 45% and 59% under the stock collapse and weak price scenario.

However, it must be emphasised that this only provides an illustration of the possible scale of employment change. The fleet will not contract evenly, so some communities will suffer more than others will. The industry is also expected to continue the existing trend of concentrating around larger fishing ports, which are best able to meet the demands of fishermen.

The employment reductions in many communities are likely to be less than might be feared from segment vessel reductions projected above, because:

- most ports have vessels from a mixture of fleet segments;
- the percentage reduction in total local employment is likely to be less than the percentage fall in fish-catching employment as the value of local fish landings can increase even though catching employment falls (although some dependent communities depend more on employment than landings, if local vessels land elsewhere); and
- the proportion of onshore supply chain jobs to fish-catching jobs (the employment multiplier) can be expected to rise with concentration in some fleet segments, as vessel numbers decline.

The communities likely to be most negatively affected by changes in the industry are:

- small, remote communities, which are highly dependent on fishing because fishing jobs are among just a few employment opportunities available in the area. These areas are also expected to be highly vulnerable to change because of the limited the range of economic opportunities; and
- medium dependency communities, where ports are not well enough equipped to develop as fishing centres as the sector concentrates and the number of vessels declines below the critical mass needed to support on-shore services.

High-dependency communities with larger ports can be expected to suffer less from restructuring. Larger ports are better able to attract vessels as fleet segments concentrate. Further and more detailed study than possible here would be needed to understand which particular ports are at most risk of falling below the critical mass of boats required. However, it is clear that some ports will lose all their fishing activity if the UK fleet is to maintain competitiveness and profitability.

The level of industry restructuring necessary to achieve a competitive and sustainable fleet will result in significant reductions in catching-sector employment. However, these are much less than the impacts of stock collapse or a lack of industry competitiveness which would see over 50% of employment being lost around the UK.

The distribution of these reductions is hard to predict given the complexity of fishing opportunities at the port and community level, but it is likely that remote and small ports would be hardest hit.

5 Risk management in EU fisheries

This Chapter:

- explains why the explicit management of risk and uncertainty is needed in EU fisheries in order to ensure long-run sustainability;
- outlines principles and guidelines for how fisheries risk-management systems should be constructed, including how risks and rewards should be allocated between Government and industry; and
- gives recommendations on how such a system should be introduced in practice, and explains how this reasoning underlies the strategies and recommendations in the rest of the report.

Summary

- EU fisheries are highly complex in biological, economic and regulatory terms. Uncertainty over critical factors (eg stock sizes) is an inherent characteristic of EU fisheries management, and is perhaps greater than in any comparable global fishery.
- Current EU and UK fisheries management systems fail to adequately address and manage these uncertainties, and this is a root cause of many existing problems. All future strategies developed for EU and UK fisheries must fully incorporate and manage these future uncertainties.
- The effective management of these risks requires a clear overview of biological and economic performance by fisheries managers, but action by all actors. The fisheries management process must explicitly recognise the limits of knowledge, and foster open debate and analysis over areas of uncertainty.
- Better science and data collection has only a limited capability to reduce key uncertainties, many of which are persistent and uncontrollable. However, the fundamental basis of good risk management in fisheries must be agreement between regulators and the fishing industry on the credibility of landings data and stock assessments, including the levels of uncertainty surrounding them.
- Risk management requires continual evolution and innovation in management systems to assess, limit and allocate risks to those best able to manage them. This will require approaches tailored to specific fisheries. The fishing industry must take a stronger and more active role in fisheries management and assume the responsibilities associated with this.
- Accelerating climatic change will produce uncertain, but possibly major, impacts on the already disrupted marine ecosystems which support commercial stocks fished by the UK. EU management systems and the UK industry will need to be more flexible to respond to such unpredictable future changes.

5.1 The need for risk management

The EU has probably the most complex fisheries in the world to manage, given the number of species, mixed ecosystems, active fishing nations and habitats. This complexity leads to very high degrees of uncertainty around the understanding of critical aspects of the sea fishing industry; for example, annual stock levels, fish prices and compliance levels. These uncertainties are compounded by political uncertainties surrounding EU decisions over Total Allowable Catches (TACs) and other management measures.

High levels of uncertainty diminish the ability of the industry to plan for the future, undermine incentives for long-run sustainability and greatly complicate the overall fisheries management task. However, these well-documented uncertainties are largely unaddressed in current management systems; with the exception of ICES advice on setting precautionary TACs.

The current system of TACs and quotas depends on a command and control approach, which assumes very high-quality data on biological systems and complete control over management systems. Table 5.1 gives estimates of some critical uncertainties in fisheries management, showing that uncertainty is both pervasive and material. Table 5.1 also shows that there are real limits to our ability to control or reduce the range of critical uncertainties present.

Table 5.1: Sources and ranges of uncertainty

Source of uncertainty	Range of uncertainty	Can uncertainty be reduced?
Annual stock fluctuations	20–400%	Cannot model complex ecosystems
Stock measurement	20–40% minimum – if measured[29]	Expensive to improve – is 20% lowest limit?
Climate change impacts	Up to 1.5°C by 2020*	Cannot model precise impact on stocks
Enforcement	9–35% over quota**	Possible to reduce non-compliance
Fleet effort shifts	9–30% change annually?	Cannot control directly – but can monitor changes
Prices	20–30% annual	Reduce with better marketing and supply contracts
Costs	10–20% annual	Can hedge impact of some costs eg fuel

* South England average air temperature rise in 2020. Source: High Emissions Scenario Hadley Centre UKCIP02 Scenarios

**Source: ICES 2000. The NAO Report on English Fisheries Enforcement 2003. Enforcement is by UK and other countries bordering the fishery. Figure is the difference between recorded landings and landings used by ICES for fisheries surrounding the UK.

The various uncertainties present in fisheries management are also interconnected. If stocks fall, prices may rise, influencing the total fishing effort applied by the fleet (depending on necessary returns to capital and commercial strategies) and potentially giving higher incentives for non-compliance. This will then impact stock projections and information quality.

Currently the uncertainty surrounding stock measurements and industry behaviour is undermining the ability of the CFP to manage many EU fisheries sustainably. Unless the overall framework of EU fisheries management recognises the need to explicitly manage inside persistent uncertainties long-run sustainability will not be achieved.

These uncertainties need to be acknowledged, understood and addressed by all actors: government, industry and scientists. Managers need to be honest and realistic about what they do not or cannot know. One of the failures of the current EU and UK systems is an inability to handle uncertainty in a non-confrontational manner.

[29] See Patterson et al, 'Estimating uncertainty in Fish Stock assessment and forecasting'. Fish and Fisheries 2001, 2, pp125-157.

How uncertainty causes disputes in mixed fisheries

In 2003, large amounts of anglerfish began to be caught inadvertently in the mixed western Channel fisheries. The numbers caught greatly exceeded the allowable quotas, forcing fishermen to discard or illegally land fish. In response to this perceived 'crisis' the UK Government was forced to make exceptional representations to the European Commission to increase the TAC, and this was accompanied by high levels of media and political interest.

However, the mismatch between quota setting and actual catch in the highly complex (80 plus species) Channel fisheries is unsurprising and should be seen as a normal aspect of mixed fisheries management. Scientific data is only collected on a few species, and species interactions are neither understood nor modelled and some stocks are known to be very volatile. This results in high uncertainty over forecasts of stock levels and TAC setting. The value of these fisheries makes any significant increase in stock sampling uneconomic. Therefore, this fishery must be managed in a way that acknowledges that there will always be high uncertainty over the level and mixture of stocks in any particular year, and application of the precautionary approach must be coupled with adaptive management to ensure adequate economic predictability.

Methods of risk management include: moving to effort-based management; using in year data from fishers to update stock estimates; and adopting an adaptive fisheries management approach which would allow a regular process for the reassessment of hard to measure stocks throughout the year.

5.2 Principles of a risk management approach to fisheries

Risk management approaches have been developed across many industries to deal with everything from contaminated land management to financial sector fraud to natural resource management.[30] Following the BSE and other problems, the UK Government has recognised the importance of improving its own performance in this area,[31] and all UK fisheries departments have some type of requirement to produce risk assessments or risk management plans.

The main lesson to take from other areas is that risk management should not be seen as just a technical exercise based around collecting estimates of risks and calculating 'optimal' responses, though these techniques have their place. In complex systems such as fisheries, where uncertainty is persistent and very high, a more evolutionary and adaptive approach is needed.

Risk management in fisheries is an evolutionary process, which is as much about learning as analysis. The key is to construct institutions and incentives that allow learning and adaptation to take place. Management can only directly affect human activity, not fundamental biological variables, and so must rest as much on socio-economic analysis and data as on biological science and understanding.

To guide this evolution a 'whole system' view is needed of a particular fishery, covering biology, economics and regulatory issues. Responsible fisheries management authorities must have a complete overview of these aspects for each functional fishery (eg North Sea mixed whitefish, Irish Sea pelagics), implying better international co-operation, otherwise risk management will be fragmented and confused. While regulators bear the responsibility for ensuring that the correct incentives and signals exist, all actors will bear responsibility for analysing and responding to different risks.

[30] See the background document commissioned for the Strategy Unit on Risk Management Systems and produced by Z/Yen on the Strategy Unit website.

[31] See previous Strategy Unit report: Risk: Improving Government's ability to handle risk and uncertainty, November 2002.

Practical industry risk management in New Zealand

The Sealord Group in New Zealand is a globally-focused sea fishing company prosecuting large-scale hoki fisheries in New Zealand and Latin America, and export to the USA, Europe and Asia. The group identifies its competitive advantage as sustainable fisheries management, efficient fishing practice and continual innovation.

The Sealord Group uses a variety of informal risk management approaches in its operations, including:

- joint industry negotiations on limiting capacity investment to match long-run stock availability, including fishing below maximum TACs to avoid capital build-up beyond sustainable measures;
- using a proportion of boats on short-term contracts when stocks are high, which can be released when stocks are low, to prevent over-capitalisation;
- detailed contractual and monitoring arrangements (going beyond legal requirements) with skippers to ensure compliance;
- the active management of its quota portfolio to give best-value and to minimise supply reliability risks; and
- to use of its own brokers in markets to smooth supply reliability, including by buying in from other sources, and to maintain long-term supply relationships.

The core principles that should guide the design of the overall risk management approach, are:

- **reduce underlying volatility,** where possible and economically attractive;
- **clearly allocate risks and rewards,** all risks should be explicitly allocated, and all actors should know and accept the risks they face;
- **risks should be fairly allocated,** to those responsible for causing them or to those who can manage them best; and
- **rewards must match risks** if fishermen face high risks they must be able to earn high profits.

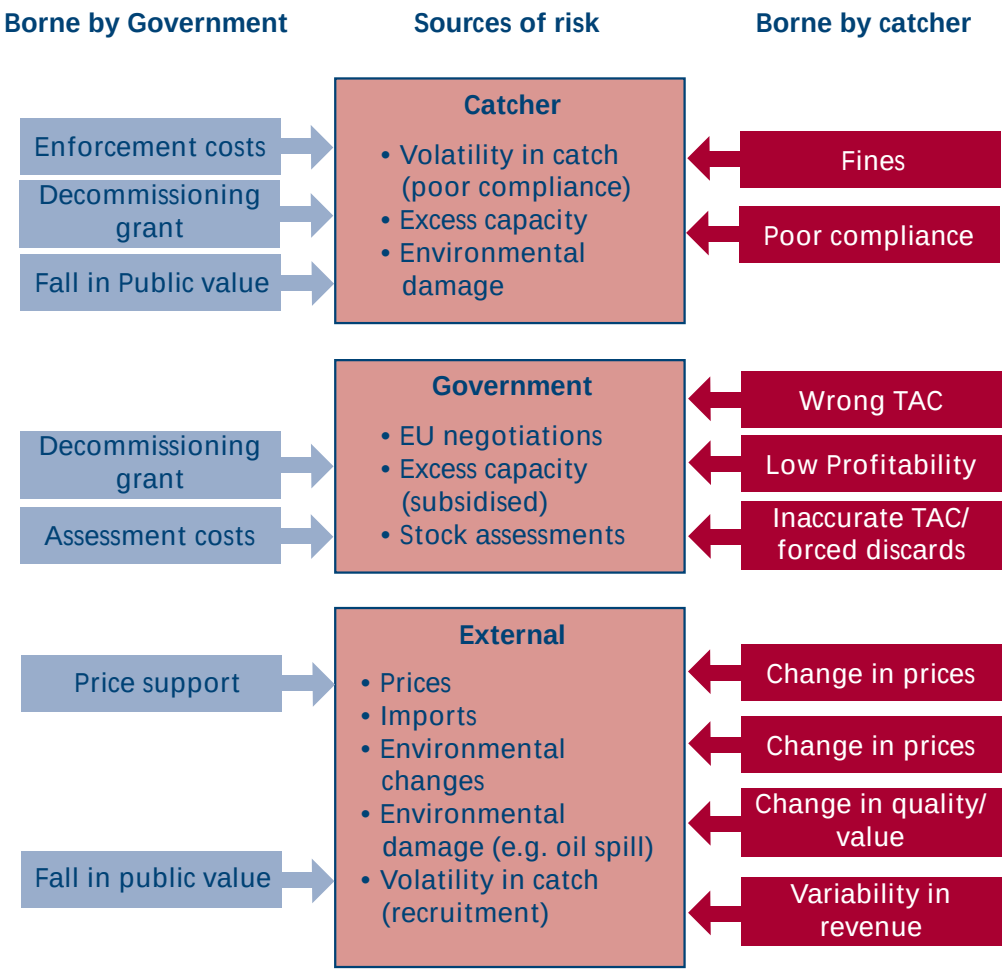
The necessary features of risk management systems in fisheries are as follows:

- **Management must be adaptive,** learning from experience and building a 'fine-grain' understanding of issues at the appropriate level. For example, building a better understanding of a particular stock's spawning behaviour.
- **Studies should identify areas where uncertainty is high and material.** For example, the different sources of uncertainty around stock estimates must be explicitly calculated and included in management decisions.
- **An ability to undertake real-time experiments.** Complex fisheries often cannot be modelled effectively and economically, especially at the local scale, so real-time experiments to close areas, or increase catch levels, may be necessary to understand the impact of possible management changes. Taking a sensible precautionary approach should not fossilise a lack of knowledge, and is compatible with careful and controlled experimentation.
- **Continuous innovation in all systems.** It is vital that management systems continually innovate new ways to reduce and/or respond to uncertainty. Fisheries management has the potential to benefit greatly from future advances in information technology, computing power, remote sensing and fundamental environmental research, and in ten years it may have completely different tools with which to address these issues.

The level and type of uncertainty in fisheries management will depend on the location and type of fishery being managed. Large single-species pelagic fisheries may be manageable by current quota systems, but small complex mixed fisheries in crowded inshore waters will need very different techniques and controls and, they will depend on adaptive learning and management.

The prevalence and persistence of complex uncertainty in fisheries means that one-size cannot fit all in terms of management systems. Unclear or misallocated risks generate perverse incentives and undermine other aspects of good fisheries management.

Figure 5.1: Current allocation of risk in fisheries management



5.3 Allocating risk in fisheries management

Figure 5.1 gives a summary of how particular risks are currently allocated between actors in the fisheries industry. This allocation does not conform to the principles of good risk/reward management, for example:

- the industry bears the costs of poor or low levels of scientific assessment but has no control over how much is spent on science or how it is allocated between different stocks and assessment techniques;
- the industry gains from good scientific assessment by having higher precautionary TACs but does pay the costs of supplying this information;
- the industry bears the risks of cyclical stock and price shifts, but has uncertain rights over access to fisheries that diminish expected future rewards;
- government bears the cost of decommissioning excess capacity but has poor control over, and information on, private investment decisions; and
- sectors and/or ports with high levels of non-compliance gain from cheating but do not bear the cost of necessary increased enforcement activities.

Based on this analysis, the following general approaches should inform the development of detailed fisheries management strategies.

Catchers should bear the risks of annual stock variability, normal commercial risks, the costs of additional stock measurement and the risk of over investment, including the costs of decommissioning or tying up excess capital.

Government should bear the risk of removing any over-capacity caused by poor management or public subsidy, and EU regulatory risks. Implicitly, Government will also bear some of the risk of environmental change/stock collapse through the welfare system.

Catching sector – risks and responses

Risk: Annual volatility in catch (recruitment)

Response: Balance revenues from good years with bad
Reduce stock volatility with healthier stocks
Pay for any increased cost of information

Risk: Annual volatility in TACs and management plans

Response: Set longer-term catch rate rules
Fishing industry involvement in management process

Risk: Low precautionary TACs due to lack of data

Response: Invest in greater scientific research
Develop adaptive fisheries to allow in-year TAC changes

Risk: Changes in prices and costs

Response: Smoothing income and investing in quality and efficiency
Long-term contracts with processors and customers

Risk: Product competition from imports

Response: Efficiency improvements and fleet modernisation

Risk: Imbalance between fleet size and stocks

Response: Decommissioning and tie-ups financed and self-negotiated by the industry

Government - risks and responses

Risk: Legacy of excess subsidised capacity

Response: One-off 'structural adjustment' financed by the UK Government

Risk: EU regulatory risks

Response: Improve UK compliance
Ensure management systems allow fishermen to be compliant
Improve European Commission oversight of Member State compliance

Risk: Ecological changes – cyclical and climate change

Response: Regional support for affected fishing communities
Promote flexibility in UK fleet

The strategies and recommendations contained in the remainder of this report all incorporate these risk-management principles. However, risk management is not a one-off process and needs to be embedded into all areas of management, both by government and the private sector.

There is no substitute for responsive, professional and tailored management that explicitly manages intrinsic risks and aims to minimise the regulatory risks and uncertainty faced by the industry.

The fundamental basis of good risk management in fisheries must be agreed information on the levels of stocks and catches, including estimates of the uncertainty surrounding these figures.

Recommendations

Fisheries departments should develop risk-management approaches to fisheries management, including by introducing tighter controls on capital investment to prevent future 'boom and bust' cycles, and:

- fisheries departments should aim to put a risk-management approach at the heart of UK and European fisheries management;
- the fisheries industry should work to improve its understanding of key commercial risks and develop tools and techniques to minimise them, including through stronger involvement in fisheries management; and
- fisheries departments should publish regular estimates of all critical risk factors, including estimates of compliance rates, variability in stocks, accuracy of stock estimates and catching activity in order to inform regulatory and industry practice.

6 UK sea fishing industry strategy

This Chapter:

- outlines long-term commercial strategic approaches for different sectors of the UK fishing industry.

Summary

- The UK fishing industry needs clear long-run commercial strategies in each sector in order to guide commercial activity, policy, regulation and industry support. These strategies must be compatible with future increased levels of competition, possible lower prices and income volatility.

- The UK Government needs to play an active partnership role in supporting these long-run commercial strategies through better regulation and management, alongside its basic aims of ensuring long-run stock sustainability and the delivery of public goods.

- The UK fishing industry needs to accept the need for increased UK competition to drive cost efficiencies, consumer focus and better business practice so it can compete internationally. This will also require higher levels of average profitability to ensure long run business sustainability.

- The need for competition and higher profitability require a structural adjustment in the whitefish sector to reduce the size of the fleet to match the long-run business opportunities. Failure to achieve this will result in 'too many businesses chasing too few profits' and a decline in the overall competitiveness and stability in the sector. Other sectors may also require some contraction, except the inshore/under-10m sector where opportunities for growth still exist, especially in mariculture.

- The industry will require a clearer and more stable regulatory framework so it can operate under less uncertainty, including clearer rights over fishing opportunities. This must include a commitment to real industry involvement in management to improve effectiveness and to hedge regulatory risks. Greater industry control and higher profits should be matched by a move to introduce cost recovery from the industry for its management costs. A profitable industry must be underpinned by incentives for high compliance both in the UK and EU, and better mechanisms to minimise the risk of future 'boom and bust' cycles.

- A stock management strategy should be introduced to reduce the high annual variation in Total Allowable Catches (TACs) set by managers and the subsequent volatility in fishery incomes. To reduce volatility the UK Government should promote use of 'large stock rules' in the EU management of key stocks where only 20–25% of a stock is caught each year, as opposed to the over 60% at present. This will require effort to be reduced in the short term, but modelling suggests that the short-term losses would be small compared to long-run economic gains from stock stability. The industry would also benefit commercially from implementing independent certification of the sustainability of key stocks, once they have recovered sufficiently.

6.1 Industry strategies

6.1.1 UK sea fishing industry strategies 2013–18

Given the competitive pressures on prices and costs the UK fleet needs to modernise and rationalise in order to survive in the long run. In doing this, the industry will need to meet three key challenges. Table 6.1, describes these challenges facing the UK fishing industry and details the responses that the industry must make as well as the threat posed by inaction.

Table 6.1: Strategic Challenges and Responses in UK Fishing Industry

Challenge	Consumer focus and orientation	Capacity utilisation and efficiency	Robust to volatility in stocks
Required response	• Improve reliability and quality in supply ecosystems • Focus on the needs of the end customer and their changing tastes • Improve the business planning side of the industry through improved data collection and transparency	• Increase in throughput of fish through UK vessels • Investment in modern equipment and vessels • Improve business processes, training, health and safety standards etc.	• Ensure that profits over the long run are sustainable to manage the short-run volatility in stocks and prices • Ensure that profits are sufficient to prevent the need to over-fish
Threat	• Better quality, eco-labelled and more reliable imports	• Leakage of quota to more efficient operators • Cheaper imports	• Bankruptcies, further crises and over-fishing

Consumer focus and orientation

The fishing industry must focus its attention on meeting the needs of the consumers that it serves. Not enough attention has been placed on product quality and reliability, forcing the processors to source product from abroad to meet consumer demand. Secondary processors continually complain that, whilst they would prefer to buy from British fishermen, the quality and reliability of imports are far superior. The industry should also aspire to Marine Stewardship Council certification (or equivalent) in key stocks by 2015, as they will be at a competitive disadvantage with major competitors otherwise, and setting such a long-term goal will provide a focus for the industry and management reforms. Whilst different sectors will have customer needs that are specific to their sector, the industry as a whole needs to improve its data collection to inform strategic planning.

High capacity utilisation and cost efficiency

In order to remain cost competitive with the competition from abroad, the fishing sector must both invest and sweat its existing assets. This will require the certain sectors of the fleet to both reduce and modernise in the long run in order to become cost competitive. If the UK fleet is not competitive, it will come under increasing pressure from both cheaper and higher quality products from abroad. Similarly, if the industry is not cost competitive, foreign companies will look at gaining further access to UK-based quota (as is their right under single market regulations). From the UK Government perspective, it must work with the industry to ensure that the correct amount of capital flows into and out of the industry to prevent over capitalisation.

Robust to volatility in biological and economic drivers

The industry needs to be able to prevent crises occurring in the future and so needs to be robust in the context of future stock downturns. This will entail making a sufficient return in the good years in order to survive the inevitable lean years. Only in this way can fisheries managers hope to maximise compliance when stocks come under pressure. The imperative of being robust to volatility in stock levels highlights the importance of having a shared vision between the industry and government of how the industry should be managed.

6.1.2 Commercial strategies by catching sector

Different sectors will need to focus on different elements of competitiveness in order to be successful in the long run. The UK Government needs to understand and complement these strategies in order to provide the appropriate regulatory environment. The regulatory implications of these issues are covered in Chapter 9 on fisheries management.

The key components of commercial strategies by sector are outlined briefly below:

Pelagic sector

Industry strategy: Improved marketing to UK and EU consumers. Increase volume through the exploitation of pelagic fisheries further afield (eg the Dutch pelagic sector is exploiting pelagic fisheries off the coast of Africa). Continue to improve cost efficiency through modernisation and capacity utilisation by matching effort to opportunity.

Government strategy: The UK Government should ensure there is precautionary management to reduce capacity through voluntary agreement with the industry. Introduce a cost recovery programme to cover management costs. Look at the possible introduction of resource rent schemes.

Whitefish sector

Industry Strategy: The sector needs to improve their focus on reliability and the quality of fish that is landed. Whitefish fishermen need to restructure so that there are fewer businesses with higher profits in order to improve resilience and allow modernisation in the fleet. There also needs to be investment to improve efficiencies within the fleet in order to compete with foreign fleets and imports.

Government strategy: Assist in a one-time structural adjustment of the fleet in order to bring capacity into line with future opportunity. The UK Government needs to improve compliance and enforcement of the fleet that remains. The government should move to a cost recovery programme for the sector in the long run.

Shellfish sector (Over-10m)

Industry Strategy: Improve marketing to UK consumers to build up demand and increase returns on the higher value species that are currently largely exported. The sector should work together to jointly market and sell its products in order to improve its bargaining position with processors and retailers. The sector also needs to rationalise and invest in efficiency and development to insulate itself from long-run competition.

Government Strategy: Within the 12-mile limit the UK Government should maintain the separation from the offshore sector. The UK Government needs to increase compliance within the sector and provide entry restrictions to prevent the over exploitation of key species. The UK Government should also look at introducing a cost recovery system into the shellfish sector and to improve the quality and amount of data collected.

Inshore/shellfish sector (Under-10m)

Industry Strategy: Improve marketing to UK consumers to increase demand for the higher value species that are currently largely exported. The sector should work together to jointly market and sell its products in order to improve its bargaining position with processors and retailers. The sector should also seek to exploit mariculture opportunities. A strategy to co-operate with other users of the local marine environment will be important in facilitating this development.

Government Strategy: The UK Government should clarify as appropriate all access and use rights and opportunities over all resources, and should improve the level of support for industry development. Over time the UK Government should look to introduce gradual cost recovery and improvement in the collection of data, beginning with self-reporting and surveys.

A stronger partnership is needed between the UK Government and the industry to secure long-run commercial goals. The highly regulated nature of the fishing industry means that this goal must supplement the traditional governmental objectives of maintaining stock sustainability and ensuring that public goods are protected and enhanced.

Recommendations

- Fisheries departments must work with the fishing industry to understand their long-run commercial strategies in each sector in order to guide policy, regulation and industry support.
- Fisheries departments should focus on the support for the development of the inshore/shellfish sector to take advantage of its large growth opportunities.
- Fisheries departments should consider providing assistance to support a one-off structural adjustment in the whitefish fleet (see Chapter 10 on transition strategy for greater detail).
- Fisheries departments should ensure clear rights and responsibilities for fishing access, and they should facilitate competition across the sectors of the fleet.
- Fisheries departments and the industry should work together to introduce cost-recovery measures to finance the science, enforcement and administration as and when each sector can afford it.
- A review should be undertaken of how effectively existing government business support instruments and SeaFish funds are used by the fishing industry to support long-run commercial strategies.
- The fishing industry should consider adopting an aspirational target of achieving Marine Stewardship Council certification for EU stocks of major interest to the UK by 2015.

6.2 Commercial stock management strategy

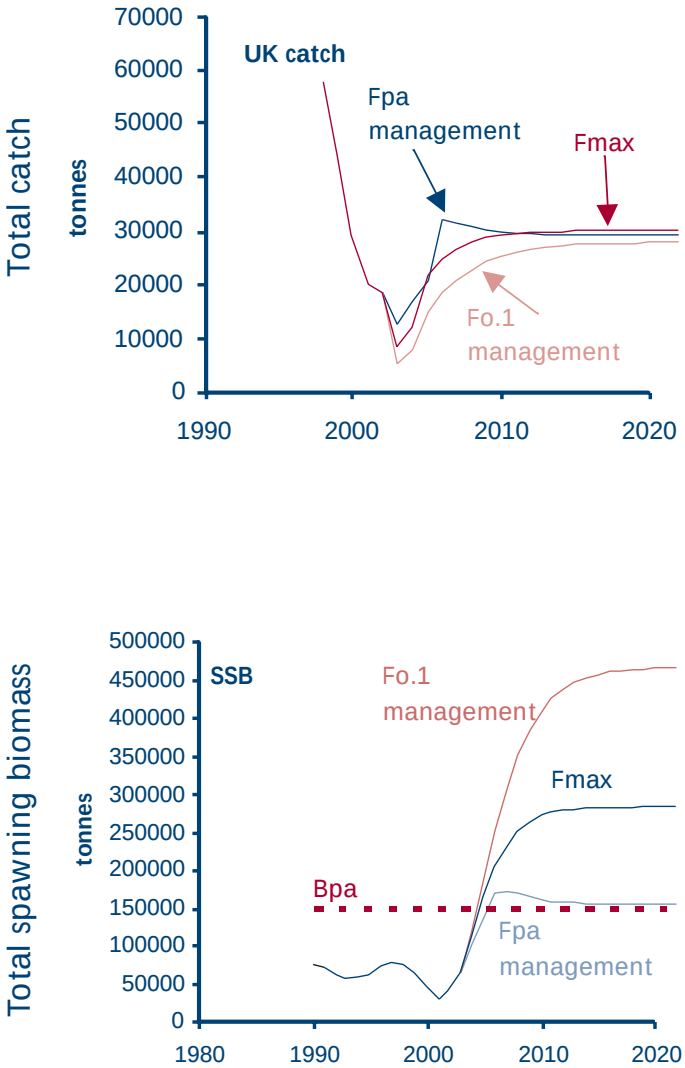
The poor condition of stocks for many of the species fished by UK fishermen contributes to the high annual variation in TACs set by managers and to the volatility in fishery incomes. Other countries have explicit rules to land only a small proportion of the total Spawning Stock Biomass (SSB). In Iceland managers set allowed catch so, on average, only 25% of fish is caught per year, in the Faroes the figure is 33% of SSB.

Currently, well over 60% of the fish in any given stock are caught each year. Figure 6.2 shows that even under current stock recovery plans when effort is reduced to sustainable levels, the uncertainty around stock biology means that 30% of EU stocks of interest to the UK will be at danger of collapse (at or below Bpa) each year in 2015. In contrast, Strategy Unit modelling in Figure 6.2 shows that only catching 16% (F0.1) of each stock every year would allow stocks to grow to much larger sizes, reduce volatility and result in no stocks being at risk of collapse in 2013. Reducing volatility in revenues has real economic benefits to the fishing industry; estimates of improving price stability in Canadian fisheries valued a 25% decrease in price volatility as being worth 5-6% of the final sale price.[32]

[32] 'A Novel Use for Options Theory – Fishy Maths', page 64, The Economist (18 August 2001).

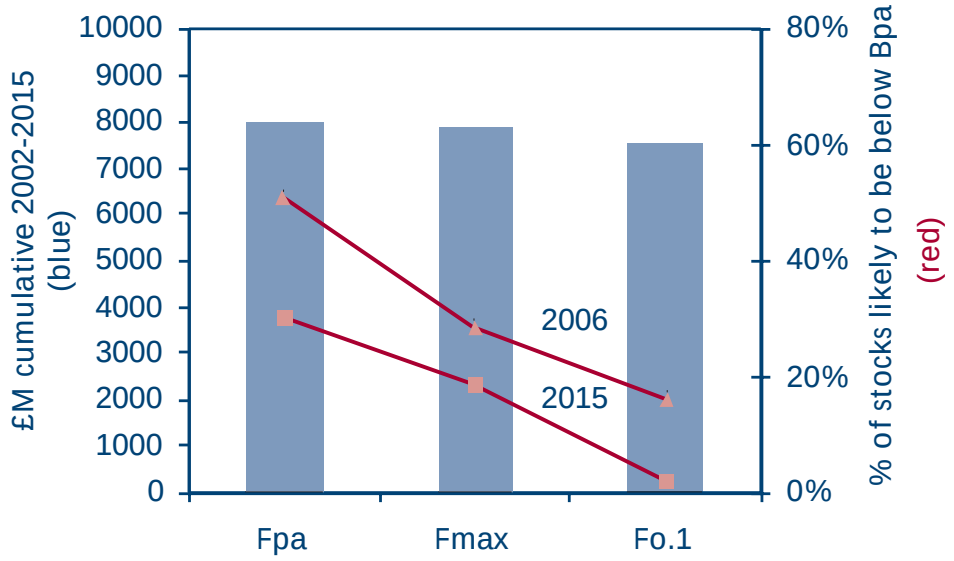
Figure 6.1 shows how a "large stock" approach would impact North Sea cod recovery and catches. The F0.1 scenario allows around 16% of the cod stock to be caught, in contrast to 63% under the Fpa management rule, which would allow recovery to minimum sustainable levels (Bpa). Though final catch levels in Figure 6.1a are very close, total stock levels in Figure 6.1b are very different for the different catch rules. Fmax represents an intermediate scenario where 23% of the stock can be caught.

Figure 6.1: North Sea cod SSB and catch modelled under different fishing mortality management objectives



Source: SU modelling

Figure 6.2: Impact on total UK stock value & percentage of catch below Bpa



Source: SU modelling

Figure 6.2 shows that adopting either of the lower catch rate scenarios would result in a very small fall in aggregate revenues over the period to 2015. As is clear in Figure 6.1, most reductions would occur in the transition phase and the final catch levels would be very close, as stocks are so much larger.

Further details on how the reduction in volatility was modelled are given in Annex C on stock management. Further work would be needed to define a workable stock management rule in each key fisheries of interest to the UK, and will also require agreement at EU level. However, this approach is consistent with the Common Fisheries Policy reforms agreed in 2002 and would bring similar commercial benefits to other countries.

Recommendations

- The UK should adopt a large-stock strategy and use this to guide its position in EU negotiations for its key economic species. This will entail reducing catch in the short to medium term. Fishery managers should explicitly seek to maximise the value of commercial stocks and reduce the volatility of catch.
- The UK should collaborate with other EU countries with interests in key stocks to develop such long-term catch rules, initially by sharing research and modelling of the costs and benefits of these approaches, and by developing potential catch rules.
- Fisheries managers should report annually on critical aspects of UK stocks, including: the overall value of UK access to key EU stocks; detailed catch data; volatility in stocks; and uncertainty in stock estimates.

7 Community strategies

This Chapter:

- sets out the rationale for an explicit social element to fisheries policy;
- recommends measures to address community issues through offshore and inshore fisheries policy; and
- looks at how all government departments can make best use of existing regional policy tools to meet the changing needs of the fishing industry and vulnerable fishing communities.

Summary

- The fishing industry provides important social goods in many remote and deprived areas that would otherwise draw down larger amounts of government welfare spending. These positive social impacts are a major justification for the current high level of public spending on fisheries management relative to the economic value of the sector.
- Fisheries departments should adopt explicit social objectives in fisheries policy, primarily aimed at assisting dependent and vulnerable fishing communities, but these objectives should be secondary to ensuring industry profitability and sustainability.
- Community quotas should be promoted as the least market-distorting and most effective method of protecting dependent and vulnerable communities from high levels of concentration in the offshore fleet, if schemes can be developed on a basis consistent with EU law. Dependence on fisheries employment is highly concentrated, with under 20 UK ports having over 5% fisheries-dependent employment, and community quotas should focus on those areas which are most vulnerable.
- The local inshore sector supports at least 45% of total UK fisheries employment, and much more if informal and family labour is included. Although it is distributed around the country, and seldom in highly fishing-dependent areas, it brings valuable rural employment. A more proactive approach to securing and promoting the social benefits of the inshore sector should be undertaken, including through assistance in making better use of a variety of existing government funding.
- Regional policy must retain and enhance its role in supporting fishing communities and industry.

7.1 Social objectives in fisheries policy

The UK Government and devolved administrations are seeking to address social exclusion and promote economic opportunities in rural and disadvantaged areas through various policies (see below).

Many fishing-dependent communities (Figure 7.1) are in areas already targeted by government regional policy, because they have low income relative to the EU average or they face difficulties resulting from their industrial heritage or location.

Fisheries can be a sustainable, renewable resource, and for some, fisheries-dependent areas, maintaining access to fishing opportunities is one of only a few viable ways of sustaining local employment and income generation. Loss of fishing opportunities in some areas implies an increase in public funds flowing into the area for benefits payments and regeneration to tackle the threat of social exclusion.

Government social objectives for rural areas and fishing communities

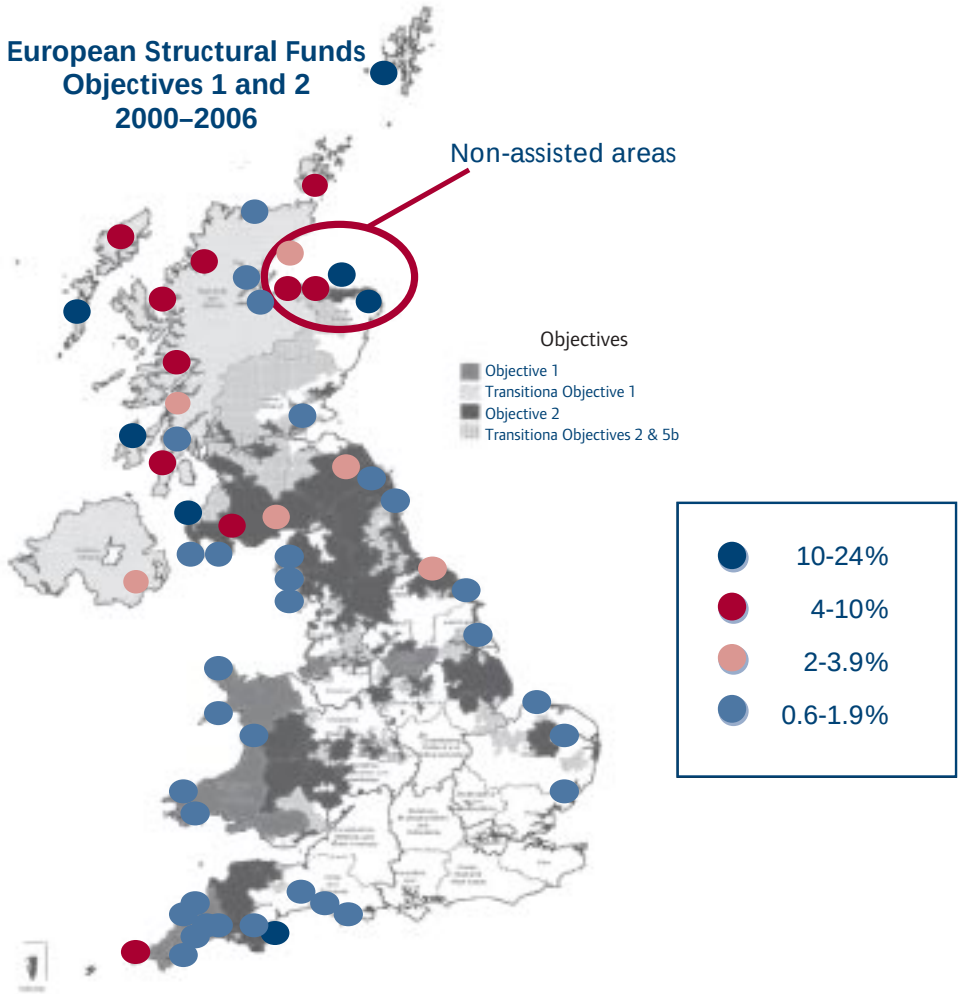
DEFRA has Public Service Agreement (PSA) targets for England to enhance opportunity and tackle social exclusion in rural areas and, improve the accessibility of services for rural people. The Rural White Paper includes objectives to facilitate the development of dynamic, competitive and sustainable economies in the countryside and to maintain and stimulate communities.

The Rural Development Programme for Northern Ireland aims to target social need and disadvantage. To do so, it will give priority to initiatives that 'address the needs of areas, groups and individuals objectively identified as being in greatest social need, to tackle problems of unemployment, increase employability and to equalise economic and social opportunities across Northern Ireland'.

In Scotland, the contribution of the fishing sector to communities' economic and employment opportunities is recognised in the Strategic Framework for the Scottish Sea Fishing Industry (SEERAD, 2001), where support for fishing communities is one of five main themes. It emphasises the benefits of diversification of the economies of fishing-dependent communities, but also states the Scottish Executive's commitment to sustaining employment opportunities in rural fishing communities.

Tackling social disadvantage is one of three major themes of the Welsh Assembly's strategic plan for Wales, 'Better Wales'. This includes the objective of developing a thriving rural economy.

Figure 7.1: Total fisheries dependency by TTWA and map of availability of structural funds 2000–2006



Source: Source: DTI, Strategy Unit analysis using DEFRA and ABI data

A profitable and sustainable fishing industry is the necessary primary condition for communities that depend on it. If the industry is not competitive, there is a significant risk of quota being bought by vessels based in other ports, including foreign-owned vessels. Despite existing economic link criteria, this would result in a loss of income and employment for UK communities. However, as described in Section 4.5, some communities will suffer in the transition to a future, sustainable industry, as the industry will need to restructure and contract to be profitable.

Government has the option of modulating fisheries policy to minimise the social impacts of moving to a sustainable future for the industry

Competition is needed in the fishing industry to promote a more efficient, competitive fleet. However, allowing full competition for rights of access to fish stocks risks a concentration in the future of these rights away from vulnerable communities that are highly dependent on them for local economic activity and employment. Measures to limit concentration are feasible and can be used to limit damage to the most vulnerable fishing-dependent communities, because:

- most competition faced by the UK fleet is from developed countries with high costs and facing similar community issues; and

- supernormal profits are possible in the fish-catching sector so that small operators can be competitive if they have access to fishing opportunities full concentration is not necessary for competitiveness.

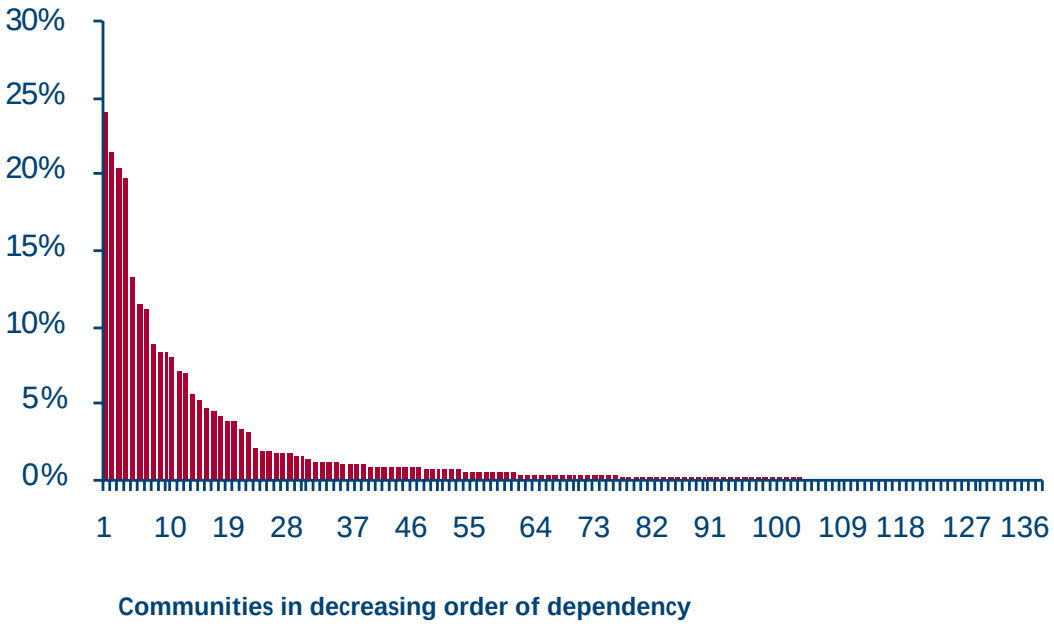
Government should introduce a clear social element to fisheries policy

The benefits of explicit objectives are set out in Chapter 9 of this report. In the absence of transparent objectives, there is a danger that decisions are based on implicit judgements about social benefits and that they are not sufficiently well thought through, debated and targeted. Fisheries departments should set out explicit social objectives and work with departments with regeneration and economic development roles to make use of opportunities in fisheries policy to meet social policy objectives, where this can be achieved while meeting the primary objective of a profitable fishing industry. Social policy tools should be analysed to ensure that they do not hamper the competitiveness of the industry or the good management of stocks.

Government intervention should focus on communities that are both fisheries dependent and vulnerable

Dependency on the fishing sector is not the same vulnerability to change. Fishing dependency alone is not a sufficient argument for further government intervention. Figure 7.2 is a cumulative distribution graph showing all significant UK fishing communities in decreasing order of employment dependency on fish catching. There is a long tail of low dependency communities, and under 20 communities have over 5% total employment dependency. Among the high dependency communities there will be some ports that will become centres for the offshore industry as this restructures and concentrates. However, some high dependency areas are small communities with small labour markets and limited opportunities for alternative activity. These, and the medium dependency ports that will see fishing activity move away to larger fishing centres are ones that should be considered vulnerable to change, and therefore a priority for social policy interventions.

Figure 7.2: Fishing communities in order of decreasing dependence on fish catching



Source: SU modelling

The different systems for regulation of the inshore and offshore sectors require different approaches to social policy in these two areas, which are discussed in the next two subsections.

Social and regional policy is the responsibility of several other parts of government. Fisheries departments need to work with government bodies responsible for regeneration, rural and regional development objectives and budgets to ensure that potential regional and community benefits from the use of fisheries resources are achieved.

Recommendation

- Fisheries departments should introduce clear and explicit social objectives into fisheries policy by the end 2004, and these should be primarily focused on the most vulnerable and dependent communities.

7.2. Social objectives in offshore policy

For the offshore sector, social objectives need to be taken into account both in the allocation of rights for fisheries access and of grants for decommissioning and transition. There are a variety of policy instruments which could be used to limit the concentration of quota away from communities that are both dependent and vulnerable towards other high fishing dependent communities (see below).

Different options for limiting concentration to support fishing dependent communities

1. Greater or complete government control over the allocation of quota, making quota non-transferable as in France, where the Government has a clearly stated policy of maintaining control over quota so that it can allocate it to meet socio-economic objectives.

2. Restricting the number of vessels that can be owned by any one person (as in Denmark).

3. Limiting eligibility for fishing licences to individuals who receive a majority of their income from fishing (as in Denmark).

4. Limiting the movement of vessels between segments of the fishing sector.

5. Ring-fenced community quota. In the UK, there have been several local or regional community quota initiatives established over the last few years, lead either by local authorities or by local fishing organisations. These buy up quota with the aim of keeping existing fishing activity in an area, as described in the following box. Community quota schemes could take different forms, with different implications, and be funded by regional public funds, private funds, or set up by fisheries departments.

All of these policy approaches present different benefits and disadvantages. Over the last few years, the UK has moved to a system where track record can be sold to other vessels under certain circumstances. Any move to restrict transferability of quota as in option 1 would be unpopular and conflicts with the objective of stimulating greater competition among the fleet.

Options 2, 3 and 4 are broad-brush approaches, are not targeted at the most vulnerable communities and would probably be incompatible with the industry strategy outlined in this report.

Option 5 contains a number of sub-options in terms of how quota is obtained for ring-fencing. The existing community quota schemes face some difficulties in terms of compliance with EU competition law and rights of equal access.

These difficulties are to a great extent due to the use of public finance to buy up quota. In addition, locally sponsored community quota schemes depend on the availability of resources, public or private, in an area. They do not necessarily reflect vulnerability. Some of the most vulnerable areas may not have the means to set up such schemes themselves. Finally, the introduction of community quota schemes would mean that some lose out in favour of the vulnerable communities.

Nevertheless, given the UK's current fisheries management system and vulnerability to competition, ring-fenced community quota seems the best way of protecting fishing opportunities for vulnerable communities while imposing minimum distortions on the market.

The difficulties of local community quota schemes mentioned above can potentially be overcome with fisheries department intervention. State aid issues may be overcome if fisheries departments directly ring-fence total allowable catches (TACs) or quota. TAC or quota reallocation by fisheries departments is less likely to require state aid consent, as in strict legal terms it involves changing who is allowed to fish, not the transfer of a financial asset or spending from the public purse. The UK departments currently set aside a proportion of TACs for the 'non-sector', under-10m vessels fishing inshore waters, based on their track record. In an analogous, manner fisheries departments could also set aside a percentage of TACs for community quota.

A central government scheme (that is, the central administration in each nation) that targets the most vulnerable communities is probably a better way of meeting government social objectives than a host of bottom-up local schemes. A central scheme concentrating on the most dependent and vulnerable communities would minimise the amount of ring-fenced quota, and thus any market distortions, given the relatively small number of highly dependent ports, as shown in Figure 7.2, and would prevent any wasteful competition between regional authorities for quota. The UK Government could make a good case in the EU for moving away from the principle of equal treatment where this is done to meet a clearly defined objective of protecting vulnerable communities.

Existing community quota initiatives

The first two community quota schemes were set up by the Shetland and Orkney Island Councils. These were the subject of a European Commission state aid investigation following a complaint from within the UK. The investigation concluded that the schemes were not compatible with common market rules.

The Commission's decision was based on the view that: the schemes were in fact funded by public money; this money was being used to lease quota to Shetland and Orkney fishermen on preferential terms, constituting an operational aid to these fishermen, forbidden under EU law; this gave an unfair advantage to Shetland and Orkney fishermen over others in the quota market; and restricting access to fishermen from Orkney and Shetland discriminates against other fishermen, going against EU law.

In Cornwall, a private, not profit-making firm, the Duchy Quota Company, has been established to buy quota to ensure a future for fishing communities in Cornwall. It intends to lease quota to existing Cornish fishermen and new entrants. If such a company can be set up with private funds, there will be no state aid concerns. Local authorities are looking to help fund this venture, and state aid issues are currently being considered.

It is important to note that government-sponsored community quota will not be appropriate for all highly dependent communities. It should only be used to maintain opportunity in vulnerable communities. Certain highly dependent communities will be the centres around which the fishing industry will tend to concentrate as it restructures. They do not risk the loss of access to quota. In the past, a concentration of activity has been seen, for example in Newlyn and Brixham in the South West, and Fraserburgh and Peterhead in north east Scotland.

While government should act to protect the most vulnerable fishing communities, communities can also set up their own private community quota schemes. Communities where individuals currently hold significant amounts of quota, and where there is a concern that quota and fishing opportunity will be transferred away, have the option of setting up private arrangements to restrict trade in quota away from the area.

The UK should have a positive policy towards community quota schemes for the most vulnerable communities, if this can be done within EU law. Government should consider the full range of options for community quota in order to try to overcome legal problems with existing schemes.

This strategy has identified the opportunity, and some high-level principles, for government-supported ring-fenced community quota to meet national social objectives. Initial legal analysis suggests that they can be compatible with EU state aid, single market and competition law, but further work is required to assess the feasibility and legality of schemes which have been defined in greater detail.

Fisheries departments have a variety of options in terms of:

- the way in which TACs or quota are obtained and ring-fenced for communities;
- the speed at which quota is ring-fenced;
- which communities benefit from community quota;
- the scale of community quota - how much TAC needs to be set aside to meet the needs of the most vulnerable communities; and
- the terms of community quota allocation, ownership transfer or leasing arrangements, and whether it is tradeable alongside other quota.

The costs to other fishermen of introducing ring-fenced community quota can be minimised by a gradual introduction over a timescale that gives sufficient time for those investing in quota to adjust their investments. As an illustration, a department could choose to announce that in three years time, it will begin to withhold 1% of the TAC for species X per year over, say, five years for use as ring-fenced community quota.

The preferred option should be to ring-fence quota at no extra public cost. Preliminary advice suggests this would be possible if it is done with notice over a reasonable timescale. However, we have also investigated the cost of buying back 5% of all UK quota for community use and 25% of quota from some regions with vulnerable and dependent communities. These suggest costs in the order of £20-£30 million. To put this in context, some £150 million has been allocated to the UK for FIFG alone over the seven years from 2000 to 2006.

This alternative course of action would raise the question of whether it was an appropriate use of public money to 'buy back' a national asset that was originally distributed for free.

Fisheries departments should launch feasibility studies exploring the different options for the ring-fencing of quota and for the allocation of ring-fenced quota to vulnerable communities, and should seek further legal advice based on a more detailed design as soon as possible. This project has not had the resources to identify the most vulnerable communities. A robust system for identifying vulnerable communities must be developed by departments as the basis for community quota allocation.

The UK Government should also work to ensure that any future review of state aid rules does not limit opportunities to maintain vulnerable communities. Such reviews may take place over the next three years in the lead-up to the new structural funds programming period, to begin in 2007.

Recommendation

- Fishery departments should consider the use of community quota in vulnerable and dependent fishing communities, looking to develop a system compatible with EU law. They should launch a feasibility study on the design of a community quota system by the end of 2004.

7.3 Social objectives in inshore policy

The inshore sector contributes to high-value employment and to the cultural and social fabric and attractiveness of many small communities dispersed around the UK coast. It is responsible for at least 45% of total employment in fish catching, probably over 50% if informal employment is included.

The UK has control of inshore waters and already ring-fences part of the quota available for the non-sector. In addition, modernised management of inshore fisheries, as discussed in Chapter 9 with more clearly defined access rights for the inshore sector, provides a means of controlling access and sustaining opportunity, where desired, for local people in this sector.

It is important to have clearly stated objectives, including social objectives, to inform the management of the inshore sector

Priorities will vary according to local or regional circumstances, so these objectives are best set at a regional level within the inshore management area to reflect local circumstances, within certain constraints imposed by national and international law.

A process is needed whereby inshore managers can involve stakeholders in agreeing explicit objectives

The absence of a structure for setting objectives for the inshore sector may be a barrier to explicit objectives being formulated. Inshore managers will need guidance on how to go about working with stakeholders in developing and agreeing objectives. To ensure that clear, useful objectives are set, fisheries departments need to establish a process that can be used at regional level by inshore managers. The proposed inshore/shellfish managers in fisheries departments should produce guidelines for regional inshore managers on how to structure the process to ensure stakeholder involvement and transparency.

Fisheries departments should develop guidelines for such a process by mid- 2005 as part of a modernised approach to inshore management.

Recommendation

- Fisheries departments should develop a process for setting explicit economic, environmental and social objectives within the recommended, modernised systems for inshore fisheries regulation

7.4 Making regional policy work for fishing communities

Although the fishing industry will never be a major contributor to GDP growth at a national level, it is, and can continue to be, a key source of income and quality of life in a number of communities.

All fisheries-dependent communities are in areas that are currently eligible for EU structural funds, either Objective 1, Objective 2 or transitional areas. Most are in 'assisted areas'. Many will continue to need regional policy support in the future to meet the wide range of objectives in each community.

The fishing industry also has its own structural fund, the Financial Instrument for Fisheries Guidance, under which € 215 million is available for the UK between 2000 and 2006. The industry will need ongoing support to undergo the transition described in this strategy.

In particular, regional policy must continue to allow communities to adapt:

- to a decline in fishing activity – some vulnerable communities will suffer from the transition to a more efficient fleet ;
- in case stocks do not recover as projected here, for example if climate change has serious negative impacts; and
- to take up appropriate diversification opportunities in areas highly dependent on fisheries, in order to increase resilience to any future environmental changes.

The structure of regional policy is expected to alter significantly from 2007 onwards to address concerns about the ability of the current system to cope with the expansion of EU membership. The UK approach to these negotiations has been outlined in a recent government statement.

This strategy and the expected changes in the fishing industry extend beyond 2007. Many fishing communities will need ongoing regional policy support during this time. It is important that fisheries departments feed into the development of future regional policy to ensure that it continues to provide support for fisheries-dependent communities. (As is the case now, this would exclude operating aid.)

The fish-catching sector poses some challenges for regional policy design and delivery.

The fish-catching industry's structure differs from that of many other industries, and this needs to be taken into account when designing industrial and regional policy instruments. The fishing industry is special in terms of:

- the extent to which it is regulated;
- its geographic spread – the location of stocks influences the location of fishing activity and the need for a certain level of port infrastructure within an area. A regional policy which is successful in drawing regional benefits from the catching industry will need to take on board industry-specific issues, such as the best distribution of investment in port infrastructure; and
- its value to communities as a local renewable resource – the industry has limited growth prospects because of the limits on stocks, but it can provide stable employment and income into the long-term future with sustainable stock management. A regional policy favouring high growth sectors may underestimate the economic value to regions of the catching sector.

Fishermen face obstacles to accessing structural fund and similar grants, resulting from the complex administrative requirements for applications, the dispersed nature of the industry, particularly the inshore sector, and cultural factors that may prevent fishermen from seeking assistance. To address this:

- regional or economic development bodies should increase the use of regional fisheries co-ordinators in Objective 1 regions and other regions where fishing is concentrated to help industry representatives put together bids for FIFG and other regional funding. This builds on existing examples of good practice, for example in the South West of England.
- fisheries co-ordinators should also be employed centrally by fisheries departments to assist with bids from geographically dispersed fishing communities, including the inshore sector. DEFRA has recently appointed a FIFG co-ordinator for English non-Objective 1 regions for a trial period of one year;
- regional fisheries managers should act as fishing industry 'champions' within regional economic development structures, and should convene the industry and fishing community representatives to influence policy; and

- in addition, members of the fishing industry need to become more actively involved in regional policy debates, to feed in information about the future development needs of their industry and their communities. Building on existing examples of good practice, they need to lead the development and implementation of projects.

Regional bodies and fishing departments must regularly review the allocation of regional aid and FIFG for 2000–2006 to ensure that it is adapted as far as possible to meet the changing needs of areas during transition.

Recommendations

- The UK Government and devolved administrations should ensure future reviews of EU state aid/structural funds maintain opportunities to provide appropriate support to vulnerable fishing communities, including:

- fisheries and other central government departments should ensure that reviews of regional policy and EU state aid rules (expected pre-2007) maintain opportunities to provide appropriate support to vulnerable fishing communities using regional and fisheries policy; and

- government departments responsible for regional policy in each nation should ensure continued appropriate support to the fishing industry beyond the end of 2006, when the current structural fund programmes come to an end. This will continue to exclude operating aid.

- Fisheries departments should actively facilitate and co-ordinate access to UK and EU support funds for transition support, diversification and industry development, including:

- regional bodies should ensure that the allocation of regional and regeneration aid is generally flexible enough to respond to changing circumstances, and in this case to the changing needs of the fishing industry and communities;

- the fishing industry should receive ongoing regional policy support during the transition period described in this strategy. This support should be to address long-term structural issues rather than compensate for short-term fluctuations in stocks and the industry;

- regional fisheries managers should act as champions of the fishing industry and bring together the industry to feed into regional and community policy in their area; and

- fisheries departments need to ensure that fisheries data is organised to allow a better understanding of the regional and community distribution of access rights, landings and employment, so that existing data can be of more value in determining the social impact of changes in fisheries policy, and can provide better information for regional and regeneration policy.

8 Integrating fisheries into broader marine management

This Chapter:

- makes linkages between fisheries management and the UK marine environment strategy;
- argues for placing the management of fisheries within the broad framework of management of the marine environment; and
- outlines the key instruments which fisheries managers should introduce to integrate their sector into broader marine management.

Summary

- Commercial fishing is only one use of the marine environment, and pressures – especially in coastal areas – are increasing. The value of different uses of the marine environment is hard to estimate, but several areas – tourism, oil and gas extraction, wind power and biodiversity – appear to be more valuable than commercial fishing. For example, the value of preserving healthy populations of sea mammals around the UK is estimated at between £470–1,200 million per annum.

- In order to maximise the benefits of all uses of UK marine resources, environmental issues should be better integrated into fisheries management, and the fishing industry should have the same rights and responsibilities to the marine environment faced by other users. The UK should make full use of its ability to introduce marine environmental management measures in ways compatible with, and supportive of, commercial fishing activities.

- Though commercial fishing has large impacts on the marine environment, fisheries management is not the right framework for managing the wider marine environment. Fisheries need to be integrated into a system of wider marine management, as is happening in other fishing nations.

- Fisheries managers should adopt goal-setting, adaptive approaches to the management of environmental issues based on environmental management systems which guide the use of Strategic Environmental Assessments, Environmental Impact Assessments, and adaptive fisheries management. Incentives are needed to encourage better and more innovative environmental performance.

- Marine Protected Areas (MPAs) offer potential benefits to fisheries, other users and ecosystem health and quality. These synergies should be maximised through a system of experimental multi-use MPAs.

- Achieving better marine management will require closer co-ordination of fisheries and marine science, and a greater focus on broader marine environmental interactions.

8.1 Links to UK marine environment strategy

The UK is already developing a broad marine environment strategy, to cover all users of the environment. The UK Government published its initial thoughts in the document Seas of Change in late 2002. The principal vision in this document is simple: "To provide for clean, healthy, safe, productive and biologically diverse oceans and seas."

The development of the marine strategy is driven by both the increasing pressure of different uses on the marine environment, and public interest in marine environmental quality. Many industries make use of the marine environment: tourism, marine transport, off shore oil and gas exploration and, over the next decade, offshore wind; each of these are all significantly larger industries than sea fishing.

Public interest in marine environmental issues, like interest in the environment more generally, is significant and growing. These concerns encompass a wide range of issues including the preservation of specific habitats or natural features, the welfare of species like marine birds, seals and porpoises, and biodiversity and genetic variation of species.

Draft goals of the UK marine environment strategy:

- To conserve and enhance the overall quality of our seas, their natural processes and biodiversity
- To use marine resources in a sustainable and ecologically sensitive manner in order to achieve maximum environmental, social and economic benefit from the marine environment
- To develop proposals for an integrated and ecosystem-based approach to marine management
- To sustain economic benefits and growth in the marine environment by enabling and encouraging environmentally sustainable employment;
- To increase our understanding of the marine environment, its natural processes and our cultural marine heritage
- To promote public awareness, understanding and appreciation of the marine environment and seek active public participation in the development of new policies.

The final strategy will impact management of all users of the marine environment, including fisheries management. One of the challenges in meeting these goals in the fisheries sector will be caused by mixed management competencies.

The conservation of marine biological resources under the Common Fisheries Policy (CFP) is the exclusive competence of European Union structures, while environmental responsibility belongs both at the Member State and European levels. The precise interaction of these competencies is unclear, and is likely to be defined on a case-by-case basis. The UK should make full use of its national powers to introduce marine environmental protection measures in ways compatible with, and supportive of, commercial fishing activities.

8.2 Uses of the marine environment

There are many uses and users of the marine environment. Some of these uses, such as fisheries or aggregate dredging, are easy to translate into monetary values based on market value of output. Other uses, such as the potential value to medicine of marine resources or the value of carbon storage in the marine environment, are harder to place a monetary value on despite their practical importance.

Table 8.1 attempts to identify the different uses of the marine environment and put a value on them, where possible, based on a literature review of current research.[34] Methodological differences mean that is not meaningful to put these values together to derive a single 'value of the marine environment', but it is clear that the value of commercial fisheries is not the largest part of the value of the marine environment. For example, the non-use value of healthy marine mammal populations to the UK public is estimated at being between £470 million and 1,200 million per year.

There are synergies and conflicts in the potential uses of the marine environment; some of these are well known, some are not. Decisions need to be made to balance these uses in a way that benefits all UK citizens across all three aspects to sustainability – environmental, social and economic. Society has direct control over social and economic issues and a large influence over the environment. Human activities can affect it, but we often cannot predict its response.

Fisheries policy must ensure that fishing does not damage the environment to the extent it compromises either the future of fishing or any other valuable uses of the seas. Equally, broader marine management must ensure that other human activities do not compromise our ability to pursue profitable and sustainable fisheries.

Working within this broader marine framework will require the fishing industry to be actively involved in the development of regulations and laws which affect the sector. Lack of engagement with the wider marine management process would be disadvantageous to the fishing industry, and could lead to inappropriate and overly restrictive regulations being imposed on the sector.

[34] The details of this review can be found as an annex to the Environment analytical paper on the Strategy Unit website.

Table 8.1: Goods and services provided by the UK marine environment

Good or service	Value or description
Monetary values available:	
Food provision and employment	Value of landings sea fishing industry £546 million.
Recreation and tourism	Net output = £11,770 million. Consumer surplus ≈ £256 million to £504 million.
Disturbance prevention (flood and storm protection)	Disturbance prevention by wetlands = £2,616 million. No values available for other marine environments.
Nutrient cycling available for other nutrients.	Nitrogen and phosphorous recycling: £0.10 to £0.28 per m^3 No values
Gas and climate regulation	£16 to £164 per tonne of carbon stored by the marine environment. No values available for other gas regulation.
Bioremediation of waste	Bioremediation by wetlands = £1096.81 to £1236.54 per acre. No values available for other marine environments.
Raw materials	Oil, gas and aggregates net output = £14,879 million No values available for other raw materials.
Physical environment (a space to work in)	Net output = £11,000 million.
Information service	The marine environment provides an insight into environmental resilience, stress, and a long term environmental record. Education, training and research funding = £83million. Natural technologies can provide the key to improvements, eg marine microbes can convert sugar into electricity, and may be a valuable method of producing batteries. No values available for natural technologies.
Non–use value: bequest value and existence value	Annual non-use value of sea mammals ≈ £474 million to £1,149 million. No values available for other marine species.
No monetary values available:	
Genetic resources	Genetic diversity held in the marine environment holds significant value, eg to enable cross-breeding and genetic engineering to improve existing commercial species and for medical purposes. Tropical rainforests have been valued at £0.01 to £19.38 per ha based on their genetic diversity.
Medicinal resources	There is much exploratory research being undertaken in this area, and the value is potentially huge, eg shark-derived material can be applied to inhibit cancerous tumour cells.
Cultural values	There is value associated with the marine environment eg the unique culture of fishing communities, art, music, links to religion.
Option use (the value associated with keeping options open)	There is value associated with maintaining a healthy marine environment, eg for every species we lose, we may lose a potential medical cure. Even though we may not use every marine species in the future, there is value in maintaining them, so that we have the option to use them.
Habitat (refugium and nursery)	A healthy habitat is a prerequisite for the provision of all goods and services; without this fundamental base the ecosystem would cease to function.
Biological control	Ecosystems have innate interactions and feedback mechanisms, leading to varying levels of stability within the community. Even small changes in the food web can significantly affect the resistance and resilience of an ecosystem to perturbations.
Glue value	The sum of the values of individual functions is likely to be less than the value of the entire environment, owing to the primary life support function, and the contribution of specific environmental assets to maintaining healthy and functional ecosystems.

8.3 Managing fisheries within an environmental context

Fisheries management has, with very few exceptions, been focused solely on attempting to maintain spawning biomass of stocks of target species. Management has traditionally taken very little account of other environmental impacts or of the effects of the environment on fish stocks. This is to the detriment of both fisheries and other uses of the marine environment.

In order to maximise benefits from the marine environment, fishing should be treated on the same basis as the other major uses of the marine environment.

8.3.1 Strategic Environmental Assessment

Some marine industries are already using Strategic Environmental Assessment (SEA) to look at the broad impacts of their activity and decide how to minimise both the negative environmental effects of that activity and the potential negative effects of the environment or other users. These assessments are required under EU legislation, but this Directive (2001/42/EC) has rather limited implications for the fisheries sector.

An SEA consists of several parts, which may be summarised as:

a) A description of the environment – this includes human activities and social/economic aspects such as the value of landings from an area, etc
b) The effects of the human activity on the marine environment, including assessment of significance
c) Possible future scenarios of activities. This can include scenarios imposed externally (eg due to climate change)
d) Any mitigation that might be used to reduce either current or possible future human activities
e) A description of the residual effects after mitigation has been applied.

The SEA process is typically open and public and should include all stakeholders in the scoping of the environmental description, in assessing the significance of possible effects and peer-review. Current marine SEAs have been based geographically on sections of the UK's continental shelf.
There are three possible frameworks within which government(s) could apply SEAs to fisheries. Inshore fisheries management bodies (SFCs/SEERAD/DARD) should be required to generate SEAs within their areas. In the offshore context SEAs should be carried out by UK authorities as part of the process of feeding into Regional Advisory Councils who should also be required to carry out SEAs within the areas that they will cover. Each of these approaches would provide a fisheries-led approach to environmental issues, which will complement and integrate with broader marine management frameworks.

Similar approaches are applied to the Fishing Plans developed regionally for fisheries in the USA and in New Zealand where a risk assessment is made for each fishery to guide management development. SEAs provide an initial framework for developing more long-term Environmental Management Plans for UK fisheries, which would allow stakeholders to identify the most important aspects of a fishery which need to be managed: for example, reducing damage to productive areas of the sea floor from beam trawling or highlighting the importance to reduce onshore pollutants in order to support mariculture.

Strategic Environmental Assessments of UK fisheries should be carried out as a first step towards defining and introducing comprehensive environmental management systems.

8.3.2 Environmental Impact Assessment

Significant environmental impacts arise from much smaller, localised changes in fishing operations. For instance, the switch from single rig to multiple rig can have profound impacts upon the overall killing capacity of the boat. The opening of a new fishery, or the use of a new gear in an area, can similarly have impacts upon the sea bed and other users.

In other industries using the marine environment it is normal to undertake Environmental Impact Assessments (EIAs) to analyse the consequences of significant new operations. Commercial fishing should also follow this principle of assessment before exploitation.

These systematically set down and, where appropriate, quantify the impacts of the change in operation upon the environment and other users. They also provide an opportunity for the affected parties to input into the change and thus reduce the side-effects. Obviously it would be unrealistic and overly bureaucratic for fishermen to undertake EIA for every change in fishing they undertake. Nor should EIAs stifle the development of new approaches to fishing; indeed, if the change generates improvements relative to the current practice, it should be approved quickly.

The fishery manager would need to provide guidance on the types of changes that would require EIAs to be conducted. This would be sensitive to the needs of other users. There also needs to be a mechanism for sharing the cost of the EIA with future beneficiaries of the new gear/fishery.

EIAs should in future be applied before any new fishery develops or before the deployment of a significant new technique or gear within a fishery, subject to guidance provided by the fishery manager.

8.3.3 Marine Protected Areas

Many areas of sea are already protected from some effects of fishing through a number of mechanisms. For instance, fisheries managers have closed areas in order to protect spawning stocks and nursery grounds. In addition, some areas have been closed to mobile gears in order to avoid conflicts with fixed gear. Fishing is also banned in other areas for non-fishery reasons – for instance, to allow safe navigation at the entrance to some ports and for safety reasons near some oil and gas installations. Some nature conservation areas have gear restrictions, including in one case a complete ban on fishing.

Marine Protected Areas could provide further benefits for fisheries and the environment. One way that the age/length balance of fish stocks might be restored would be to cease using fishing methods that catch large fish in a sufficiently large area to allow a population of fish to grow in size. The size of this area will be related to the area used by a fish over the years – a relatively small area would be required for a relatively sedentary stock, while a larger area would be required for a migratory stock. The gains that could come from a closed area would be lost if the fish stock that is being managed moves out of the area and is caught elsewhere.

Since little is known about the use made of the seas by most stocks of fish, it follows that the full benefits of a marine protected area could not be predicted accurately. However, as with other aspects of fisheries management, a lack of perfect knowledge should not lead to inaction and maintenance of the status quo, but to an adaptive and precautionary approach.

Marine Protected Areas should be established on an experimental basis, and their economic and biological impacts carefully studied. This process should begin in areas which give multiple benefits to multiple users of the marine environment, where possible.

8.3.4 Adaptive fisheries management for the environment

Knowledge of the precise ways of best managing fisheries to give environmental (and other) benefits is poor. This should not inhibit taking decisions that should theoretically be expected to improve environmental performance – but it is important that the effects of these decisions are carefully followed and lessons learned. A recent example of this has been the deployment of acoustic pingers on fixed nets to reduce harbour porpoise by-catch. These pingers work in experimental set-ups, but recent tests in commercial fisheries have revealed problems with robustness and operation in practice. This does not mean that the technique is invalid, just that further development is required. Fixed and strict regulation can inhibit development of techniques, whether in place for environmental or commercial reasons. Good regulatory practice suggests that a goal-setting approach is more likely to encourage innovation, and fisheries managers should adopt goal-setting, adaptive approaches to the management of environmental issues.

Adaptive management – or experimentation – should become a routine technique in fisheries where accurate scientific data is too expensive or difficult to obtain. Though the extent of experimentation must always be guided by the application of the

precautionary principle, it can be used to explore the consequences of both increasing or reducing fishing effort in an area. However, adaptive fisheries management will only work if effort and catches are accurately recorded, and will be non-viable at current levels of non-compliance or without the co-operation of all countries and fishermen that fish inside a particular area.

Further encouragement of better environmental performance can be through the use of financial and other incentives. The CFP review in 2002 removed the most damaging subsidies for new capacity, but not for environmental improvements.

Fisheries managers should explore the potential for payments to be given to encourage better environmental performance and gear types. These could be funded either from public environmental protection budgets, or by releasing public funds from fisheries management budgets by introducing cost recovery for routine management tasks.

8.3.5 Strategy in marine ecosystem science

Considerable scientific efforts are already expended on studying marine ecosystems and providing support for current management. Despite this, much remains unknown. Changes in emphasis of fisheries science are described in Chapter 9, but further studies are needed to aid the integration of environmental considerations into fisheries.

In terms of gains for management, studies of the effects of fisheries on the environment, and of techniques and technologies to reduce the magnitude of those effects, seem likely to give most benefit. However, the most fruitful focus of studies should emerge from the SEA process and the environmental management systems in particular fisheries.

Other scientific priorities derive from the preceding paragraphs in this chapter – including studies of Marine Protected Areas and adaptive management.

It is vital that knowledge of the marine environment generated by different processes is brought together, and not left in an unco-ordinated manner; for example, EIAs carried out by wind farm developers, oil and gas exploration etc.

Other countries such as New Zealand and Australia are currently introducing broad marine management systems, underpinned by baseline surveys of the marine environment, including measurement of 'natural capital' and the value of ecosystem services.[35] The UK should learn the lessons of these approaches and how they have been integrated with fisheries management through environmental management systems and assessment processes.

There is a common interest of all users of the marine environment to have a clearer understanding of marine ecosystems. Government should investigate the possibility of charging all users of the marine environment for basic scientific assessment and mapping studies which define the baseline for marine environmental management.

Recommendations

- Fisheries departments should introduce Strategic Environmental Assessments of both inshore and offshore fisheries, by the end of 2006, as the first stage of establishing comprehensive Environmental Management Systems.

- Fisheries departments should press for the implementation of Sustainability Impact Assessments of fisheries policy and practice at the EU level, following the Gothenburg Council Conclusions.[36]

- Fisheries managers and industry should be fully involved in the development of broad marine management frameworks. Lessons should be learnt from on going processes in New Zealand and Australia, including through the possibility of establishing an informal international network covering these issues.

[35] See www.oceans.govt.nz and www.oceans.govt.au.

[36] 'Notes that the Commission will include in its action plan for better regulation to be presented to the Laeken European Council mechanisms to ensure that all major policy proposals include a sustainability impact assessment covering their potential economic, social and environmental consequences.' Gothenburg European Council, June 2002.

- Environmental Impact Assessments should be carried out prior to the introduction of a new gear to a fishery or the start of a new fishery.

- A programme of experimental Marine Protected Areas should be established focusing initially on areas which provide benefits to multiple users (commercial fishing, tourism, environment, recreational fishermen, etc).

- Incentives should be provided to improve environmental performance and encourage the development of environmentally-friendly gear types. This should be carried out in co-operation with key European partners, eg France, Denmark, Netherlands and Ireland.

- Consideration should be given for establishing a system where all economic users of the marine environment contribute to funding basic understanding and mapping of ecosystems, both to improve marine management and reduce duplication of research and assessment.

- In the medium to long term, the UK Government and devolved administrations should consider integrating fisheries management tasks inside a marine environment agency responsible for broader management tasks, if such bodies are established under other legislation (eg possible Marine Acts being considered in different parts of the UK).

9 UK and EU fisheries management strategy

This Section:

- outlines the necessary conditions for long-run sustainable fisheries management;
- proposes a set of linked reforms to all aspects of UK fisheries management, including science and compliance, to achieve these ends; and
- outlines the case for remaining inside the CFP, and a priority set of areas for CFP reform and co-operation with other Member States.

Summary

- European mixed fisheries are the most complex in the world in terms of the numbers of species, countries and density of fishing effort. Different fisheries important to the UK require different management approaches: one size does not fit all. The current UK and EU management system is failing to deliver sustainability in a large number of stocks, and a concerted process of modernisation, decentralisation and innovation will be needed to ensure long-term sustainability.

- UK management needs reform to make it more innovative, flexible, industry-driven and supportive of Regional Advisory Councils (RACs), including:
  - developing explicit objectives for fisheries management covering all aspects of sustainable development;
  - moving to more contested, innovative and management-driven science;
  - laying the backbone for compliance through fleet restructuring to improve profitability and individual fishing rights allocation to give incentives for sustainability and modernisation;
  - implementation of a set of measures to improve compliance through enhanced transparency and predictable administrative penalties;
  - better understanding of the economic behaviour of the fleet, and development of systems to control over-investment;
  - regionalisation of UK management structures with regional managers mirroring European RACs, and modernisation of inshore management; and
  - direct involvement of industry in all management decisions, and a move to cost recovery of stock assessment and enforcement costs.

- The UK can achieve real gains from unilateral reforms. However, some more wide-ranging changes will require enhanced co-operation with the EU Commission and other Member States with whom we share stocks, and a full and flexible implementation of the CFP reforms agreed in 2002.

- It is a biological reality that the UK will always need to manage its fish stocks in co-operation with other countries. However, multi-jurisdictional fisheries management is intrinsically difficult, and there is no fully successful example anywhere it the world. The EU's legal structures provide a good institutional basis for multi-jurisdictional management, exemplified by its global leadership in outlawing damaging fisheries subsidies by 2004. However, the current system is too centralised and poorly resourced to undertake the complex management tasks needed to ensure sustainability.

- A progressive approach to enhanced regional co-operation in Europe, and implementation of the 2002 CFP reforms, would lay the foundation for sustainability. However, more radical reforms are needed in the medium term to strengthen regional management, improve scientific analysis, strengthen oversight of Member State implementation, allow greater flexibility and responsiveness in management, and introduce new management approaches such as effort control and adaptive fisheries management.

- A future system would see the bulk of technical fisheries management being carried out at the regional level in close collaboration with stakeholders, with the Commission and Fisheries Council having an overall audit and enforcement responsibility over these plans to ensure sustainability and a level playing field. These reforms are likely to produce greater benefits to the

UK fishing industry than attempts to 'renationalise' fisheries management back to Member States.

- Modernisation of EU fisheries management must go hand in hand with the strengthening of broader marine environmental management at all levels, including through better integration with environmental policy at the European level.

9.1 Introduction

The analysis presented in earlier chapters demonstrates that the UK fishing industry has a potentially bright future. This future, however, is dependent on a reform programme to be delivered by both government and industry. This chapter describes the necessary elements of a package to deliver sustainable management in the fisheries sector.

The package contains a set of reinforcing measures which work together to promote profitability, good information, control of capital flows and high compliance. The elements have merit in their own right but, to ensure long-run sustainability, they must be introduced together as a package of interlocking elements.

Fisheries is already a highly regulated policy area with a command-and-control management structure. The strategy presented here seeks to develop a central role for market-driven incentives and mechanisms whereby information can be used to influence decision-making by individual businesses. The strategy recognises, however, that market solutions will not, by themselves, deliver a sustainable fishing industry and that some areas will need more and better regulation rather than less, in order to achieve government objectives. Better regulation involves meeting principles including proportionality, accountability, consistency, transparency and targeting.[37]

Regulators should be able to justify their decisions and be subject to public scrutiny. The proposal for UK Regional Fisheries Managers detailed below will make lines of accountability clearer and provide a logical point of contact for concerns about regulation in particular fisheries. The proposals on control and enforcement will help to make the rules more consistent and provide stability and certainty to fishermen.

A key theme running through these proposals is the need for greater transparency, both in the way the industry is regulated and in the way the industry conducts its business. A clear definition of policy objectives will allow for public debate on government's priorities. Industry transparency encourages good business practices and discourages non-compliance. Transparency and good information are the foundation for developing innovative management, including the challenges of future risks, such as climate change.

The extensive consultation and visits carried out in the preparation of this report have demonstrated the diversity of the fish-catching industry in terms of different sectors with unique characteristics and issues. Fisheries around the UK differ in composition and biology and these factors affect the most appropriate management measures. This complexity means there is a limit on the level of detail that this report can contain while maintaining accuracy, but the following sections set out general principles for developing appropriate management systems targeting distinct fleet segments and types of fishery.

This chapter focuses on measures the UK can take to promote a sustainable future for the UK marine fishing industry. There is a great deal that the UK can do on its own to facilitate this. However, to be fully effective, the UK needs to work with the European Commission and other Member States to conserve fish stocks and seek further reform of the Common Fisheries Policy. The substantial reforms agreed in 2002 form a sound foundation from which to construct a more sophisticated and responsive management regime.

This chapter has been divided up into an outline of the basic approach and objectives, measures needed in the short term, measures needed in the long term and related institutional issues in the UK.

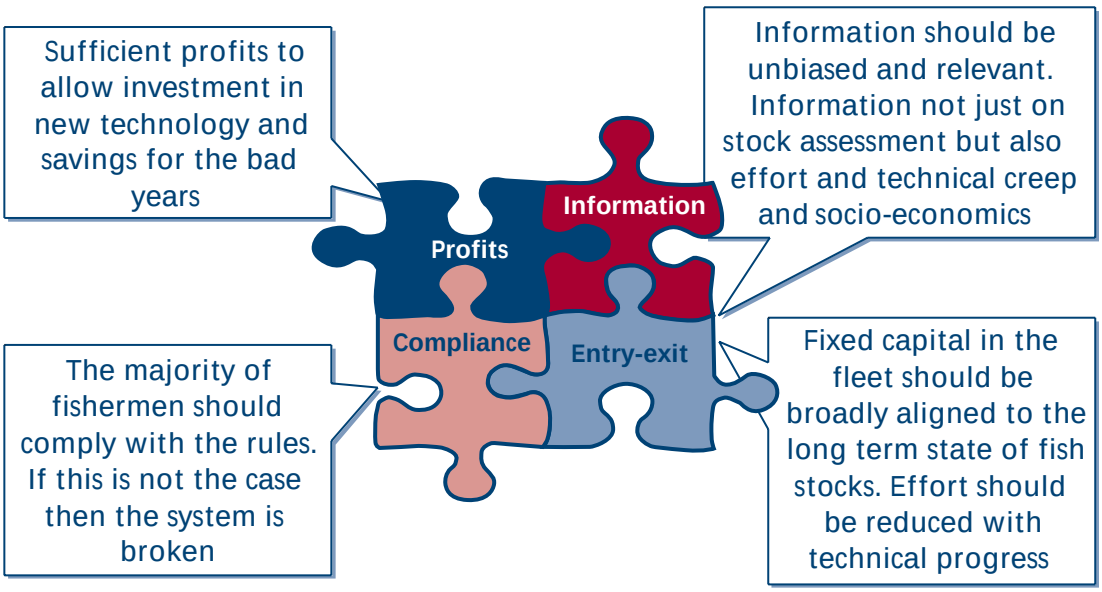
9.2 Elements of sustainable fisheries management

Sustainable fisheries management depends upon:

- adequate profitability;
- good quality information;

[37] Principle of Good Regulation, Better Regulation Task Force, Cabinet Office, 2003.

Figure 9.1: The fisheries management jigsaw



- high levels of compliance; and
- entry-exit of fleet being aligned to long-term biological stock.

In addition, the fisheries management system and the industry must also be able to effectively manage risk and uncertainty.

Figure 9.1 summarises the role played by each part of the management jigsaw. Like any jigsaw the pieces make no sense on their own, only as part of the overall picture.

No amount of good information or strict legal enforcement measures will produce sustainable management if economic incentives are misaligned because the industry is not profitable and/or the industry is over-capitalised.

Even inside a system with strong economic and legal incentives for compliance, there needs to be strong involvement and buy-in from the fishing industry if sustainability is to be achieved. This 'factor X' cannot be achieved overnight, but requires an evolving sense of industry involvement in the management process, matched by clear rights and responsibilities, including industry payment for fisheries management services.

UK and EU fisheries management does not fulfil all the criteria for long-run sustainable management, even in sectors where profitability is currently strong and stocks are healthy. Though the need for reform is strongest in the whitefish sector, management in all sectors requires reform, modernisation and innovation in the medium term.

In the short term this will involve:
- setting clear objectives for fisheries management;
- restructuring of the whitefish fleet;
- increasing transparency and compliance procedures; and
- moving to Individual Tradable Quotas (ITQs).

In the longer term this requires:
- reforms to fisheries science and information gathering;
- improved systems to regulate capital entry into fisheries;
- innovative systems to manage mixed fisheries, including moving to effort control where this is beneficial; and
- on-going regionalisation of the CFP.

All of these stages will require institutional reforms in UK management to make them effective and the building of a partnership approach between regulators and the industry.

9.3 Providing clear objectives for fisheries management

Summary

- Publicly-stated objectives aid transparency by making priorities clear and opening them up to public debate.

- UK fisheries departments should develop explicit objectives covering all aspects of sustainable development, safety and good governance.

9.3.1 The need for clear government objectives

Fisheries policy, like all other areas of public policy, needs clear objectives to guide decision-making. Without clear objectives, decisions tend to be taken on an ad hoc basis according to implicit or implied objectives which are not open to challenge. Clear, outcome-driven and publicly-stated objectives aid transparency by making priorities transparent and allowing for public debate on their appropriateness and worth.

The current mix of fisheries objectives derives from a number of sources including the CFP, international treaty obligations, and the Marine Stewardship process. The UK's policy, as stated in the first Marine Stewardship report "Safeguarding our Seas", is 'to help establish responsible and sustainable fisheries that ensure healthy marine ecosystems, maintaining the quality, diversity and availability of marine resources and habitats.'

In the past there has been a reluctance to explicitly identify economic and social objectives for UK fisheries management, partly because of an implicit fear that they would undermine the commitment to stock and environmental sustainability. However, this view is counterproductive to effective stock management, and fails to account for the high social value of fisheries which is one of the main justifications for such high levels of public spending on this sector.

Failure to set explicit economic and social objectives means that these are not carefully measured and monitored inside UK fisheries management, despite their critical importance to ensuring stock sustainability. Without explicit management objectives there is also always the possibility that economic and social considerations will influence decisions in unplanned and non-transparent ways, and that the management system will not be designed to deliver an optimal balance of different objectives inside a clear hierarchy.

All objectives should be defined in terms of outcomes not outputs. In particular, objectives for enforcement and compliance should (as in other law enforcement areas) be based on estimates of overall rates of illegal landings and compliance, not the number of inspections carried out or visits made.

Recommendations:

- Fisheries departments should develop sets of fisheries management objectives with a clear hierarchy.

- The over-arching aim should be 'to maximise the return to the UK of the sustainable use of fisheries resources and protection of the marine environment'.

- Sub-objectives should be established covering economic, social and environmental issues, safety and good governance which are consistent with the following principles and approaches:

- The fishing industry should be profitable and globally competitive.
- Social policy should focus on preserving profitable employment in vulnerable fishing-dependent communities and be secondary to economic goals.
- Fisheries management should be consistent with best practice in other areas of marine environmental management.
- Safety considerations should be integrated into all policies.
- Fisheries management should be consistent with the principles of good governance: outcome-driven objectives; better matching of roles with responsibilities; recovering costs from users; and achieving high levels of compliance and industry agreement with regulatory approaches.

9.4 Getting it right in the short term

9.4.1 Adequate profitability - restructuring the industry

Summary

- Restructuring is a core component of the overall package. Profitability is a necessary precondition for higher compliance.

Earlier chapters have made the case for further reductions in the whitefish fleet to ensure long-run profitability and promote stock recovery. This section argues that this is also an essential part of the overall management and policy package and explains the difference between this proposal and previous decommissioning schemes. Details of how such a process could be carried out are given in Chapter 10.

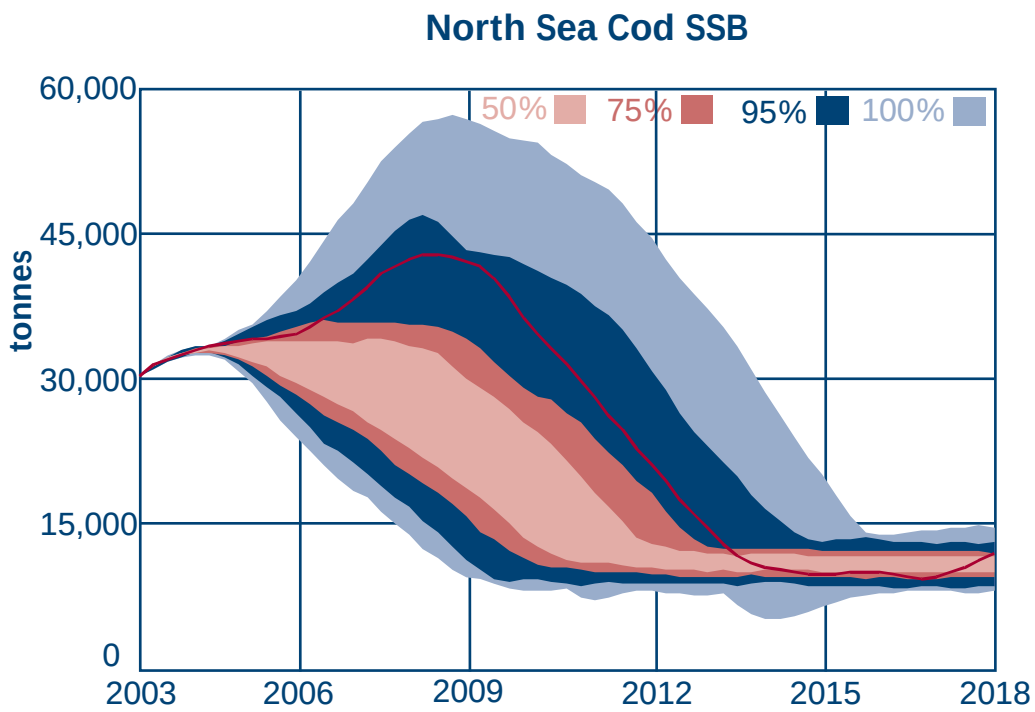
The Strategy Unit's analysis has demonstrated that the whitefish fleet has substantial over capacity even if stocks fully recover in the coming years.

Previous decommissioning rounds have removed a significant portion of the whitefish fleet but have not managed to bring capacity into line with the state of the stocks.

A reduction in capacity in the whitefish fleet will underpin the achievement of higher compliance and will improve the chance of a strong stock recovery. It also provides the opportunity to target older, more dangerous vessels and thereby improve safety standards in the UK's most dangerous occupation.

Figure 9.2 shows the results of probabilistic, dynamic modelling carried out by the Strategy Unit of recovery in the North Sea cod stock if no restructuring occurs in the fleet. The model is run for various random combinations of stock recruitment in the 'weak recovery' scenario assumptions, and with no new entrants to the fishery. It can be seen that even if the stock recovers strongly in the short term, in the medium term the fleet will respond to greater fishing opportunities and the stock will be pushed back to 'collapse' levels.[38]

Figure 9.2: Recovery Dynamics for North Sea cod – current fleet

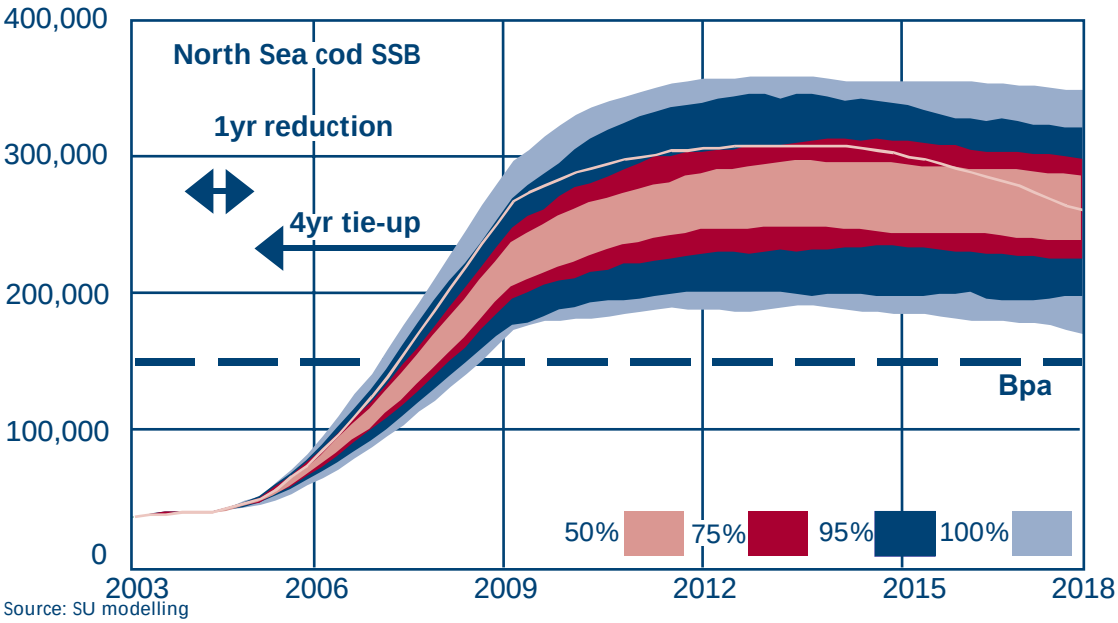


Source: SU modelling

[38] Details and limitations of the dynamic modelling approach can be found in the analytical papers on the Strategy Unit website.

Figure 9.3 shows recovery in North Sea cod under the same recruitment assumptions, and with strong intervention where 21% of the fleet is decommissioned in 2004, and 30% of the remainder tied up for four years.

Figure 9.3: Weak Recovery in North Sea cod with fleet intervention



Source: SU modelling

With reductions in capacity and tie-ups, the fleet achieves sustainability well above Bpa in the medium term, showing the large benefits of 'right sizing' the fleet. The economics of tie-ups are discussed more fully in Chapter 11 on transition policy, but essentially they accelerate the pace of recovery but do not affect the maintenance of medium-term sustainability.

Without adequate profitability, fishermen may decide to operate illegally and cut corners on safety. The consultation carried out for this report suggests that the vast majority of fishermen want to comply with the rules and will do so if they can make an acceptable profit. This is also observed to be the case internationally.[39] There is no reason to believe that UK fishermen are significantly different from fishermen of other nations with high compliance systems, eg New Zealand, Iceland. Consequently, reducing fishing capacity in this sector to a level where operators could make a reasonable return on their investment is necessary, but not sufficient, to achieve gains in higher compliance and reduce the chance of stock collapse.

Failing to restructure the fleet will both undermine compliance and mean that revenues are flowing into businesses with no chance of long-run profitability. This diversion of profits into the short-run survival of a few operators will prevent the majority of the fleet from being able to invest and modernise, and so reduce their competitiveness and flexibility to respond to changing biological conditions.

[39] Nielsen, J.R. and Mathiesen, C. Important factors influencing rule compliance in fisheries: lessons from Denmark Marine Policy 27 (2003) 409-416.

9.4.2 Good compliance, improved information and transparency

Summary

- A more streamlined system for detecting and applying penalties is needed
- Merely increasing penalties and enforcement without tackling other drivers of non-compliance is unlikely to result in sustainable management, and may further reduce industry trust in the management system.
- Greater transparency in recording landings and activity data, and the development of capacity to track transactions throughout the supply chain, will assist in promoting a culture of compliance in the fishing industry and provide a basis for better management.

Compliance is more than enforcement

Poor compliance with management rules is viewed as a root cause of unsustainability in parts of the UK fishing industry. As in any industry, there will always be a small number of fishermen aiming to abuse the system to make a short-run profit, and these should be subject to tough legal penalties. However, enforcement is not enough and the management system must also aim to reduce levels of non-compliance by tackling structural drivers, including a lack of profitability, lack of trust in the current management system, the relatively low probability of being successfully prosecuted for illegal actions and the low level of fines. The package of measures presented here addresses all these drivers in a holistic manner.

Annex D analyses the fishermen's motivations and the incentives created by the current policy. Only 8% of fishermen believe quotas are effective in conserving stock, and only 37% agree quotas are the best way of conserving stock (Hatcher & Gordon, unpublished)[40] . In 2000 and 2001, 122 cases taken to court led to fines. On average, fines were just 1.7 times the value of the infringement (NAO, 2003).[41] Modelling work undertaken by the Strategy Unit[42] suggests that even if levels of fines or success rates in prosecution were 10 to 20 times higher than they are at present there would still be significant illegal landing of fish. The current levels of non-compliance are a problem because they disrupt efforts to recover stocks, undermine trust in the system and corrupt incentives within the industry. Strategy Unit modelling suggests that the level and probability of fines routinely imposed by courts in the UK will not tend to outweigh the profits available from illegal fishing in many major UK fisheries, though these fall short of the maximum penalties which could be imposed. Fishermen cite the illegal landings by other fishermen as the most important reason for their own illegal actions.[43] Such perceptions and attitudes are deeply corrosive and undermine the general principle of 'policing by consent' which is the foundation of the general UK regulatory approach.

Improving compliance requires multiple measures

Addressing compliance will require concerted action on a number of fronts, and has the potential to provide benefits in terms of providing better information for managers. The following are necessary components:

- Ensuring, as far as possible, regulations that are easy to understand and easy to enforce
- Creating a clear system of penalties that are applied swiftly
- Being 'smarter' in deploying limited staff and making greater use of new technology for enforcement purposes
- Greater transparency in information, and joining-up databases used for enforcement, stock assessment and marketing purposes

VMS (Vessel Monitoring Systems, ie satellite monitoring) is already being rolled out under the CFP reform programme. Were the EU to move to an effort-based system (as proposed below) for certain fisheries, VMS would play an essential role in regulating the fishery.

At present only a small proportion of offences result in fishermen being taken to court and fined. Criminal penalties are only of use in a limited number of

[40] survey of 70 skippers carried out in 2001.
[41] National Audit Office (2003) Fisheries Enforcement in England. HC 563 Session 2002-03: 3 April 2003.
[42] See the extended version of the paper Fishermen incentives and policy on Strategy Unit website.
[43] Nautilus Consultants (1998).

circumstances, and should be reserved for persistent and extreme 'criminal' behaviour. For the rest, the imposition of administrative penalties, on-the-spot fines and a points system on licences would be a sufficient deterrent. Fines could be escalated for repeat offenders, and would involve confiscation of quota in extreme circumstances.

Fisheries enforcement agencies should establish units to develop forensic accounting techniques and offender-profiling, financed by a reduction in at sea inspection which has a low deterrent effect. These units should have access to all the information available from fish buyers and sellers to reconcile information and check that landings data truly reflects the size of catches. This information should be provided electronically to ensure easy handling. They should also have access to the information held by bodies which depend on a levy based on a proportion of catches. Enforcement authorities should have access to the information held by the Sea Fish Industry Authority and producer organisations. The evidence suggests that the risk that non-compliance will be detected at a later stage has a strong deterrent effect.

Such profiling would allow cost-recovery for enforcement costs to be incrementally introduced in a manner that reflects the risk on non-compliance in a particular sector or port. Repeat offenders should be expected to bear the cost of increased inspection and on-board observers in order to give incentives for compliance.

All these measures will benefit honest fishermen who wish to comply with the rules, but fear being disadvantaged by others who behave illegally, either in the UK or in other European countries. Compliance must begin at home, and it is no excuse, and positively self-defeating, to justify non-compliance by pointing to others' poor behaviour.

Better information and greater transparency has multiple benefits

Greater transparency in the way the fishing industry is regulated and in the way it conducts its business would promote good business practices and improve compliance. For example, information on the species and quantity of fish caught should be declared electronically while at sea, within a specified time of catches occurring. This would help to overcome some of the log book offences in which fishermen misrecord their catch. It would also help fishermen to find the best market for the fish through electronic markets. Transparency will also allow more accurate stock modelling and higher precautionary TACs, and will lay the foundation for reforms to the scientific process detailed below. Issues around mixed fisheries management, including incentives to discard, are also addressed below, but again rest on the need for good, transparent information as a precursor to reform.

Cost recovery of stock assessments and management should be incrementally introduced alongside the management reforms outlined below, giving the industry greater involvement in management. Cost recovery will give incentives for the industry to assess the best use of scientific data, and better understand the cost to themselves of inaccuracies caused by poor catch data and/or other forms of non-compliance.

Recommendations

- Fisheries departments should introduce a high-transparency system where all catches and landings are traced through markets and processors; and enforcement focuses more on forensic accounting, on-board observers and risk profiling, including:
  - publishing catch records, ITQ trades and leases on the Internet, taking into account reasonable demands for commercial confidentiality in the timing of such releases;
  - extending tamper-proof satellite monitoring to all vessels over 10m by the end of 2006; and
  - phasing in electronic logbooks over the same period, linked to onshore markets.

- Fisheries departments should introduce simple administrative penalties and 'points' systems where the costs of infringements are transparent and predictable to the industry and most offences are decriminalised, including by:
  - developing a system of automatic administrative penalties including a 'points' system for licences;
  - developing the capacity of enforcement agencies for enforcement by greater use of forensic accounting techniques and the use of offender-profiling; and
  - vessels identified as being 'high risk' should have

observers on board, the costs to be borne by the vessel owners.
- Fisheries departments should introduce progressive cost-recovery of management and enforcement costs from industry to give greater buy-in and incentives for compliance.

- The UK should continue supporting the European Commission in taking a stronger enforcement role to ensure a level playing field for all EU fleets, and collaborate more actively with European partners in major UK fisheries to improve compliance and enforcement practices.

9.4.3 Encouraging responsible and competitive fishing – the introduction of ITQs

Summary

- The introduction of Individual Transferable Quotas (ITQs) has had beneficial effects in fisheries which have adopted this management tool. These include reductions in fishing effort, improved profitability and a greater sense of resource stewardship

The UK quota system dilutes incentives for sustainability and efficiency

In a well-functioning system the majority of fishermen would comply with the rules and want to see others do the same. Fishermen have an interest in the long-term health of fish stocks and the Strategy Unit consultation process showed support for sensible measures, which promote a sustainable future for them and for future generations.

The current system of quota allocation based on FQAs (Fixed Quota Allocations) should be transformed into a system based on ITQs (Individual Transferable Quotas). ITQs have a number of advantages over the current system (see Box below). The current system is confused and confusing. FQAs have some of the features of property rights but their legal status is uncertain. This uncertainty inhibits investment and long-term planning.

At present, the Government insists that licence holders have no title to the FQA units attached to the licence. These were originally distributed for free and the quota that they represent is rightly considered a national asset. However, in-year quota management is devolved to the producer organisations and this flexibility has been used to develop a trade in the fishing opportunities associated with FQA units. Accordingly, while the FQA units stay with the licence, the fishing opportunities can (and do) move around the industry. The longer this goes on the more those involved in these trades can claim a 'legitimate expectation' (backed by European law) in terms of their 'ownership' of the fishing opportunities represented by FQA units, muddying the ownership of the stocks.

Obstacles to current quota trading include a lack of transparency and bureaucratic hurdles which prevent the efficient allocation of fishing rights to the most efficient fishermen. Real tradeability is necessary in the offshore sector, not only to ensure competitiveness and manage the balance of species caught by fishermen, but also to provide a fluid, functioning market in which accurate price information can be transmitted. Prices should approximate to the expected present value of future rents in the fishery. Price signals are therefore an important source of information which can influence decisions to enter or exit the fishery or to expand or contract individual fishing activity.[44]

The current FQA system gives neither clarity of ownership, and accompanying rights and responsibilities, nor a liquid and transparent market in fishing opportunities which would promote the efficiency necessary for the UK fleet to compete in world markets.

[44] Newell,R.G., Sanchirico, J. N. and Kerr, S. ' Fishing quota markets.' Resources for the Future, August 2002

Individual Transferable Quotas (ITQs)

Individual Transferable Quotas (ITQs) have been used in a number of major fishing nations since their inception in the 1970s; including Australia, New Zealand, the USA, Iceland and the Netherlands. The Strategy Unit team have visited all of these countries in the course of the study in order to examine how ITQ systems work in practice.[45]

The introduction of ITQs has largely brought positive benefits including a reduction in fishing effort, recovery of depleted stocks and improvements in the quality of the catch and industry profitability.

ITQs have the following advantages:

1. They help to achieve the optimum number and configuration of vessels. Quota will tend to gravitate to the most efficient operators and eliminate excess capacity from the fleet.
2. Free pooling or transfer of quotas between fishermen helps to solve the problems of unintentional by-catch, over quota fishing and under-catching of quota.
3. Transferability results in savings on implementation and enforcement. It is difficult to allocate quotas in a way which matches current fishing practices. A market system can provide a self-correcting mechanism whereby greater catches can be covered by the purchase or lease of additional quota.
4. ITQs make it easier to exit the industry. Quota holders who are not able to make a profit have a valuable property right which they can capitalise to finance exit from the industry.[46]

ITQs also have disadvantages which need to be managed:

1. They can lead to a concentration of ownership. The evidence on this is mixed but concentration of ownership has occurred in some fisheries where ITQs have been introduced. Ring-fencing quota for the use of particular communities is the least distortionary way to prevent this, and such schemes have been discussed above.
2. Under European single market legislation ITQs must be available on a non-discriminatory basis, and so may be bought by foreign-owned vessels. However, this is the same situation as currently holds for FQAs, and with a healthy UK fishing industry there is no reason to expect quota to leak overseas in large net amounts.
3. They can increase the cost of entering the fishery.

The economic incentives to misreport landings and land illegal catches remain as do the incentives to high grade and dump by-catch. These problems are also a feature of the current quota allocation scheme.

ITQs are not a panacea, but are a valuable tool

ITQs come in many different varieties. The exact detail of how they should be implemented is beyond the scope of this report and is a matter for discussion between the fisheries departments and the catching sector. Some general principles can, however, be set out:

- It should be clear that the European allocation of fishing rights received by the UK is a public resource, and that the ITQs themselves only represent a set of defined rights to use this resource under certain conditions.
- Responsible behaviour should be a precondition of holding ITQs. Repeated, serious breaches of fisheries rules should be able to result in confiscation of all or part of a fisher's ITQs.
- There should be a clear mechanism and procedure for the return of ITQs to the state if this should be necessary, which does not dilute the long-term incentives for sustainability: for example, a commitment that 15 years notice will be given if ITQs need to taken back or that appropriate and clearly defined compensation will be paid.
- The requirement to implement proportionate environmental protection measures must take precedence over ITQ use-rights and compensation will not be paid in these circumstances (the 'polluter pays' principle).

[45] Hatcher, A. Pascoe, S. Banks, R. and Arnson, R (June 2002) 'Future options for UK fish quota management.' Centre for Economics and Management of Aquatic Resouces, University of Portsmouth.

[46] O'Connor, R. and MacNamara, B. ' Individual Transferable Quotas and Property Rights.' in Gray, T. ed. Macmilllan (1998) The Politics of Fishing. MacMillan.

Addressing community vulnerability

Fisheries departments in the UK can learn from the experience of implementing ITQs in other fishing nations when designing an ITQ system for the UK. An important area to study is the impact of ITQs on concentration of fishing opportunities and impacts on vulnerable communities. Experience in Iceland and New Zealand has shown that some regions and some (smaller) operators can be disadvantaged by the introduction of ITQs.

Chapter 7 considered the likely effects on vulnerable fishing-dependent communities of a move to a profitable fleet and contains recommendations for measures to mitigate these impacts. Measures to ensure the ability of the UK fleet to compete in global markets must take precedence over social objectives, but fisheries departments should begin work on designing viable community quota schemes at the same time. The optimum route to reform would involve establishing community quota schemes before moving to a system of ITQs. However, delays in designing a suitable scheme should not hold up the move to ITQs. In some sectors, such as pelagics, the movement to ITQs should take place straight away and not be dependent on progress on community quota because the sector has already fully consolidated.

Recommendations

Fisheries departments should

- change the system of quota allocation based on Fixed Quota Allocations (FQAs) into a system based on ITQs for all UK sectors by the end of 2006.
- ITQs should be defined as use rights, with ownership residing with the Government. Fishermen should have clearly defined rights and responsibilities, including an obligation to avoid environmental damage caused through fishing activity.
- The conversion of FQAs to ITQs should be introduced in a phased manner, earliest in the pelagic sector and then in the demersal and shellfish sectors.
- In order to mitigate some of the negative effects of improved efficiency on fishing communities, a workable system of community quotas should ideally be developed prior to the move to ITQs in the demersal and shellfish sectors, but priority should be given to ensuring a competitive fleet.

9.5 Getting it right in the longer term

9.5.1 Improving information and science

Summary

- Fisheries managers need a wider information base to achieve their objectives, including economic and socio-economic information as well as broader biological data and innovative models.
- Funding sources should reflect who benefits from improved information and recognise that fisheries are but one use of the marine environment.
- Fisheries science needs to be more innovative, contested and management-driven in order to support sustainable management.
- Further efforts should be made to ensure the fishing industry trusts the scientific basis for management decisions, including by understanding its practical limitations and the benefits of taking a precautionary approach.

Principles for improving information provision

Fisheries managers and stakeholders rely on good quality, timely and unbiased information. Large amounts of public funds are spent on fisheries science, and these must be utilised efficiently and in support of the public good. The strategy for fisheries science and information should be based on the following principles:

- **Innovative:** A higher proportion of the significant amount of public money spent on fisheries science should be used to develop innovative ways to improve the quality of current management, and new ways to meet fundamental fisheries management objectives (eg sustainability) rather than supporting fisheries management tools

(eg quotas). For example: innovative methodologies for fisheries modelling; assessment of environmental interactions; and multidisciplinary research into new management methods, such as effort control and real-time management.

- **Contested:** On going advances in computing technology, remote sensing and environmental mapping have the potential to revolutionise fisheries and marine management in the next 10–15 years. The commitment to an ecosystem-based approach to fisheries management, and growing climate change impacts, will make innovative multidisciplinary work of growing importance. As with all scientific processes, innovation and quality are maximised when there is transparent and open competition between different research groups and approaches, including interdisciplinary research. Open commissioning of fisheries science should ensure research contracts are adequately contested between a wide range of institutions.

- **Management-driven:** Most on going fisheries science will necessarily be in support of existing management systems. This should be highly targeted to those areas with highest economic benefit, once basic baselines for ensuring sustainability have been met. An assessment of the economic value of greater information should be made when commissioning scientific work. Much of this practical science should be paid for by the industry, as they benefit from it and are best able to determine where better information would produce economic benefits; eg by reducing the error levels in particular TAC measurement and allowing higher precautionary catches. Funds for basic marine research should also be collected from other users of the marine environment.

- **Trusted:** Strategy Unit consultation showed that there is a real need to reconnect the fishing industry with the science base and develop a better sense of ownership and trust. This includes the need for better understanding of the limits of science by industry, and acceptance of the benefits of using a precautionary approach when information is poor.

Fisheries management needs more than good biological information

At present, fisheries managers use too narrow an information base to make their policy advice. Fishery managers need more information on a regular, possibly annual, basis on: the state of the stocks; the profitability of the industry and economic climate; and the change in killing capacity of the fleet and extent of its utilisation.

Knowledge of profitability is needed to understand how fishermen are likely to respond to management changes. Information about technical change and capital use in the fleet is needed to access whether the fleet's killing capacity is aligned to the biological stock. Without this information, which is specific to particular fleets, the design of management measures is likely to be flawed.

Improving industry trust is a fundamental objective

The stock assessments undertaken by UK and ICES scientists are of world-class quality, and yet are not trusted by the industry. Much of this distrust is due to the corrosive effect of non-compliance and the resulting poor information on catches. As a result, fishermen disbelieve assessments that are based on this data because they know its flaws. Improving trust in scientific assessments will involve actions by scientists, government and industry to develop a better shared understanding of how such data is best used in fisheries management, and the economic value of good data to commercial fishing businesses.

In order to foster a greater sense of ownership of the science, fisheries departments should involve the fishing industry in deciding science priorities through more extensive use of co-commissioning of independent scientific advice. There also needs to be greater acceptance by all actors that there is a limit to current knowledge, and that the cost of gathering accurate information will often outweigh its value to managers and the industry. Information is not a free good, but an expensive and valuable commodity.

Greater co-funding of scientific advice by catchers will help counter the sense of detachment felt by the industry and give direct incentives for them to make judgements on the value and use of different sources of information.

Where scientific information is too expensive to obtain, there needs to be greater use of controlled experimentation in management. 'Adaptive fisheries management' provides a mechanism whereby managers can experiment with different management regimes and change in response to feedback from the environment in situations where the cost of collecting accurate data beforehand is prohibitive. The current CFP makes experimentation with these systems very difficult, despite the large potential benefits they could bring.

An even more fundamental approach would be to reduce reliance on scientific assessments by moving to effort-based management systems as an alternative approach to managing highly mixed fisheries. This would create lower incentives to misreport catch information and should improve data quality. It also has implications for the frequency and relative importance of annual assessments. The TAC system relies on annual estimates of landings and stocks, which have significant statistical errors. These statistical errors are often of a similar or larger magnitude to the proposed change in TAC. An effort based system places less importance on getting the stock assessment exactly right, but might reach the overall management objective of restricting fishing effort to the size of the fishery, equally well if not better.

Improving innovation in scientific and management approaches

To improve trust in the science, managers need to be honest about the limitations of the current approach. Current stock assessments are still focused on single species models. ICES itself has drawn attention to the weaknesses of such models for predicting stocks in the multi-species fisheries which characterise the UK's whitefish stocks. The most recent ICES assessments attempt to deal with this problem through more detailed overviews of sea areas. There are also calls for developing more complex, multi-species modelling, but it remains to be seen whether such approaches generate stock estimates that are more robust and useful to managers. Multi-species models are just as prone to issues about the quality of the data as single species ones. However, given advances in computing power and remote sensing, completely new approaches to fisheries modelling are likely to emerge in the next decade, and the system itself must encourage and promote such innovation.

Currently only a few centres of excellence dominate the field of UK fisheries science. This reduces innovation, and often means that public debate is dominated by the views of marginal and dissident scientists rather than well-informed, peer-reviewed discussion of real scientific issues between professional research centres.

Responses to the Strategy Unit consultation[47] showed the breadth of knowledge in UK academia, and highlighted shortcomings in integrating state of the knowledge in ecology and biology. There needs to be greater competition between different approaches and suppliers, involving academic and government scientists and different academic disciplines (this should be on a level playing field where all institutions face the same requirements to cover full costs). This competition should occur at the commissioning stage so that novel approaches are presented to the fishery manager and stakeholders, but ensures that public and industry resources are not unnecessarily fragmented.

Fisheries departments should establish a science and technology innovation budget to which fisheries managers can bid for research and technical development in order to solve emerging problems, a model that has been pioneered in Australian fisheries management. Specific multidisciplinary research should be commissioned on the challenges of managing mixed fisheries. At the same time the burden of providing annual single species stock assessments should be reduced, in part though greater use of longer-term management targets. Moving to partial cost-recovery for routine scientific assessment should also free up the necessary funding for these activities.

Fisheries are but one use of the marine environment and other uses may generate as much if not greater value. There needs to be more funding, in particular joint funding of ESRC, NERC, university and government science research. Such marine science research needs to be jointly funded by all marine users, as all benefit from it.

[47] See the NERC response on the Strategy Unit website www.strategy.gov.uk.

Recommendations

- Fisheries departments should give the fishing industry a greater role in co-ordinating information priorities through more extensive use of co-commissioning of research. This should follow shortly after the appointment of regional managers in 2005, and include the following.
  - In return for this greater involvement in setting priorities, the industry will need to partner government in funding scientific and information analysis through incremental cost recovery.
  - Fisheries science research must retain its independent nature from both government and industry and become more contested between different scientific institutions.
  - There should be greater use of on-board observers and specifically contracted fisher's data sources, eg 'Sentinel Fisheries' which can be funded either from existing science budgets or by the industry itself.

- Fisheries departments should promote greater innovation and management-focus in fisheries science by regionalising the process of science tasking and introducing contested budgets for innovation in scientific and management approaches, by:
  - introducing more joint ESRC, NERC, university and government science research and greater contestability between different scientific institutes. A share of the current fisheries research budget should be set aside for this broadening supply of the science base through open-tendering;
  - developing methods for applying 'adaptive fisheries management' where research is too costly to provide information on the impacts of increasing fishing pressures or closing fishing areas;
  - using funding released through cost-recovery to establish science innovation budgets, to which fisheries managers can bid for research and technical development to solve emerging problems; and
  - commissioning specific multidisciplinary research on the challenges of managing mixed fisheries and aiming to reduce the burden of providing single-species assessments. The specific challenges include a greater emphasis on, and regular updating of, socio-economic data on fishermen's profitability and attitudes, and explicit modelling of behavioural impacts of new policies. A review of socio-economic data needs should be undertaken in 2004.

- More basic science is needed to better understand the reasons for variability in recruitment, ecosystem effects and interactions between species. A review of basic marine science provision should be carried out between fisheries departments, CEFAS, FRS, NERC, and relevant universities to assess how different streams of public funding are contributing to the basic knowledge base underlying long term fisheries management, and how this research could be better directed and used.

- Cross-institutional research should be encouraged to better understand how climate change will affect key species and ecosystems. A preliminary public assessment on the current state of knowledge, and the potential for further understanding to inform fisheries management options, should be carried out by CEFAS, FRS, Hadley Centre and other relevant UK researchers,
  to be published by the end of 2005.

9.5.2 Regulating fleet capacity and killing power

Summary

- Fishing is an industry which, by its underlying economics, attracts over-investment and requires a proactive approach to capital control and regulation on the part of government.

- The capacity of the fleet to catch fish – or killing power – depends on both invested capital and the technology, skills and business models employed by fishermen. Current estimates of capacity do not adequately capture all these effects.

- Strategy Unit modelling suggests that failure to better manage capital investment and increases in 'killing power', driven by the variable nature of fish stocks, is likely to result in further 'boom and bust' cycles in UK stocks, even if the fleet capacity is 'right sized' relative to long-run opportunities.

- Management can be achieved in several ways depending on the structure of each sector, including: industry self-regulation; government-regulated self-insurance schemes; and direct government capital restrictions. In all cases ongoing monitoring of the fleet capacity and investment is vital if the mistakes of the past are to be avoided.

The return of 'boom and bust'

Fishing needs to be profitable to finance investment and provide cash reserves to survive bad years. Poor profitability creates pressures for fishermen to take actions which make economic sense in the short term but which can be ruinous in the long term. Fishery managers need to ensure these problems do not arise again, or previous public funds spent on decommissioning (over £100 million in the last five years) will have been wasted.

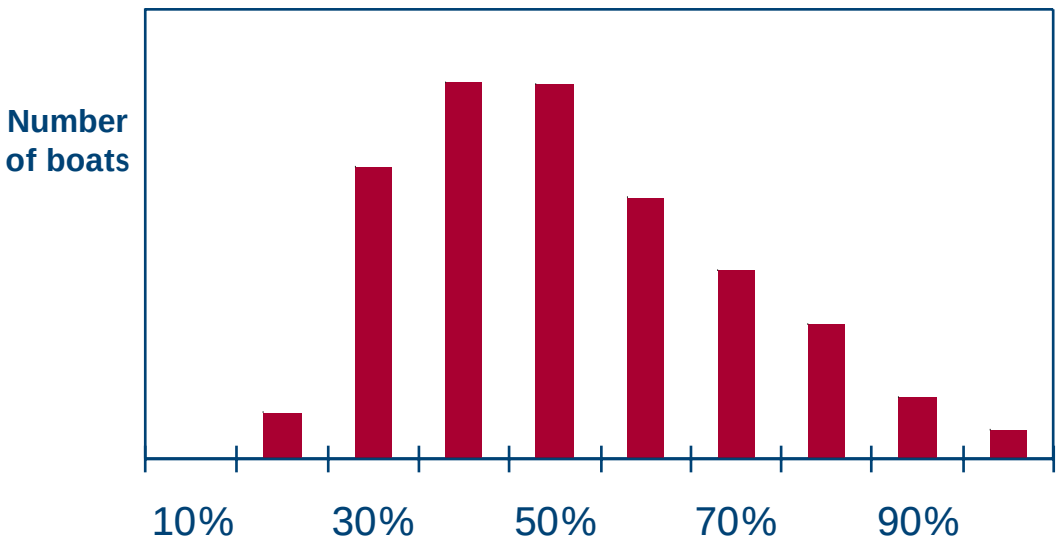
Fishing generates extremely high profits (resource rents) when stocks are good. Such good times can sometimes last several years at a time and attract new capital into the industry. Evidence from the UK, and internationally, suggests that the catching sector tends to over-invest in fishing unless there is some type of government or collective industry management. This evidence is backed up by economic theory which suggests that market mechanisms, by themselves, cannot simultaneously ensure stock and profit sustainability, especially if stocks are volatile.[48] Capital is attracted by high short-term returns when stocks are high, but there is no equivalent mechanism for capital to be withdrawn when stocks fall to lower levels.

Better fishing skills and technical progress, in which incremental improvements in gear design, engines and equipment enhance a boat's killing ability, exacerbate this effect. Therefore, fisheries managers need to monitor the fleet's fishing capacity and ensure it does not become misaligned with stocks. This management must be flexible enough to allow for the promotion of fleet modernisation. The aim should be to develop a safer, modern, technologically-advanced fishing fleet, while avoiding the over-investment in capital which has brought us to the current situation.

Present policies exist to contain the size of the fleet. These include restrictions on the number of licences and the total capacity of the fleet. But there is more to killing capacity than VCUs. VCUs do not measure the differences in 'killing power' due to differences in skipper skill, use of assets and incremental investment.

Figure 9.4 shows this effect by demonstrating the large range in efficiency that exists in UK channel trawlers.

Figure 9.4: Range of technical efficiency in UK channel trawlers



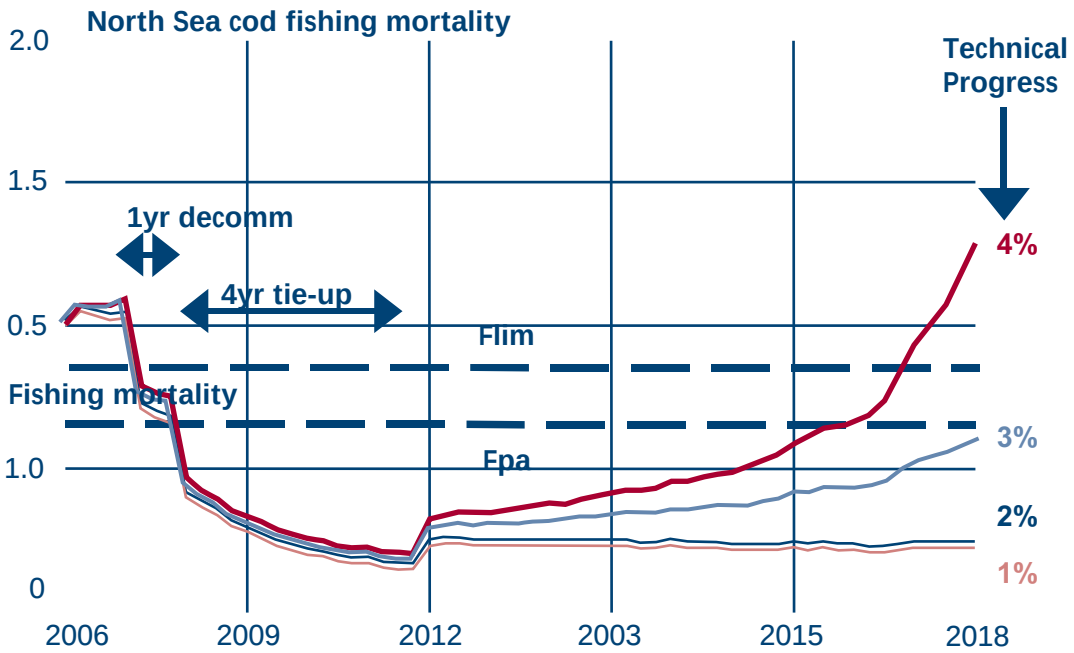
Source: CEMARE, TEMEC Report (2002)

[48] see J.M. Conrad and C.W. Clark. Natural Resource Economics: Notes and Problems, Cambridge, Cambridge University Press, 1987

To examine the importance of these different effects in UK fisheries, the Strategy Unit used a dynamic model of fleet investment and technical progress for several key UK stocks.[49] Figure 9.2 and Figure 9.3 above show the importance of right-sizing the fleet to ensure a sustainable recovery. However, even when no new entrants are allowed into the fishery (constant licence condition), the sustainability of recovery is highly sensitive to changes in technical capacity.

Figure 9.5 combines several modelling simulations using different estimates of technical progress, for the same recruitment and fleet intervention assumptions as above. Relatively small changes in the rate of technical progress (here from 3% to 4 % per annum) can quickly push effective fleet capacity above sustainable levels (Fpa). Coupled with volatile stocks, these effects set the conditions for boom and bust behaviour.

Figure 9.5: North Sea cod mortality with technical progress



Present measures of capacity do not accurately reflect the changes arising from better detection equipment, gear type and other technological advances made in boat design. It is unrealistic and probably impossible to predict how these advances enhance fishing capacity, which in practice must be monitored as they occur.

Monitoring and managing killing capacity

The measures proposed in this report, in particular strengthened compliance, should significantly improve the signals sent to fishermen and hence their ability to take informed investment decisions. However, given the importance of avoiding over-fishing, fisheries managers need to monitor if actual fishing capacity is increasing, and new mechanisms are needed to ensure that capacity does not increase and risk the boom-bust cycle recurring.

There are several possible mechanisms for restricting the amount of investment undertaken by the industry:

- Voluntary withdrawal of capital by the industry
- Industry-organised contributory scheme to fund decommissioning
- Extraction of super-normal profits by fisheries managers when stocks are high.

Circumstances differ between different fisheries and these will determine the most appropriate capital restraint policy.

[49] The details and limitations of the dynamic modelling approach can be found in the relevant analytical paper on the Strategy Unit website: www.strategy.gov.uk.

Voluntary restraint by the industry works best when there are a small number of players, or where many boats are jointly managed by a single company allowing co-ordination of action. Though economic theory suggests voluntary co-ordination is limited to groups of 30–40 actors, experience has shown negotiated agreements work among larger groups of fishermen, especially when backed by enforceable private contracts.

In Australia, one nephrops fishery voluntarily decided to reduce the number of boats from 300 to 90 over three years purely on commercial grounds, ie to enhance their profitability in the face of fluctuating exchange rates rather than conserve stock per se. In the New Zealand hoki fishery, companies decided not to fish the full level of catch allowed by scientific estimates of TACs, in order to prevent over-investment. In the UK context the pelagic sector is best placed to develop such co-operative actions to restrict capital, though it is also relevant to many small inshore fisheries. Clearly any industry-led action to control investment will need to be consistent with competition policy.

The second option involves the industry, perhaps through a trade association, paying a share of profits into a fund when stocks are above average levels. The fund is used as 'insurance' to finance tie-ups or decommissioning if stocks are depressed or if fleet capacity (catch per unit effort) is rising unsustainably. Such mutual insurance is found in other industries. For instance, travel agents assure one another's liabilities through the ABTA scheme, which protects customers against the insolvency of individual travel agencies. Such a scheme works well when there are a large number of individual fishermen in a fishery and a powerful industry body. Norway is beginning to introduce an industry-supported fund to pay for any future decommissioning.

The third option requires fisheries managers to actively withdraw revenue from a fishery if stocks are healthy and profits are excessive. This money could be used to finance management, science and enforcement activities, and possibly be paid into general taxation as a resource rent or windfall tax, as seen in other industries.

Cost recovery of management costs would also help reduce over-investment. In New Zealand the fishery industry meets all the cost of management (around NZ$30 million pa) including the cost of gathering scientific information. Costs are recovered from the segment/species that benefits from the expenditure. However, while an annual fixed fee provides a predictable source of income and reduces some of the ability to over-invest, it does not necessarily ensure alignment of capital and biology. Cost recovery should therefore generally be justified on other grounds than capital control.

Recommendations

Fisheries departments should

- maintain existing controls and reporting on fleet capacity: vessel licensing, VCUs and gross tonnage.
- task fishery managers with developing a system for monitoring fleet killing capacity and utilisation rates, and agree specific management actions with each sector to ensure they remain within agreed limits.

9.5.3 Meeting the challenge of mixed fisheries

Summary

- Mixed fisheries are inherently difficult to manage, and in many cases unsuited to the current quota management scheme.

- The UK should develop concrete proposals for alternative management methods, beginning with feasibility studies on using effort control in certain EU fisheries.

- A more flexible adaptive approach to managing mixed fisheries inside quota management should also be developed, including better use of fishermen's data.

The problems of mixed fisheries management

Mixed fisheries present a significant challenge to scientists, fishery managers and fishermen. The present quota management system is best suited to a clean fishery, in which science assesses stocks and probable recruitment of each species, managers set TACs for target fisheries, and fishermen selectively catch only those species for which they have quota.

However, in the real world different species compete with one another and feed off one another. As a result, scientific forecasts of levels and mix of species are difficult. Managers also have to decide how much to restrict the effort of fishermen who catch at-risk species incidentally as by-catch, without compensating those fishermen for loss of revenues.

Perhaps worst of all fishermen are forced to discard marketable fish for which they hold no quota (perhaps because science has underestimated stocks and set TAC too low). Some 700,000 tonnes of fish were discarded in the North Sea in 1990; this is seen as wasteful by the general public and fishermen and reduces industry buy-in to the management system. Fishermen also discard fish for purely economic reasons because they are too small to market, or because they would rather reserve their quota for more valuable fish, so-called 'high-grading'.

The present system does not meet the challenge of managing mixed fisheries. The scientific base and sampled information used to set quotas is often too weak and too infrequently revised to accurately depict highly mixed fisheries. But, despite these known weaknesses, our management shows little flexibility to make use of new and better information. As a result, honest fishermen are forced into wasteful actions such as discarding, and illegally landing over-quota fish is seen as an acceptable practice.

No country in the world has completely solved the problem of managing highly mixed fisheries. There are, however, some valuable lessons that can be learned from alternative approaches to fisheries management, but the EU must also innovate to develop new approaches.

Effort-based systems should be the preferred option for managing highly mixed fisheries.

The box below shows how effort control is practised in the Faeroe Islands. An effort system does not attempt to manage species individually but recognises that the species form a complex. Fishermen are no longer restricted in how much fish they can land, thereby removing the present incentive to hide their landings and provide inaccurate information. Fishing effort, rather than catch, is regulated. This is, by its nature, easier to enforce and reduces the scope for non-compliance. Effort allocations would be fully tradeable to ensure competition, and would have similar economic effects to an ITQ system.

There are practical and political difficulties to overcome with effort control. Some of the practical issues are discussed below. There are also political issues to address in that some other key Member States do not support moving to an effort-based system.

There are many issues to resolve before an effort-days scheme, similar to the one used in the Faeroes, could be used in EU fisheries. Factors to take into account include: how to marry an effort control system with relative stability; how to accommodate the incentive upon fishermen to 'capital stuff' (that is, increase the killing power of vessels to maximise the fish they catch per fishing day); and how to protect high value species that are outside safe biological limits from being targeted by fishermen. However, none of these problems are insurmountable and many also occur under the current management system.

Switching over to effort control should be decided on cost and benefits in a particular fishery; this is a technical issue which needs careful assessment. The potential benefits of reliable catch information, industry support and improved compliance mean that this option should be considered seriously for all mixed fisheries of interest to the UK.

Faeroes effort system

Since 1996, the Faeroe Islands have been operating an effort-control system in their demersal fishery (cod, haddock, saithe, and redfish amongst others). Every year each segment of the demersal fleet is informed how many fishing days individual fishermen can fish; individuals can trade these days amongst fishermen of a similar size – exchange rates exist to permit trades between different types of vessel. Fishermen are free to land whatever fish they catch, reducing discards and 'high-grading'. There is also much more reliable catch information since fishermen have no incentive to under-record catch or misdeclare species. Over time the fishery manager committee has reduced the number of days that can be fished as the fleet has become more efficient.

As well as effort control, the fisheries manager applies technical regulations (closed areas, gear measures) upon the fishery. Fishery inspectors protect juvenile and spawning stock by closing areas for up to a fortnight if large numbers of juvenile or spawning fish are caught. The system is widely supported by the industry.

Compliance with an effort-based system is much easier to monitor since all that needs to be monitored is how many days a boat is away from port. Many of the Faeroese fishing vessels are equipped with satellite monitoring which eases the enforcement task.

In some circumstances or in relatively clean fisheries (pelagics, nephrops) the balance of advantage lies with an ITQ or an improved TAC system, with higher levels of transparency. For other fisheries further work needs to be undertaken on whether the balance of advantage is for effort or amended TAC. Key to this decision is the actual degree of 'mixedness' in a fishery, which is an empirical issue – fisheries can be mixed for part of the year and in certain discrete regions of water. The fisheries manager is best placed to research and decide the appropriate regulatory instruments, bearing in mind the issues of practicality, location and seasonality.

Improving quota management of mixed fisheries

While effort control should be the preferred option for highly mixed fisheries, conditional on costs and benefits in practice, there are measures that can be taken within a quota-based fishery to improve management. In mixed fisheries, where the quality of stock assessments and recommendations for TACs have a large degree of uncertainty, the management system needs to be more flexible and make better use of new information as it becomes available; chief amongst these is information from catchers. Scientists have legitimate concerns about the quality and reliability of information provided by fishermen but at present it is significantly under-utilised.

The use of sentinel fisheries and observers could provide better quality and more reliable information from fishermen to feed into the management system. Sentinel fishermen are trained and tasked with providing information back to the manager, while they are fishing. They inform the manager about the location, environment, catch and discards allowing stock state to be reassessed in real time. The alternative 'Observer' approach puts scientists on fishermen's boats. These scientists can then observe actual discard rates, the proportion of by-catch, and the numbers of spawning fish, and feed information back to the assessment process.

Catcher information is only useful when it leads to a more flexible response from the manager. At present it is difficult for the system to accommodate changes to the TAC or fishing areas mid-year. It would be better for the system to identify a discrete number of fisheries, which are acknowledged to be difficult to manage with annual TACs and which will be managed in an adaptive fashion. Here the TAC could be revised during the year as new information comes to light, and the imposition of real-time closed areas would be a normal feature of management not requiring the use of 'emergency' powers or Council decisions.

A further reform would be to allow catchers to land and sell marketable by-catch in excess of their quota. The profits earned from this would have to be sequestered to avoid giving an incentive to target species for which fishermen have no quota.
This would avoid the wasteful practice of throwing away good fish and provide the fisheries manager with income. At present this idea is outside the scope of the reformed CFP so this improvement will have to be discussed and agreed with EU partners.

Recommendations

- Fisheries departments should commission detailed technical analysis and plans on the practicalities of introducing effort-management systems in mixed North Sea, Irish Sea and Channel fisheries by:
  - tasking UK fisheries managers and stakeholder groups to consider the practicality and feasibility of implementing an effort-based system in the main UK mixed fisheries. They would consider the mechanism for setting and allocating days, develop systems to allow trade in effort-days and devise methods to protect high-value stocks (perhaps by using observers) from excessive pressures; and
  - based on this technical analysis, discussing with major partner countries and the EU Commission the feasibility of implementing effort based systems to

replace catch limits in the mixed fisheries prosecuted by the UK fleet.

- For mixed fisheries, where effort control is either not achievable or appropriate, fisheries departments should develop alternative adaptive TAC systems through discussions with the Commission and EU partners by:
  - pursuing modifications to the CFP to allow fishermen to land over-quota by-catch of defined species, in defined fisheries. Fishery managers would impose a charge upon the value of over-quota fish at least equal to the profit margin in the market; and
  - tasking CEFAS and FRS with designing appropriate statistical tools for utilising sentinel fisheries and observer information. In 2004, they should undertake a review of fisheries statistics to ensure the information base exists to introduce effort systems and observer programmes into UK fisheries, including any new data needs.

9.5.4 Regionalising the Common Fisheries Policy

Summary

- Managing multi-jurisdictional fisheries is inherently complex and the CFP performs well in several areas compared to other international systems. The strengths of the CFP are 'relative stability' and a set of legal institutions which allow for decision-making to take place in a relatively timely and efficient manner.

- However, the CFP needs further reform to make it more innovative, flexible and industry driven. Regionalisation would allow for planning and decisions to be taken at a more appropriate level and would enable fisheries management to draw upon the wealth of Member State and stakeholder resources in this area more effectively.

- The UK's overall aim should be to reform the management system to meet sustainability objectives. The CFP reforms agreed in 2002 potentially go some of the way towards achieving this; in particular, harmful subsidies will no longer be paid from the end of 2004, a unique global achievement in multi-jurisdictional management.

- An ideal future system would see the bulk of technical fisheries management being carried out at the regional level in close collaboration with stakeholders, with the Commission and Fisheries Council having an overall audit and enforcement responsibility over these plans to ensure sustainability and a level playing field.

Benchmarking the CFP

Managing the EU's fisheries is an extremely complicated task. These are the most complicated fisheries to manage in the world, especially the highly mixed fisheries of most interest to the UK. The UK shares an interest in these stocks, and a history of fishing for them, with a number of other Member States. The coastlines of many EU Member States have numerous fishing communities, many with a long fishing heritage.

Evidence from the Strategy Unit's international visits indicates that multi-jurisdictional, mixed fisheries are extremely difficult to manage and there is no blueprint solution available from other regions.

We can learn some lessons, however, from examination of other similar situations, such as the regional fisheries management organisations in the USA and Australia and regional fisheries organisations.

This research shows there are three pillars upholding effective management:

- A sophisticated, responsive management system
- A system for taking decisions in a timely and enforceable manner
- An agreed allocation method

The CFP scores poorly on the first pillar but well on the second and third. The Community has effective structures for taking decisions in the Fisheries Council and the legal mechanisms to enforce them. The quality of those decisions is often criticised, but Qualified Majority Voting is a real improvement over weaker forms of consensus-based decision-making which are common in most international fisheries organisations, and lead to a failure to take action.

The Community has an agreed method for allocating the resource called 'relative stability'. The lack of

agreement over how to share out resources is often the stumbling block in multi-jurisdictional fisheries. The difficulty in agreeing management measures for blue whiting is a good example of the kind of issues that are involved. For four years the EU and the other coastal states (the Faeroe Islands, Iceland, Norway and Russia) have been attempting to agree an allocation key for this stock. The parties have been able to agree a global TAC but not the share-out. The individual claims, when added together, amount to 160% of the total. While the EU sets its fishermen an autonomous TAC, the other coastal states do not and consequently there is no effective management of this valuable fishery.

Relative stability

It is difficult to achieve agreement among a group of nations on how to share out a resource which moves about between jurisdictions at different times in the life cycle. This problem is not unique to EU fisheries, but the EU has developed a tool for dealing with this problem.

In the early years of the CFP (between 1976 and 1983) the Community debated how to share out fisheries resources. The aim was to set up an objective model for the calculation of allocations which would serve as the basis for future allocation decisions. The result was 'relative stability'. This relies on using catch records over an agreed reference period (1973–78 for the initial allocation) to assess which Member States traditionally fish for which stocks. This means that the UK, for example, is allocated approximately 50% of the North Sea cod TAC and 50% of the Irish Sea haddock TAC.

In the 20 years since the establishment of relative stability, a number of previously unregulated stocks have become part of the system. For these stocks as well, the Community has developed allocation keys based on historic fishing patterns over an agreed reference period.

There is a strong view expressed by some in the UK industry in the Strategy Unit consultation that leaving the CFP would be the best course of action to ensure the sustainability of UK stocks. The evidence suggests, however, that 'national control' is not a solution to the problems facing the UK fishing industry. Given the strengths of the reformed CFP system, this report concludes that the best use of the Government's resources is in seeking to continue to reform the current EU management system so that it at least matches best international practice, and in the future develops innovative approaches to the EU's specific management problems.

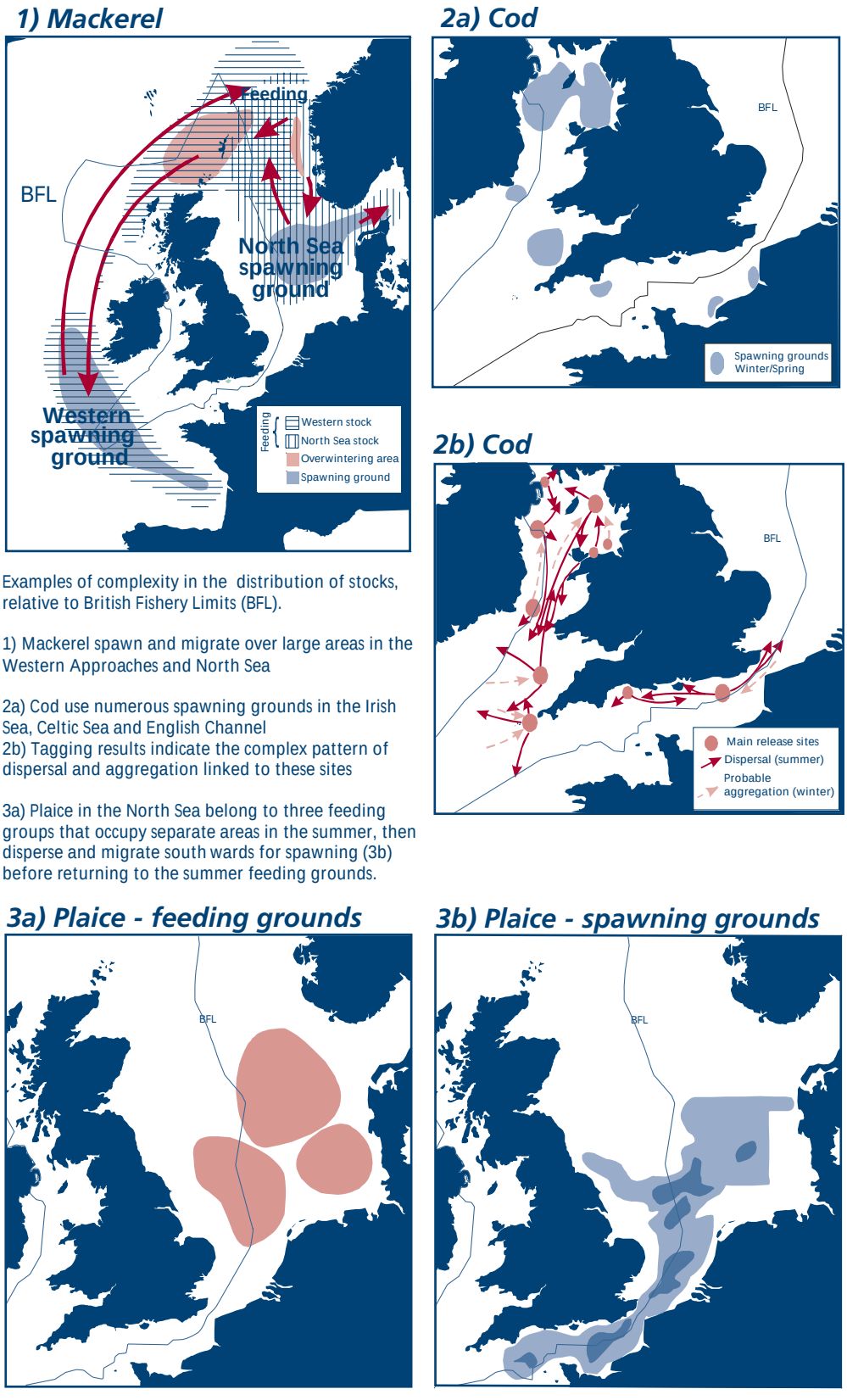
Figure 9.6 shows how the key stocks of interest to the UK inhabit our waters and those of other Member States during their life cycle, even if much of the fishing of mature stocks is carried out inside UK waters. International co-operation is necessary to conserve these stocks effectively.

Pulling out of the CFP would allow the UK to control activities within British Fishery Limits, but the UK would have no influence on what happens on the other side of the line. The UK's international commitments, including the straddling stocks agreement and UNCLOS, require us to enter into co-operation with other coastal states to conserve joint stocks. Without the CFP the UK would have to enter into a complex series of bilateral and multilateral agreements with other coastal states on all key demersal and pelagic stocks. There is no guarantee that such arrangements would be any more beneficial to the UK than at present, or that they would be effective in conserving stocks. These agreements would each require separate negotiation of allocation keys, voting rules and enforcement mechanisms. The experience of blue whiting would seem to suggest that leaving the CFP and tearing up the agreements already in place would at the very least be damaging to the conservation of fisheries resources in the short and medium term.

The CFP suffers from some systemic weaknesses and from problems of perception. The recent reform of the CFP has gone some of the way towards correcting the systemic weaknesses of the management system, but further reforms are needed. Institutional changes are also needed to deal with the problems of perception which make the CFP unpopular.

The main problem of perception stems from the fact that fishermen feel that they are 'twice-removed' from decision-making, and this is well founded. In the EU fishermen not only have the various UK fisheries departments to deal with, but the fact that

Figure 9.6: UK fishing limits and the extent of key fish stocks



Examples of complexity in the distribution of stocks, relative to British Fishery Limits (BFL).

1) Mackerel spawn and migrate over large areas in the Western Approaches and North Sea

2a) Cod use numerous spawning grounds in the Irish Sea, Celtic Sea and English Channel
2b) Tagging results indicate the complex pattern of dispersal and aggregation linked to these sites

3a) Plaice in the North Sea belong to three feeding groups that occupy separate areas in the summer, then disperse and migrate south wards for spawning (3b) before returning to the summer feeding grounds.

decision-making takes place in Brussels at meetings of the EU Fisheries Ministers. This centralisation distances decision-making from those most affected and has other negative effects on the content of management plans.

Centralisation promotes 'one-size-fits-all' common denominator solutions. This approach means that the Community manages fisheries by a combination of lowest common denominator measures (TACs and quotas) and derogations to deal with the fact that one size does not fit all (Shetland Box and the Western Waters regime).

The Regional Advisory Councils hold the key to the future direction of the CFP. The UK should lead the way in redirecting national resources to make the RACs work. This can be achieved by a twin-track process: establishing Regional Fisheries Managers and appropriate supporting structures at the UK level; and through greater regional co-operation with other key Member States at the inter-governmental level.

The detailed recommendation to create UK Regional Fisheries Managers is fully covered in the next section of this report, but is a key component of the UK's approach to EU management. Greater regional co-operation involves working with key Member States and the European Commission to develop recovery plans, in the first instance, and management plans thereafter for the fisheries of key interest to the UK. Such informal co-operation should be seen as the natural way forward when a limited number of countries have the vast majority of the share of a particular quota.

Informal co-operation, combined with well-functioning Regional Advisory Councils, should lead to more decisions effectively being taken at the appropriate regional level. At the same time as the details of management planning are regionalised, the crucial audit role of the European Commission should be strengthened in ensuring: critical sustainability criteria are met in all fisheries; enforcement and compliance is consistent across Member States; and environmental issues are fully integrated inside EU fisheries policy.

As described above, the complexity of European fisheries will require innovation in science and management if sustainability is to be achieved in the long term. To maximise the value of proposed reforms at the UK level, greater EU co-operation on problem-solving and technical issues should be encouraged, outside the negotiating culture of the Council process. A successful precedent for such an approach in the EU is to be found in the expert co-operation on technical climate change issues.

Fisheries departments should aim to capitalise on these positive developments and develop practical methods for regional co-operation over the coming years. The UK should adopt an aim to establish effective regional fisheries management over the coming years.

Recommendations

- The UK should adopt an aim of progressively regionalising the management functions of the CFP, while strengthening Commission oversight on audit, sustainability goals, compliance and enforcement and environmental issues, by doing the following:
  - Fisheries departments should begin to build the basis for regional management by increasing informal management co-operation with key EU partners, especially on scientific, technical and enforcement issues.
  - Fisheries departments and stakeholders should work together to strongly facilitate and support the development of Regional Advisory Councils (RACs).
  - Fisheries departments should improve problem-solving and innovation capacity by proposing shared solution forums at EU level; for example, on ecosystem-based management, marine science, and the impacts of climate change on fisheries.
  - Fisheries departments should begin discussions with interested Member States on the potential for, and practicalities of, moving to effort control in some shared EU fisheries.

- Fisheries departments should ensure a full Sustainability Impact Assessment is carried out of EU fisheries policies, as mandated by the Gothenburg Council.

9.6 Institutional issues

9.6.1 Creating Regional Fisheries Managers

Summary

- Fisheries management suffers from fragmentation and a lack of a clear direction. Named fisheries managers, for specific sea regions, will overcome this fragmentation, encourage greater professionalism and reflect and support the future RAC structures.

Fragmentation of management tasks

Membership of the European Union and the devolution settlement, while beneficial and desirable in themselves, have led to a situation where fisheries management is a somewhat fragmented policy area.

At the EU level the institutions of the Community provide a framework in which decisions are taken and the fisheries managed. The tasks are, as in other areas of European policy, divided between Community institutions and the Member States. The Commission proposes overall catch limits for regulated species, other management measures and recovery plans for stocks outside safe biological limits. These are then debated in the Agriculture and Fisheries Council which makes the final decision. Enforcement and capacity reduction, however, are the responsibility of Member States with Commission oversight. The Member States and the Commission both have powers to deal with emergencies, and differing powers on broader marine environmental issues. To protect the interests of individual fishermen, these can be overturned if they are considered to be discriminatory. The RACs, once established, add a new, regional dimension and will have the power to propose management and recovery plans of their own.

In the UK, fisheries departments (DEFRA, SEERAD, NAWAD and DARD) are responsible for developing management and negotiating strategies, and assessing and improving compliance and enforcement with the relevant authorities. They also have responsibility for the commissioning of biological and social science to support management and innovation with the Commission in consultation with statutory advisers.

This report does not recommend altering the formal powers allocated under the devolved settlement, but proposes the creation of UK Regional Fisheries Managers to address fragmentation and realign resources to mirror the structure of RACs. This report recommends that fisheries departments should collaborate to establish UK Regional Fisheries Managers for each of the key sea areas around the UK (West of Scotland, the North Sea, West of Scotland, Western Approaches and Irish Sea, Channel). Their responsibilities would include:

- developing management strategies and approaches;
- co-ordinating and monitoring of compliance and enforcement;
- monitoring capacity and killing power, and agreeing management approaches to control it in the future;
- co-operating informally with EU partners on technical issues;
- facilitating the development of commercial strategies; and
- co-ordinating elements of the social strategy and its implementation

In addition, the inshore and shellfish sectors should also have a named manager appointed for them at national level, where this does not already exist, in order to provide a focal point for development of these sectors (this proposal is covered in detail in the next section).

Some of the resources currently allocated to fisheries departments should be redirected to support the work of Regional Fisheries Managers. This would include a devolved science budget for commissioning new work; a management budget; and support in the form of a Stakeholder Advisory Group and a Technical Support Group.

Stakeholders, primarily the catching industry, would have defined rights to advise fisheries managers on management approaches, focus and innovation on a regular basis. The strength of stakeholder involvement should evolve over time in each fishery, depending on the capacity and interest of the sector, the aim being to develop a full ‘co-management’ approach over time.

Regional Fisheries Managers would continue to report to UK Fisheries Ministers who would have the formal responsibility to agree, amend or reject their proposed management plans. Fisheries departments would continue to cover EU, cross-cutting environmental and technical issues and national administrative tasks.

This reorientation of UK fisheries management would underpin the development of Regional Advisory Councils. RACs were agreed in the 2002 reform of the CFP in order to bring stakeholders closer to decision-making and for this to take place on a more appropriate geographical scale. Reorienting UK institutions to align with the likely future shape of RACs makes sense so that stakeholders and managers can begin to operate at the UK level in bodies which mirror the shape of the RACs.

Recommendations

- Fisheries departments should create five UK Regional Fisheries Managers in the offshore sector for the following regions: West of Scotland, North Sea, Western Approaches and Irish Sea, Channel and a further four Inshore/Shellfish Managers in each nation.

- Current resources should be redirected to support the work of the Regional Fisheries Managers: including a devolved science budget for commissioning new work; a management budget; and a Technical Support Group.

- Fisheries departments should give industry and other stakeholders clearly defined advisory roles inside the regional and inshore management structures in the form of a formal Stakeholder Advisory Group.

9.6.2 Managing the inshore sector

Summary

- The inshore sector is extremely valuable in terms of landings and employment but good data on its performance and impact is scarce.

- The sector is, by its nature, fragmented and often fails to gain adequate attention compared to parts of the offshore sector.

Reflecting the importance of the inshore sector

The inshore sector often complains of having no collective voice as a result of its dispersion and the predominance of small operators. To ensure that the contribution of the sector is optimised and its value recognised, the post of Inshore/Shellfish Fisheries Manager should be created in DEFRA and DARD. SEERAD already has an Inshore Fisheries Branch.

Despite the inshore sector's importance in terms of employment and landings value, data is hard to come by. Proper quantification of the sector would help ensure that its contribution is recognised and its management is appropriately targeted and resourced. The requirements and steps necessary to ensure full inshore data collection should be reviewed as soon as possible. An appropriate data collection system should be initiated by 2005; this need not form a large burden on the industry if extensive use is made of survey techniques and web-based self-reporting.

The current inshore management structure in England and Wales is based upon Sea Fisheries Committees (SFCs), the legislation for which was first introduced in 1888. Despite having proved adaptable over time, the inshore management system now faces significant challenges. The inshore zone is becoming increasingly pressured. The decline of 'offshore' fishing opportunities has led to more fishing activity in inshore areas. The zone has also seen an increase in non-fishing uses, for example offshore wind farm development and the establishment of Marine Protected Areas.

Fishing access and use rights should be fully defined out to 12 miles, where possible, to safeguard the sector's future. The inshore management system needs to be reviewed. Inshore fisheries management is currently under review in a wider review of the arrangements for control and enforcement in England and Wales. This review needs to consider the tasks, composition, legislation and funding of the inshore management system. The requirements for strengthened inshore management in Northern Ireland should also be reviewed. SEERAD has recently carried out a 'Strategic Review of Inshore Fisheries' in Scotland.

Inshore management is often highly complex due to the variety of habitats, and the proximity and overlap of different types of fishing and other marine activity. Many consultees expressed the view that current management systems are under-resourced, and incremental cost recovery should be implemented to support local management.

There is significant potential for further increasing the sector's value and sustaining employment through the development of new fisheries and mariculture opportunities. Such development should be championed by the Inshore/Shellfish Manager. To this end, a review should be undertaken of existing funding sources available to industry and the development potential for value-added and marketing initiatives. The use of innovative management methods should be encouraged in the inshore sector. Where potential overlap exists between 'offshore' and 'inshore' management policies, the local manager should retain the right to decide whether to apply 'offshore' policy in the 'inshore' zone.

Respondents to the Consultation Paper expressed a strong feeling of uncertainty regarding the future of the 6–12 mile zone derogation under the CFP. This restricts access in the 6–12 mile zone to UK vessels and those from other Member States with traditional patterns of fishing there. Whilst the majority in Council are in favour of renewing the derogation they will continue to re-evaluate it at ten-year intervals. The chances of the 6 and 12-mile limits being revoked in the future are extremely remote. It is best to be pro-active in managing the 0–12 mile zone now rather than stifle the sector's development and potential because of remote fears about its future.

Inshore fisheries management should not be used as the primary vehicle for managing the marine environment and wider coastal zone. Proposed new fisheries and mariculture opportunities should be subject to Environmental Impact Assessments where the development impact can be clearly identified. Strategic Environmental Assessments (SEAs) should be used as a matter of course in assessing impacts of a wider, more general nature. However, fisheries management should be integrated into broader marine management ensuring that it fits into part of a larger system designed to manage all users of the coastal zone and marine environment.

Recommendations

- Fisheries departments should reform inshore fisheries management and give a focus on developing the sector:
- The inshore fisheries management system in England and Wales needs to be modernised and strengthened: the current review of SFC enforcement could be extended to cover broader management issues and make recommendations by mid-end 2004.
- Fishing access and use rights inside the 12-mile limit should be better defined to safeguard the sector's future.
- All fisheries departments should appoint an inshore/shellfish manager where one does not already exist.
- A 'light-touch' data collection system covering under-10s and shellfish should be initiated by 2005.
- Inshore/shellfish managers should champion development and innovation in the sector. A review of funding sources should be undertaken and incremental cost recovery implemented for management tasks.

9.6.3 Developing the recreational sea fishing sector

Summary

- The recreational fishing sector is a potentially high contributor to local economies in coastal areas.
- There is a need for better data on the value and contribution of this sector.
- Fisheries management policy should recognise that sea angling may, in some circumstances, provide a better return on the use of some resources than commercial exploitation.

Role of the recreational sector

The majority of recreational sea angling takes place in the inshore zone. In 2002 around 2 million people went sea angling at least once in England and Wales; there is no comparable data for Scotland and Northern Ireland. The total expenditure by sea anglers in the UK on their sport (eg on fishing equipment, travel, food and accommodation, etc.) is estimated to be at least £1 billion annually.

The quality of the sea angling experience is reported to have diminished in line with the decline in local fish stocks, resulting in lower UK trip rates by serious anglers and an increase in angling trips overseas. It is likely that the recreational catch of commercially caught species is significant in some areas. In view of their impact on, and use of, commercial fish stocks it is necessary to include representatives of recreational sea angling interests in relevant fisheries management bodies.

In some circumstances the economic and social benefits of sea angling for specific species may provide a greater contribution to society than if they are commercially caught. This is the case in parts of many other fishing nations such as New Zealand, Australia and the USA, where recreational sea angling has been aggressively promoted.

Governmental responsibility for recreational fishing is often unclear. For example, in England and Wales freshwater angling is managed by the Environment Agency, but responsibility for sea angling is shared by DEFRA and DCMS. A single government organisation should be identified to represent the needs of the recreational sector at the national level. Recreational sea anglers should also be represented in the fisheries management process at the local level.

There is limited information available to determine the true extent and national impact of recreational sea angling on local economies and fish stocks. To improve this situation it is recommended that a voluntary licensing scheme is introduced, along with provision for sea anglers to provide voluntary catch data via a web-based survey system, supplemented by independent research. It is also important to improve our knowledge of the impacts of recreational fishing through targeted research. Funding for additional research could be raised by a voluntary administrative levy administered through existing sea angling organisations. For example, a £10 per year levy raised from 40000 anglers would fund £400,000 worth of annual scientific research.

Organisations representing anglers at the national level should work with national fisheries departments to assess the case for designating specific species for wholly recreational use, eg bass.

Recommendations

- The UK Government and the devolved administrations should determine the most appropriate body in each region to represent the needs of recreational sea anglers by the end of 2004.
- Fisheries departments should ensure that angling needs are represented at the local fisheries management level during their reviews of inshore management.
- Relevant departments should determine the funding and administrative requirements of operating a voluntary licensing and catch record scheme for sea anglers, which would be developed in co-operation with representative sea angling organisations.
- Fisheries departments should review the evidence supporting arguments for re-designating commercially caught species for wholly recreational sea angling, beginning with bass by the end of 2004.

10 Transition and implementation

The Strategy Unit was tasked with conducting a strategic review of the fishing industry over the next 10 – 15 years. A clear vision for the future of the fishing industry and its management, and an honest assessment of its strengths, weaknesses and opportunities, is necessary for guiding the difficult day-to-day decisions Government and the industry routinely makes.

The Strategy Unit was not asked to develop a detailed implementation plan, nor are we well placed to do this. Such detailed planning needs to take place once government and industry have reflected on the proposals made in this document and have agreed a plan of action.

However, a brief discussion of the transition is useful to inform the discussions that government, industry and other stakeholders will hold. Therefore, this section proposes a tentative timetable and some initial costings for major elements of the transition process; however, these will need to be supplemented by much more detailed analysis.

10.1 Proposed timetable

Three points about the transition phase are worth making at the outset: The proposals form a coherent package; the order in which proposals are implemented matters; and momentum needs to be maintained.

Sequencing of reforms

Through this report, we have put forward a number of key themes:

- decentralising and regionalising fisheries management;
- giving stakeholders a greater role in the management of their fisheries;
- improving transparency; and
- improving profitability

This section considers some of the sequencing issues involved in implementing the reforms.

Regionalisation and greater stakeholder engagement can advance simultaneously if the UK creates strong regional managers to work with stakeholders in developing management plans and positions. As the system beds in, we would expect Ministers to take a more hands-off role – while the groups take on more responsibilities, including paying for fisheries management and research. In time, the fishery managers and stakeholders would take over operational responsibility for research, data collection and day-to-day management. Successful development of such bodies would underpin and support the evolution of RACs at a European level.

The improvement of transparency and profitability should be advanced as a single package, and need not wait until the recruitment and establishment of UK regional managers. Right-sizing the fleet increases the probability of stock recovery and of the whitefish sector becoming profitable. But right-sizing is part of a broader package, and if public finance is to be used to remove more vessels from the fleet, then the industry must accept reforms that will ensure that fishery managers have reliable information and that their management decisions are being complied with.

Implementation in specific sectors

The modernisation proposals outlined in this report are likely to be taken up at different rates in different segments of the industry.

The pelagic industry is small, highly profitable and well capitalised. The current system of FQAs can, and should, rapidly be converted into ITQs. Transparency can be achieved by an industry-funded observer programme that will cover all trips. Government could quickly move to full cost recovery so that the costs of science, enforcement and management are paid for by the industry.

Nephrops fisheries are also currently profitable and could also move quickly to an ITQ system, improved transparency and compliance, and progressive cost recovery. Reforms in the inshore sector are less urgent, and should focus on gaining a clearer picture of landings and of the vulnerability to shifts in effort from the offshore sector. This work should be led by inshore managers.

In the case of the whitefish sector, the priority is for industry and the Government to negotiate a combined right-sizing and transparency package that ensures that a restructured fleet does not allow endemic non-compliance, over-investment or technical creep to develop into major concerns once again.

Whitefish fisheries are highly mixed fisheries, and an effort-based system might well be preferable to the current TAC-based system. As an early priority, regional fishery managers should investigate this possibility in the different mixed fisheries. An effective effort management system has different informational needs to a TAC-based system, with more emphasis on measuring the killing power of the fleet. The collection of such data should be a priority. In the short term (the next two years), policies to improve compliance and transparency and converting FQAs into ITQs will be useful, regardless of whether an effort-based or TAC system is brought in and can be introduced more readily alongside the right-sizing proposal.

10.2 Right-sizing the fleet

This report has argued that all sectors of the fishing industry have the potential to be profitable, but this will require some contraction in fleet size even when stocks have recovered.

At present, stocks of many whitefish species are at low levels, some at historically low levels. This has been the case since 2001 and, although many boats manage to just break even, this sector is not presently profitable in the sense used here of being able to cover its long-run investment costs. This produces a downward spiral of poor stocks, low TACs, over-capitalisation, lack of profit, and non-compliance, further reducing the probability of stock recovery. Decisive action needs to be taken to break from this cycle, simultaneously addressing the two root causes: over-capitalisation and lack of compliance. This section of the paper discusses the extent and possible cost of such right-sizing. Earlier sections of the paper have discussed measures to improve compliance.

Right-sizing, the once and for all removal of excess capacity which will never earn sustainable profits, creates an opportunity to achieve broader fishery objectives. The fleet can be modernised and concentrated in the most vulnerable areas. This can be achieved by funds being targeted to retain new boats and maintain fleets in the most vulnerable communities. Right-sizing is part of a reform package for the industry. If government is to invest money in the future of the industry, industry must agree to a package of reforms so there is a shared interest in compliance.

Government and industry will need to negotiate an acceptable package of actions based on the general proposals given in this report.

There are possible two levers for right-sizing the fleet.

1) **Structural adjustment:** This would be a government-funded programme to permanently remove excess capacity not required even under optimistic stock and economic scenarios.

2) **Tie-up:** This would be a temporary withdrawal of capacity from the fleet once it has been reduced to its maximum long-run size. The advantage of this is that it retains flexibility in the long-run to respond to developments in stock recovery.

The purpose of right-sizing the fleet is twofold: to improve the probability of whitefish recovery and to reduce the size of the fleet so that once stocks have recovered the fleet can earn a reasonable profit on invested capital. Failure to remove excess capacity now weakens the profitability of the whole sector, reducing its ability to invest and increasing incentives for non-compliance.

Inevitably, a large number of assumptions have had to be made in order to calculate the scale of right-sizing. In particular assumptions were made on how the price of fish will develop and on the pace and level of recovery. Uncertainty in these future variables is reflected in the range of futures modelled in

Chapter 4. Taken as a whole, these assumptions have a positive bias; that is, they probably over-estimate the potential future size of the profitable fleet.

Under optimistic stock recovery and economic scenario assumptions, 13% of the current whitefish fleet (taking into account the 2003 decommissioning) would need to be permanently removed to enable the fleet to achieve long-run profitability by 2013. Under the more negative price scenarios, this could increase to 40% even if stocks recover fully.

Reducing the fleet below its long-run sustainable level by taking out more than 13% of capacity would be useful if: this capacity is unlikely in practice to be used when stocks recover because it is old or inefficient; or if fisheries departments and the industry take a more pessimistic view of future prices than used in the 'optimistic' scenario modelled here.

The 13% figure should be seen as the minimum level of fleet reduction needed to support this reform package. Based on recent experience of decommissioning rounds, between £40 million and £50 million in additional spending would be needed to remove 13% excess capacity from the whitefish fleet.

However, costs may be less than this as the right-sizing process should target boats and fishermen who are unlikely to be fishing once stocks have recovered. The introduction of stricter compliance measures, automatic and higher fines, ITQs and the prospect of future cost recovery will provide an increased incentive for marginal businesses to leave the industry.

Once stocks have recovered and the fleet is profitable, fleet capacity will be controlled through the mechanisms outlined in Section 9.5.2, and there should be no expectations of continued public funding for decommissioning rounds as this sends perverse incentives for over-investment to the industry.

The right-sizing proposal seeks to structurally adjust the whitefish fleet back to a size small enough to profitably prosecute whitefish once stocks have recovered. However, whitefish stocks are presently in a poor state, too poor to provide even a right-sized fleet with good profits while the stock is recovering.

Industry has also brought forward proposals to tie up boats for a defined period of time. The advantage of a tie-up over greater decommissioning is that it avoids the expense of rebuilding the fleet, while still reducing pressure on the stocks. Tie-ups are therefore only an attractive option once all excess capacity has been removed from the fleet.

Clearly, the longer the period needed for stocks to recover the less attractive tie-ups become. However, Strategy Unit modelling has shown that there are potential merits in tying up part of the fleet for four to six years while stocks recover. The removal of capacity will increase the profitability of boats that remain, potentially improving compliance and increasing the probability and rate of stock recovery. Tying up for longer than six years is unattractive and increased decommissioning would be a better option. However, these potential benefits are not an argument for government to bear the costs of tie-up, as the benefits mainly accrue to the industry in the form of increased profits on recovery (as extra capital costs are avoided).

Tie-ups only produce positive benefits if the fleet is first structurally adjusted, and then industry organises and finances the tie-up itself.

A tie-up scheme to withdraw approximately 30% of the current whitefish fleet, combined with the structural adjustment scheme, will have the effect of reducing capacity by over 43% compared to 2003. With a combined right-sizing and tie-up scheme, the biological model suggests stocks would recover under the strong and weak recovery recruitment levels if other major countries co-operate. Under the collapse recruitment scenario, no amount of tie-up allows stocks of cod to recover.

The amount of compensation a boat owner would need to temporarily withdraw his vessel depends on how much he needs to pay his crew while the boat is tied up. If boats are tied up for an entire year, the crew will have time to find alternative employment. The owner has lower costs, but runs the risk of losing skilled crew when the boat is brought back into service. The industry itself is best placed to decide the appropriate price boats should be paid for tie-up, and how trained crew would be retained or increased and allied industries maintained in business. Maintenance

of vessels over the tie-up period and the potential loss of experienced crew to alternative occupations have significant implications for safety. These would have to be fully addressed in any proposed tie-up scheme.

Given the present low profitability, the whitefish fleet is not in a position to finance a tie-up itself at the moment, and is unlikely to have access to private capital to fund such a programme. Pragmatically, tie-ups would only occur if government was prepared to play a role in facilitating access to funds, by either guaranteeing or providing a loan for tie-ups. However, if stocks do not recover, either due to industry non-compliance or environmental shifts, there is no practical way the government could recover such a loan from remaining players in the industry. This risk of non-payment, and the fact that benefits from tie-ups mainly flow to the industry, makes funding or supporting tie-ups an unattractive public spending option.

Recommendation

- Fisheries departments should consider funding the decommissioning of a minimum of 13% of the whitefish fleet beyond the 2003 decommissioning scheme as part of an overall package of management reforms; this would require between £40 million and £50 million in additional spending.

- The fishing industry would benefit from tying up a further 30% of the whitefish fleet for around four years to accelerate stock recovery, but this should not be supported by public funds.

11 Summary of Recommendations

This chapter brings together all the specific recommendations in the body of the report, organised in the same way as in the executive summary. In some areas, recommendations which for clarity have been duplicated between sections of the report have been omitted.

Clear objectives

Recommendation 1: Fisheries departments should all develop sets of fisheries management objectives with a clear hierarchy in order to promote better and more transparent decision-making (9.3).

Recommendation 2: The overarching aim of fisheries management should be 'to maximise the return to the UK of the sustainable use of fisheries resources and protection of the marine environment' (9.3).

Recommendation 3: Sub-objectives should also be established covering economic, social and environmental issues, safety and good governance (9.3).

a) Sub-objectives covering economic, social and environmental issues, safety and good governance should be consistent with the following principles:
- The fishing industry should be profitable and globally competitive.
- Social policy should focus on preserving profitable employment in vulnerable fishing-dependent communities and be secondary to economic goals.
- Safety considerations should be integrated into all policies.
- Fisheries management should be consistent with best practice in other areas of marine environmental management.

b) Fisheries management should be consistent with the principles of good governance: outcome-driven objectives; better matching of roles with responsibilities; recovering costs from users; and achieving high levels of compliance and industry agreement with regulatory approaches (9.3).

Creating a competitive and profitable UK fleet

Recommendation 4: Fisheries departments should ensure a basis for both long-run profitability and stock recovery by considering funding the removal of a minimum of 13% of the whitefish fleet (beyond the 2003 decommissioning scheme) as part of an overall package of reforms. This would require between £40 million and £50 million in additional spending. The fishing industry would benefit from tying up a further 30% of the whitefish fleet for four years to accelerate stock recovery, but this should not be supported by public funds (10.2).

Recommendation 5: Fisheries departments should promote competition by introducing individual tradeable rights for resource access, beginning in the pelagic and nephrops sectors (9.4.3).

a) Fisheries departments should change the system of quota allocation based on Fixed Quota Allocations (FQAs) into a system based on ITQs for all UK sectors by the end of 2006 (9.4.3).

b) ITQs should be defined as use rights, with ownership residing with the government. Fishermen should have clearly defined rights and responsibilities, including an obligation to avoid environmental damage caused through fishing activity (9.4.3).

c) The conversion of FQAs to ITQs should be introduced in a phased manner, earliest in the pelagic sector and then in the demersal and shellfish sectors (9.4.3).

d) In order to mitigate some of the negative effects of improved efficiency on fishing communities, a workable system of community quotas should ideally be developed prior to the move to ITQs in the demersal and shellfish sectors, but priority should be given to the development of a competitive fleet (9.4.3).

Recommendation 6: Fisheries departments should focus on support for the development of the inshore/shellfish industry to take advantage of its large growth opportunities (6.1.2).

a) Fisheries departments must work with the fishing industry to understand their long run commercial strategies in each sector in order to guide policy, regulation and industry support (6.1.2).

b) A review should be undertaken of how effectively existing government business support instruments (& Seafish) are used by the fishing industry (6.1.2).

Recommendation 7: Fishing industry should maintain and enhance its market opportunities by aiming to achieve Marine Stewardship Council (or equivalent) certification for all stocks of major interest to the UK by 2015 (6.1.2).

Improving UK and EU information and compliance

Recommendation 8: Fisheries departments should introduce a high-transparency system where all catches and landings are traced through markets and processors; and enforcement focuses more on forensic accounting, on-board observers and risk profiling (9.4.2).

a) Fisheries departments should publish catch records, ITQ trades and leases on the Internet, taking into account reasonable demands for commercial confidentiality in the timing of such releases (9.4.2).

b) Fisheries departments should extend tamper-proof satellite monitoring to all vessels over 10m by the end of 2006 (9.4.2).

c) Fisheries departments should phase in electronic logbooks over the same period, linked to onshore markets (9.4.2).

Recommendation 9: Fisheries departments should introduce simple administrative penalties and 'points' systems where the costs of infringements are transparent and predictable to the industry and most offences are decriminalised (9.4.2).

a) Fisheries departments should develop a system of automatic administrative penalties including a 'points' system for licences (9.4.2).

b) Fisheries departments should develop the capacity of enforcement agencies for enforcement by greater use of forensic accounting techniques and the use of offender-profiling (9.4.2).

c) Vessels identified as being 'high risk' should have observers on board, the costs to be borne by the vessel owners (9.4.2).

Recommendation 10: Fisheries departments should introduce progressive cost-recovery of management costs from industry to give greater buy-in and incentives for compliance (9.4.2).

Recommendation 11: Fisheries departments should commission detailed technical analysis and plans on the practicalities of introducing effort-management systems in mixed North Sea, Irish Sea and Channel fisheries (9.5.3).

a) Fisheries departments should task the fisheries managers and stakeholder groups to consider the practicality and feasibility of implementing an effort-based system in the main UK mixed fisheries. They would consider the mechanism for setting and allocating days, develop systems to allow trade in effort-days and devise methods to protect high-value stocks (perhaps by using observers) from excessive pressures (9.5.3).

b) Based on this technical analysis, fisheries departments should discuss with major partner countries and the EU Commission the feasibility of implementing effort-based systems to replace catch limits in the mixed fisheries prosecuted by the UK fleet (9.5.3).

Recommendation 12: Fisheries departments should develop alternative adaptive TAC systems through discussions with the Commission and EU partners for mixed fisheries where effort control is either not achievable or appropriate, by (9.5.3):

a) pursuing modifications to the CFP to allow fishermen to land over-quota by-catch of defined species, in defined fisheries. Fishery managers would impose a charge upon the value of over-quota fish equal to the profit margin (9.5.3);

b) tasking CEFAS and FRS with designing appropriate statistical tools for utilising sentinel fisheries and observer information. In 2004, they should undertake a review of fisheries statistics to ensure

the information base exists to introduce effort systems and observer programmes into UK fisheries, including any new data needs (9.5.3).

Recommendation 13: The UK should continue supporting the European Commission in taking a stronger enforcement role to ensure a level playing field for all EU fleets, and collaborate more actively with European partners in major UK fisheries to improve compliance and enforcement practices (9.4.2).

Decentralising and modernising UK fisheries management

Recommendation 14: Fisheries departments should collaborate to create a system of UK Regional Fisheries Managers for the West of Scotland, the North Sea, Channel, Irish Sea and Western Approaches, and Inshore/Shellfish Managers in each nation, with the authority to draw up management approaches and task/fund science (9.6.1).

a) Current resources should be redirected to support the work of the Regional Fisheries Managers: including a devolved science budget for commissioning new work; a management budget; and a Technical Support Group (9.6.1).

b) Fisheries departments should give industry and other stakeholders defined advisory roles inside the regional and inshore management structures in the form of a formal Stakeholder Advisory Group (9.6.1).

Recommendation 15: Fisheries departments should reform inshore fisheries management and give a focus on developing the sector, including explicit management of recreational sea angling interests (9.6.2; 9.6.3).

a) The inshore fisheries management system in England and Wales needs to be modernised and strengthened, the current review of SFC: enforcement could be extended to cover broader management issues and make recommendations by mid-end 2004 (9.6.2).

b) Fishing access and use rights inside the 12-mile limit should be better defined to safeguard the sector's future (9.6.2).

c) All fisheries departments should appoint an inshore/shellfish manager where one does not already exist (9.6.2).

d) A 'light-touch' data collection system covering under-10s and shellfish should be initiated by 2005 (9.6.2).

e) Inshore/shellfish managers should champion development and innovation in the sector. A review of funding sources should be undertaken and incremental cost recovery implemented (9.6.2).

f) The UK Government and the devolved administrations should determine the most appropriate body in each region to represent the needs of recreational sea anglers by the end of 2004 (9.6.3).

g) Fisheries departments should ensure that angling needs are represented at the local fisheries management level during their reviews of inshore management (9.6.3).

h) Relevant departments should determine the funding and administrative requirements of operating a voluntary licensing and catch record scheme for sea anglers, which would be developed in co-operation with representative sea angling organisations (9.6.3).

i) Fisheries departments should review the evidence supporting arguments for re-designating commercially caught species for wholly recreational sea angling, beginning with bass by the end of 2004 (9.6.3).

Recommendation 16: Fisheries departments should give industry and other stakeholders clearly defined advisory roles inside the regional and inshore management structures (9.6.1).

Recommendation 17: Fisheries departments should give the fishing industry a greater role in co-ordinating information priorities through more extensive use of co-commissioning of research. This should follow shortly after the appointment of regional managers in 2005 (9.5.1).

a) In return for this greater involvement in setting priorities, the industry will need to partner

government in funding scientific and information analysis through incremental cost recovery (9.5.1).

b) Fisheries science research must retain its independent nature from both government and industry and become more contested between different scientific institutions (9.5.1).

c) There should be greater use of on-board observers and specifically contracted fisher's data sources eg 'Sentinel Fisheries' which can be funded either from existing science budgets or by the industry itself (9.5.1).

Recommendation 18: Fisheries departments should promote greater innovation and management-focus in fisheries science by regionalising the process of science tasking and introducing contested budgets for innovation in scientific and management approaches (9.5.1).

a) Introducing more joint ESRC, NERC, university and government science research and greater contestability between different scientific institutes. A share of the current fisheries research budget should be set aside for this broadening supply of the science base through open tendering (9.5.1).

b) Fisheries departments should develop methods for applying 'adaptive fisheries management' where research is too costly to provide information on the impacts of increasing fishing pressures or closing fishing areas (9.5.1).

c) Fisheries departments should establish science innovation budgets, to which fisheries managers can bid for research and technical development to solve emerging problems (9.5.1).

d) Fisheries departments should commission specific multidisciplinary research on the challenges of managing mixed fisheries and aim to reduce the burden of providing single-species assessments. The specific challenges include a greater emphasis, and regular updating of socio-economic data on fishermen's profitability and attitudes, and explicit modelling of behavioural impacts of new policies. A review of socio-economic data needs should be undertaken in 2004 (9.5.1).

e) More basic science is needed to better understand the reasons for variability in recruitment, ecosystem effects and interactions between species. A review of basic marine science provision should be carried out between fisheries departments, CEFAS, FRS, NERC, and relevant universities to assess how different streams of public funding are contributing to the basic knowledge base underlying long-term fisheries management, and how this research could be better directed and used (9.5.1).

f) Cross-institutional research should be encouraged to better understand how climate change will effect key species and ecosystems. A preliminary public assessment on the current state of knowledge, and the potential for further understanding to inform fisheries management options, should be carried out by CEFAS, FRS, Hadley Centre and relevant UK researchers, to be published by the end of 2005 (9.5.1).

Recommendation 19: The UK should adopt a large-stock strategy and use this to guide its position in EU negotiations for its key economic species. This will entail reducing catch in the short-term. Fishery managers should explicitly seek to maximise the value of commercial stocks and reduce the volatility of catch (6.2).

a) The UK should collaborate with other EU countries with interests in key stocks to develop such long-term catch rules, initially by sharing research and modelling the costs and benefits of these approaches, and, developing potential catch rules (6.2).

b) Fisheries managers should report annually on critical aspects of UK stocks, including: the overall value of UK access to key stocks; detailed catch data; volatility in stocks; and uncertainty in stock estimates (6.2).

Recommendation 20: Fisheries departments should develop risk-management approaches to fisheries management, including by introducing tighter controls on capital investment to prevent future 'boom and bust' cycles.

a) Fisheries departments should aim to put a risk management approach at the heart of UK and European fisheries management (5.3).

b) The fisheries industry should work to improve its understanding of key commercial risks and develop tools and techniques to minimise them, including through stronger involvement in fisheries management (5.3).

c) Fisheries departments should publish regular estimates of all critical risk factors, including estimates of compliance rates, variability in stocks, accuracy of stock estimates and catching activity in order to inform regulatory and industry practice (5.3).

d) Fisheries departments should maintain existing controls and reporting on fleet capacity: vessel licensing, VCUs and gross tonnage (9.5.2).

e) Fisheries departments should task fishery managers with developing a system for monitoring fleet killing capacity and utilisation rates, and agree specific management actions with each sector to ensure they remain within agreed limits (9.5.2).

Progressively regionalise EU management under the CFP

Recommendation 21: The UK should adopt an aim of progressively regionalising the management functions of the CFP, while strengthening Commission oversight on audit, sustainability goals, compliance and enforcement and environmental issues (9.5.4).

Recommendation 22: Fisheries departments should begin to build the basis for regional management by increasing informal management co-operation with key EU partners, especially on scientific, technical and enforcement issues (9.5.4).

Recommendation 23: Fisheries departments and stakeholders should work together to strongly facilitate and support the development of Regional Advisory Councils (9.5.4).

Recommendation 24: Fisheries departments should improve problem-solving and innovation capacity by proposing shared solution forums at EU level; for example, on ecosystem-based management, marine science, and the impacts of climate change on fisheries (9.5.4).

Recommendation 25: Fisheries departments should press for the implementation of Sustainability Impact Assessments of fisheries policy and practice at the EU level, following the Gothenburg Council Conclusions (8.3.5).

Setting clear social objectives in fisheries policy

Recommendation 26: Fishery departments should consider the use of community quota in vulnerable and dependent fishing communities, looking to develop a system compatible with EU law. They should launch a feasibility study on the design of a community quota system by the end of 2004 (7.2).

a) In order to mitigate some of the negative effects of improved efficiency on fishing communities, a workable system of community quotas should ideally be developed prior to the move to ITQs in the demersal and shellfish sectors, but priority should be given to ensuring a competitive fleet (9.4.3).

b) Fisheries departments should develop a process for setting explicit economic, environmental and social objectives within the recommended, modernised systems for inshore fisheries regulation (7.3)

Recommendation 27: The UK Government and devolved administrations should ensure future reviews of EU state aids/structural funds maintain opportunities to provide appropriate support to vulnerable fishing communities (7.4).

a) Fisheries and other central government departments should ensure that reviews of regional policy and EU state aid rules expected pre-2007 maintain opportunities to provide appropriate support to vulnerable fishing communities using regional and fisheries policies (7.4).

b) Government departments responsible for regional policy in each nation should ensure continued appropriate support to the fishing industry beyond the end of 2006, when the current Structural Fund programmes come to an end. This will continue to exclude operating aid (7.4).

Recommendation 28: Fisheries departments should actively facilitate and co-ordinate access to UK and EU support funds for transition support, diversification and industry development (7.4).

a) Regional bodies should ensure that the allocation of regional and regeneration aid is generally flexible enough to respond to changing circumstances, and in this case to the changing needs of the fishing industry and communities (7.4).

b) The fishing industry should receive ongoing regional policy support during the transition period described in this strategy. This support should be to address long-term structural issues rather than compensate for short-term fluctuations in stocks and the industry (7.4).

c) Regional fisheries managers should act as champions of the fishing industry and bring together the industry to feed into regional and community policy in their area (7.4).

d) Fisheries departments need to ensure that fisheries data is organised to allow a better understanding of the regional and community distribution of access rights, landings and employment, so that existing data can be of more value in determining the social impact of changes in fisheries policy, and to provide better information for regional and regeneration policy (7.4).

Integrating the needs of the fishing industry with other uses of the marine environment

Recommendation 29: Fisheries departments should introduce Strategic Environmental Assessments of both inshore and offshore fisheries by the end of 2006 as the first stage of establishing comprehensive Environmental Management Systems (8.3.5).

a) Fisheries managers and industry should be fully involved in the development of broad marine management frameworks. Lessons should be learnt from on going processes in New Zealand and Australia, including through the possibility of establishing an informal international network (8.3.5).

Recommendation 30: Fisheries departments should ensure Environmental Impact Assessments are carried out prior to the introduction of a new gear to a fishery or the start of a new fishery (8.3.5).

Recommendation 31: The UK Government and devolved administrations should develop an experimental programme of Marine Protected Areas – focusing initially on areas which provide benefits to multiple users (commercial fishing, tourism, environment, recreational fishermen, etc) (8.3.5).

Recommendation 32: Fisheries departments should provide incentives to improve environmental performance and encourage the development of environmentally-friendly gear types (8.3.5).

Recommendation 33: In the medium to long term, the UK Government and devolved administrations should consider integrating fisheries management tasks inside a marine environment agency responsible for broader management tasks, if such bodies are established under other legislation (eg possible Marine Acts being considered in different parts of the UK) (8.3.5).

a) Consideration should be given for establishing a system where all economic users of the marine environment contribute to funding basic understanding and mapping of ecosystems, both to improve marine management and reduce duplication of research and assessment (8.3.5).

Annex A: Details of project team, Sponsor Minister and advisory group

The report was prepared by a multi-disciplinary team, guided by a ministerial sponsor and advised by an 'Red team' of external experts and a Stakeholder advisory group consisting of government and non-governmental representatives.

The project team:

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Policy Adviser
Carole Auchterlonie
Stakeholder Manager
Mark Holden
Policy Adviser
Mathew Jaffa
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Prashant Vaze
Deputy Team Leader
Sam Whittaker
Policy Adviser

Steering group and Sponsor Minister:

The work of the Strategy Unit team was overseen by a Sponsor Minister and guided by a governmental steering group:

Sponsor Minister

Ben Bradshaw MP
Minister for Nature Conservation and Fisheries

(Elliot Morley MP, the then Minister for Fisheries, was the project's Sponsor Minister from February to June 2003.)

Steering group

Ross Finnie MSP
Minister for Environment and Rural Development, Scottish Executive
Ian Pearson MP
Minister for Fisheries, Northern Ireland Office
Carwyn Johnson AM
Minister for Environment, Planning and Countryside, Welsh Assembly
Don Touhig
Wales Office
Anne McGuire
Scotland Office
Senior Official
HMT
Yvette Cooper
ODPM
Jacqui Smith
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Vicki Bakhshi
No. 10
Catriona Laing
Strategy Unit

The stakeholder advisory group

The project was guided and assisted in their work by an external group of representative stakeholders from all parts of the UK.

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Arnold Locker
National Federation of Fishermen's Organisations
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Scottish Seafood Processors' Federation
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Fisheries Research Services
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Alan McCulla
Anglo-North Irish Fish Producers' Organisation Ltd.
Dick James
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Red team

The project team was assisted by a 'Red Team' of fishing industry experts providing critical comment and advice on a confidential basis.

Professor John Beddington
Imperial College, London
Dr Sean Pascoe
CEMARE Portsmouth
Crick Carleton
Nautilus Consultants
Stephen Aldridge
Chief Economist, Strategy Unit
David Symes
Independent Consultant

Annex B: Glossary

ABTA
Association of British Travel Agents
ACI
Atmospheric Circulation Index
Aquaculture
Farming of salmon, trout, shellfish and other species
Bpa
Minimum biomass consistent with precautionary approach
Catching Sector:
Catching of fish and shellfish
CEFAS
Centre for the Environment, Fisheries and Aquaculture Science
CEMARE
Centre for the Economics and Management of Aquatic Resources (University of Portsmouth)
CFP
Common Fisheries Policy
DARD
Department of Agriculture and Rural Development (Northern Ireland)
DCMS
Department of Culture, Media and Sport
DEFRA
Department for Environment, Food and Rural Affairs
Demersal
Bottom-living species of fish. Includes cod, haddock, plaice and sole
DSN
Demersal, Seine and Nephrops
DTI
Department of Trade and Industry
EIA
Environmental Impact Assessment
ESRC
Economic and Social Research Council
EU
European Union
Fishing industry
All aspects of catching, processing, retail, etc. that rely on wild-fish catch, including shellfish
FIFG
Financial Instrument for Fisheries Guidance
Fpa
Maximum fishing effort consistent with precautionary approach
FQA
Fixed Quota Allocation
FRS
Fisheries Research Services
GDP
Gross Domestic Product
HMT
Her Majesty's Treasury
ICCAT
International Commission for the Conservation of Atlantic Tunas
ICES
International Council for the Exploration of the Sea
IOTC
Indian Ocean Tuna Commission
ITEQ
Individual Transferable Effort Quota
ITQ
Individual Transferable Quota
MP
Member of Parliament
MPA
Marine Protected Areas
MSC
Marine Stewardship Council
MSP
Member of the Scottish Parliament
NAWAD
National Assembly for Wales Agriculture Department
NERC
Natural Environment Research Council
No. 10
Number 10 -– Prime Minister's Office
NOMIS
A web-based database of labour market statistics
NPV
Net Present Value

ODPM
Office of the Deputy Prime Minister
OECD
Organisation for Economic Co-operation and Development
OSPAR
"OSPAR Convention" for the Protection of the Marine Environment of the North-East Atlantic
ONS
Office for National Statistics
Pelagic fish
Fish living in open water. Species include herring and mackerel
PSA
Public Service Agreement
RAC
Regional Advisory Council
SAG
Stakeholder Advisory Group
Seafood industry
All commercial activities associated with seafood products, from catching to retail and including aquaculture.
SEA
Strategic Environmental Assessment
SEERAD
Scottish Executive Environment and Rural Affairs Department
SFC
Sea Fisheries Committee
SFF
Scottish Fishermen's Federation
SFIA
Sea Fish Industry Authority
SSB
Spawning Stock Biomass
Service industries
All ancillary and service industries supporting the catching sector – boat building, maintenance, supplies, equipment, etc
SU Strategy Unit
TAC Total Allowable Catch
TTWA Travel to Work Areas
UN United Nations
UNCLOS
United Nations Convention on the Law of the Sea
VCU
Vessel Capacity Unit
WTO
World Trade Organisation

Annex C: Stock stability analysis

For most UK stocks, the age structure is much more truncated than would occur naturally. This, combined with the natural high variability in recruitment, results in total allowable catch swinging significantly from year to year. The situation is worst for stocks such as cod where stocks are relatively low compared to historic levels. Current stock strategy is necessarily one of crisis management. Effort has to be cut, sometimes dramatically, to allow for stock recovery. This is undesirable because it makes fishermen's incomes uncertain and volatile.

Poor stocks contribute to dramatic year-to-year variations in allowed catch and fishermen's incomes

There is a high level of uncertainty inherent in the fisheries ecological system, stock assessment process and management process. These factors can combine to produce management decisions which may at best vary a lot from year to year, or at worst be inaccurate or distrusted. Fishermen are not able to plan business activities in the medium to long term.

An alternative approach to stock management would be to maintain a high biomass of key economic species by reducing fishing effort so that a much smaller proportion is removed in any year. In Iceland, the stock management strategy is to remove just 25% of the biomass, in Faeroes 33%. Currently, in most EU fisheries more than 60% of the biomass is removed each year.

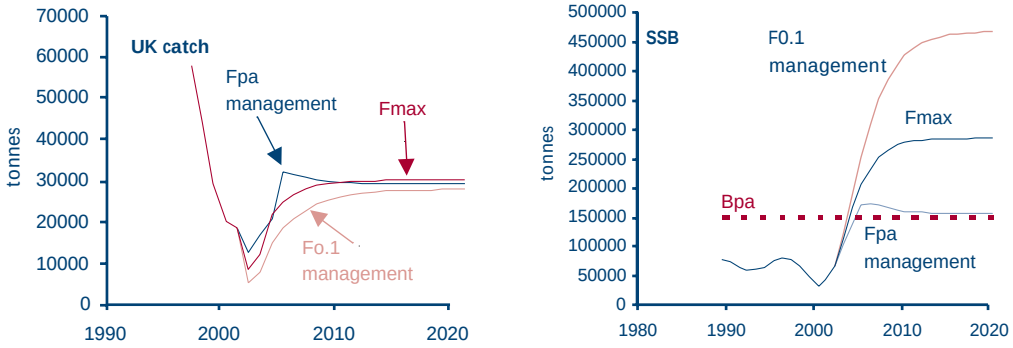
A large stock rule brings valuable stability in long-run catches, and the system is more robust to biological uncertainty and non-compliance by fishermen.

To manage stocks well, it is important to have a target above Bpa. Figure C.1 shows the results achieved from applying different fishing mortality management objectives to the North Sea cod stock. As expected, setting a management objective of Fpa (the precautionary level of fishing mortality) achieves Bpa in the long run. However, Fpa is intended to provide only a boundary for managers, not a target. Each time the stock size falls below Bpa, managers would need to reduce fishing mortality (quota or effort) to bring the biomass back to the target level. Around 60% of the SSB would be captured each year and there is a 30% probability that the stock would be over-exploited by 2015.

What happens if biomass is kept well above Bpa? One option is to produce the largest possible long-run sustainable yield (Fmax) – this would nearly double the SSB. Just under 33% of the SSB would be caught annually and there is an 18% probability of over-exploitation by 2015. Managing to an even lower target (F0.1) would generate a stock size around four times the Bpa size, providing a very large buffer zone. Only 16% of the SSB would be captured each year and it would be virtually certain that stocks would remain at sustainable levels in the long run.

The 'large stock' rule brings many benefits. There is greater stability in the catch since variation in annual recruitment volatility is buffered. Catch and effort levels can be set with much less annual variation. There is also a much lower probability of stock decline and the need for drastic management intervention. The mean age, and hence size, of fish and price are increased.

Figure C.1: North Sea cod SSB and catch modelled under different fishing mortality management objectives



Total catch **Total spawning stock biomass**

Moving to long-term management would allow a re-distribution of scientific resources away from the annual assessment cycle and more towards long-term assessments and widening the science base. It would also increase the average age of fish in the population, and, consequently the average trophic level of the catch (since older animals eat larger fish further up the food chain).

Figure C.1 shows that, despite some short-term losses, in the longer term the total value of the catch is almost unchanged as target F is reduced. The probability of Bpa falling below critical levels in 2015 falls from about 25% (using Fpa) to virtually 0% (using F0.1). The two major consequences of this are: that the risk of depletion, and therefore the need for intervention to recover the stock, is reduced; and that catches are less dependent upon incoming recruitment and are thus less variable.

Pricing the reduction in uncertainty

The London-based risk/reward consultancy Z/Yen have applied the Black and Sholes option value formula to value how much the Alaskan salmon industry would benefit from reduced salmon price volatility. Five different types of salmon were analysed: sockeye, chum, coho, pink and chinook. The value put on reducing volatility was based on what a 'reasonable person would pay to hedge the price risk'. The risk-free cost of money was assumed to be 7%.

Prices of salmon were analysed for the past 30 years and volatility (standard error) varied from 34% to 67%. The assumption in the analysis was that Marine Stewardship Council certification would reduce price volatility to its lowest level recent years. This would make the incomes earned by fishermen more stable and reduce the need to finance fluctuations in price. The saving of reducing volatility was put at $1million per year for the whole fishery. The cost of hedging was cut from 40 US cents per pound of sockeye fish to 29 cents, on a sale price of $1.55, representing a 7% effective price increase.

Source: Z/Yen data

This reduction in volatility has a significant, though usually unrecognised, value to fishermen. The financial markets are long experienced in valuing risk and the types of premium that should be paid for reducing risk. The Marine Stewardship Council asked a firm of risk consultants to examine the issue of risk management in the salmon fishery in northern Alaska (see box above). Using the conventional Black and Sholes option pricing theory, they suggested that reducing the volatility (standard deviation) of salmon prices from 40% to 20% is worth about £0.07/kg (salmon was sold for about £1.00/kg in the time period studied).

Figure C.2: Average age of fish in 25 of the stocks most valuable to the UK under different management rules

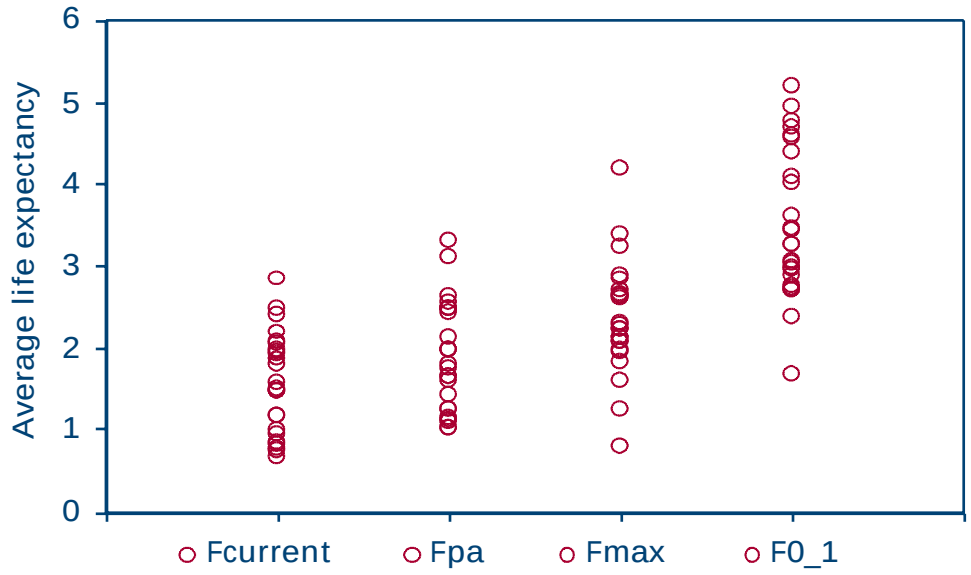


Figure C.2 shows the results of Monte Carlo simulations of how the average age of stock varies for different levels of fishing pressures. If F is reduced to F0.1, the average age of cod rises from the present age of 1.5 to approximately 3.

Figure C.3: Reduction in volatility from a large catch rule

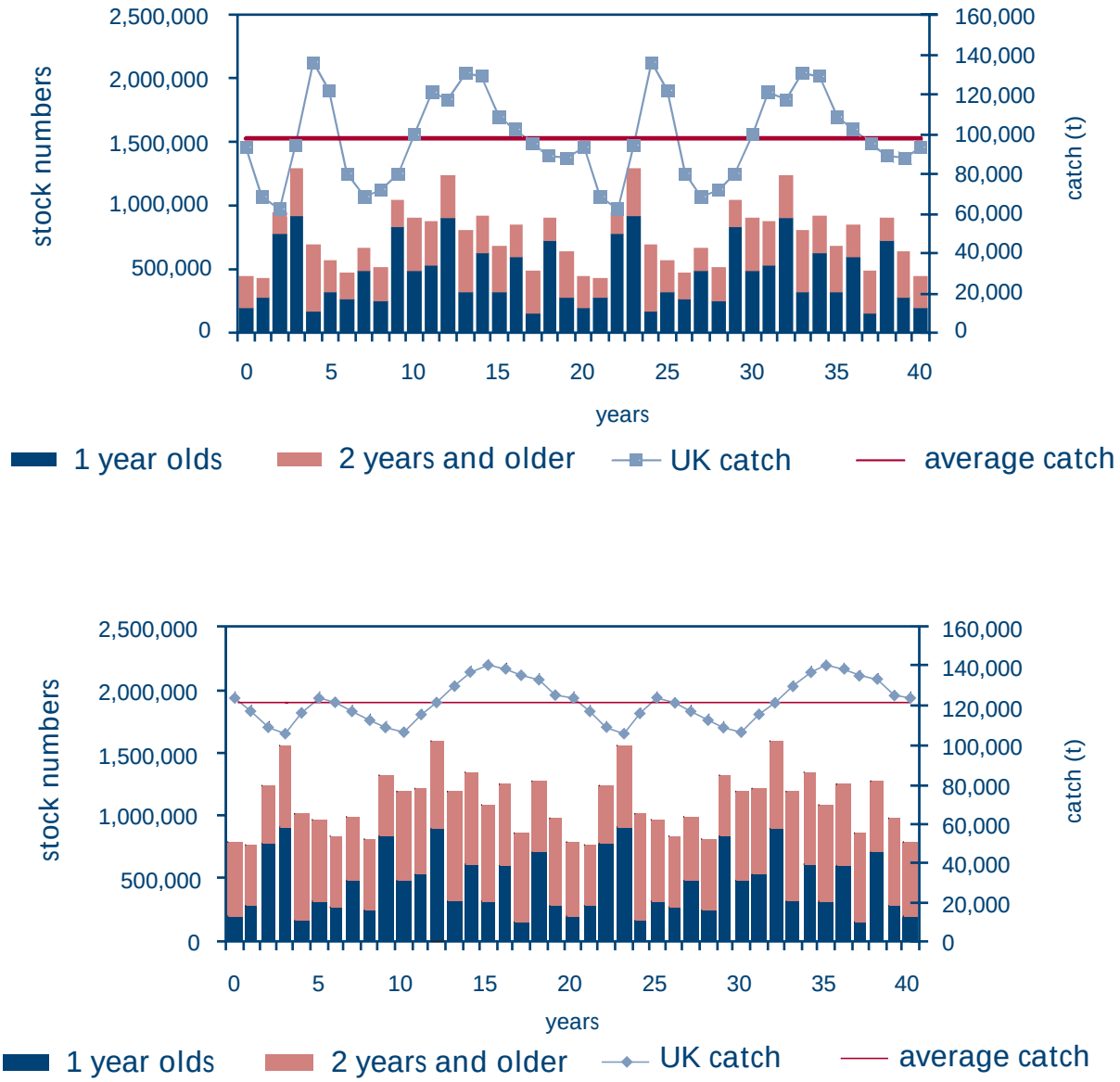


Figure C.3 demonstrates the buffering effect of having older fish in the population. This is a simulation of the North Sea cod stock with recruitment equal to that over the 20 years 1970 – 89. In the top figure fishing is at the level of recent years (F=1.1) and in the bottom it is at F0.1 levels (F=0.15). At the higher level of fishing mortality, most of the population is made up of one-year old fish and catch varies by 75,000 tonnes between the minimum and maximum levels, closely following fluctuations in recruitment. At the lower fishing mortality there is a larger population of older fish, and catches are much less dependent upon sharp fluctuations in recruitment. Consequently, fluctuations in catch are smoothed, and there is only a 35,000 tonne variation between minimum and maximum catch.

Annex D: Fishery incentives and policy

Key messages

This annex analyses fishery policies from the perspective of the fisherman looking at motivations, financial pressures and present management incentives.

This paper addresses two key problems in fisheries management:

- ensuring that fishermen comply with the rules of the fisheries management system; and
- preventing the build up of capital so that catching capacity exceeds the ability of the stock to replenish itself.

Current assumptions affect the types of tools used to manage fisheries:

- present policy seeks to manage fisheries by assessing the state of stock and attempting to restrain fishing using measures such as fishing quotas; and
- there is an implicit assumption that non-compliance can be addressed through better enforcement.

The evidence suggests that the picture is more complex:

- poor compliance is also the result of a lack of trust and poor profitability. Trust, profits and better enforcement are necessary to improve compliance; and
- over-investment can arise through small, incremental technical changes and not solely through major investment. Such decisions can be individually rational and low cost but in aggregate can result in irrational levels of investment.

The annex advocates:

- developing a more thorough understanding of the incentives on fishermen. This will require better information on fishermen's attitudes and industry profitability; proactive policies by fishery managers or the industry to monitor and restrain killing capacity; and policies designed to react more speedily to new information; and

- integrating risk management approaches with fisheries policy. Volatile recruitment can result in large swings in allowed catch and hence incomes. The industry needs a more systematic approach to handling such risks including clearer use rights, and adaptive management techniques to prevent over-fishing damaging long term fishing opportunities.

Moving to a high-compliance, high-transparency system requires some consideration of the process of achieving reform as well as the content of the reforms that are needed. This annex advocates that fisheries departments should:

- provide a clear strategic direction for fisheries policies; and
- work with the fishing industry to jointly implement the programme of reform advocated in the main report. This process should involve sharing responsibility with the fishing industry in return for their shouldering of a greater proportion of the management cost.

1. Objectives of the analysis and process

In order to manage UK fisheries successfully, managers need to understand a range of interlinked drivers in the fishery system. The choices made by individual fishermen affect the quantity of fish caught, the amount of profit generated by the industry, the level of investment in new boats and the quality of information used by scientists and fisheries managers. A proper understanding of how fishermen respond to decisions made by fisheries managers is essential to maintaining a sustainable fishing industry.

This annex analyses:
- the key incentives driving fishermen's decisions;
- how these incentives interact with the fisheries management system;
- the resulting key management challenges;
- which policies can address these challenges;
- results from the modelling analysis; and
- recommendations for the future.

This analysis relied on a wide variety of data sources, including a literature review, a consultation exercise, discussions with UK and international experts and results from two models developed by the Strategy Unit project team. Members of the project team visited many UK fishing communities and met with fishermen, their representatives, representatives from allied industries, scientists and fishery managers. We also undertook a series of international benchmarking trips to learn from the experiences of other countries.

2. Incentives

This section reviews the key drivers and pressures acting upon fishermen, which in turn affect how fishermen respond to management measures. The review draws upon available literature and face-to-face discussions held with fishermen and experts.

The main incentives facing fishermen can be grouped as:
- fishermen's attitudes;
- financial and economic pressures;
- management pressures; and
- individual diversity.

2.1. Fishermen attitudes

This section discusses the views and opinions of the fishing industry. No comment is made at this stage about the validity or accuracy of these views.

Distrust of science

The overwhelming majority of fishermen interviewed by the Strategy Unit, at all levels of the industry, doubt the validity of the advice official scientists provide to fishery managers. At the most basic level, fishermen believe official science underestimates the health of fish stock. More sophisticated criticisms (for instance Kristjansson, 2003) argue that the science is too crude: fishery models typically exclude multi-species effects, and ecological impacts (from climate and competition from other species).

The industry and official scientists are well aware of this tension and have gone some way in ensuring there is dialogue. CEFAS scientists and the industry hold regional meetings prior to the ICES working group meetings, and official scientists accompany fishermen to observe discards levels. However, a recent meeting organised by ICES to improve the trust between scientists and the industry concluded that 'the process of incorporation of additional information from the fishery into fish stock assessment should be viewed as a process rather than an act' (ICES/NSCFP, 2003).

The perception of the industry is that official scientists talk at, rather than to, the industry. In response, industry has developed initiatives such as the Europêche survey (Scottish Fishermen's Federation, 2002) collating the industry view about the state of the stock relative to the previous year. It wishes for a greater role in commissioning the science and gathering data on the state of the stock. The Sentinel fisheries scheme operating in Canada and north-east USA is held up by UK fishermen as a possible model for the future role of the industry.

Distrust of management

The industry's views towards fisheries management is similarly jaundiced. Broadly, fishermen believe they have too little influence in deciding how fisheries are managed – less than 15% feel involved and two-thirds feel either uninvolved or ignored (Hatcher et al, 2000).

The instruments used to manage fisheries are unpopular. Survey data (Hatcher et al, 2000) shows most fishermen believe quotas are ineffective at conserving fish stock (84% as they operate now, 60% even if all fishermen complied with their quota). A more recent survey (Hatcher & Gordon, unpublished)[50] echo these viewpoints: only 8% believe quotas are effective in conserving stock, only 37% agree quotas are the best way of conserving stock. In particular, the requirement to discard over-quota fish is unpopular with 99% of fishermen who believe it is wrong to discard 'good marketable fish because you are over-quota'. Over the past year, fishermen have offered to land fish and donate the

[50] survey of 70 skippers carried out in 2001

proceeds to charity rather than discard the fish. Fishermen argue that the geographic restrictions of ICES fishing zones, used for assigning quota and some technical restrictions, do not reflect fish movements (Nautilus Consultants, 1998). Fishermen express the least concern about technical measures with regards the fishing gear they are permitted to use.

Courts agree regulations are confusing

A Magistrates court in north-east England recently gave absolute discharge to skippers being prosecuted by DEFRA under temporary catch-composition rules in force as part of the cod recovery programme. The skippers successfully argued that the EU regulations were so confusing that they could not be understood.

Source: Fishing News, 2003

Compliance

Most fishermen do not consider themselves criminals for non-compliance with regulations and quota restrictions. Their communities and other skippers tend to be sympathetic when a fisherman is found guilty. (However, this picture does vary across the country, in the west coast of Scotland there is intolerance to non-compliance). A recent survey (Hatcher & Gordon, unpublished) showed that only 37% of fishermen agreed with the statement 'quotas should be complied with because they are the law'.

However, the majority of fishermen wish to operate within the rules: 70% of skippers considered violating quota restrictions was 'basically wrong, but an economic necessity'. Fishermen have mentioned their belief that non-compliance is an economic necessity in discussions.

2.2. Financial pressures and risk

Financial pressures

Fishing enterprises are businesses first and foremost. Earnings from fishing have to be sufficient to maintain and invest in the vessel, pay the skipper's and crew's wages and meet all other variable costs. In the UK, as in several other European countries, individuals and families, as opposed to large and medium-sized companies, own boats. Fishing is a capital-intensive industry and entrepreneurial fishermen can take on significant financial risks. A fisherman, interviewed by the SU, had financed the purchase of his £2.5 million whitefish boat from bank loans, by mortgaging his home and by borrowing from his family. He is in no way atypical, new whitefish boats cost in excess of £1 million. A new entrant into the industry has to purchase not just his boat, but also a fishing licence and quota. Often this risk is pooled between the skipper, crew and fishing agents, with each party taking a share in the boat.

Table D2-1 is drawn from a survey by Seafish (Watson & Martin, 2002) and shows the profitability of different segments of the UK fleet. The figures exclude capital charges such as interest and depreciation. If these were accounted for profits would be lower. The figures highlight the change in earnings over three to five years. Profit margins in 1997/98 were between 15% and 30% but these fell by 50% by 2000/01. The profit margin in the whitefish fleet segments averaged 5% of revenue.

Table D2-1: Comparison of average earnings and profit levels per vessel for 1997/98 and 2000/01 across key sectors of the Scottish fishing fleet.

Sector	Average earnings 1997/98 (£)	Average earnings 2000/1 **2002/2003** (£)	Average profit 1997/98 (£)	Average profit 1997/98 **2002/2003** (£)
West of Scotland nephrops trawl	202,119	151,609	69,513	30,526
North Sea nephrops	186,197	161,527	59,708	19,235
North Sea and west of Scotland twin rig whitefish trawl	965,878	630,000	164,905	72,000
North Sea and west of Scotland twin rig nephrop trawl	506,877	270,717	96,991	14,745
North Sea and west of Scotland demersal trawl >24m	772,399	680,000	158,731	30,000
North Sea and west of Scotland demersal trawl <24m <300kw	326,472	275,000	49,552	10,000
North Sea and west of Scotland seine nets	622,818	390,000	118,616	20,000
North Sea and west of Scotland demersal trawl <24m >300kw	526,232	400,000	80,024	30,000
West of Scotland scallopers	*	277,705	*	63,481
Under 10m vessels with mobile gear	*	68,353	*	-438
Under 10m vessels with static gear	*	47,059	*	11,088

Source: Watson & Martin, 2002; Watson and Seidel (2004).[51]

Risk

As well as the average level of profits, fishermen will be concerned about the riskiness of income. The above table highlights the substantial variation in profitability over a short period of time. Risks that fishermen are prone to include changes in poor weather, physical damage to boats and price risks such as fish and fuel prices. There are also regulatory risks arising from the management system, including changes in TACs, allowed fishing days and technical changes in regulations. Any management system needs to consider the how fishermen will manage these risks.

2.3. Perverse impacts

The current system of management can influence fishermen's behaviour in a number of unwanted ways. This section discusses three of these.

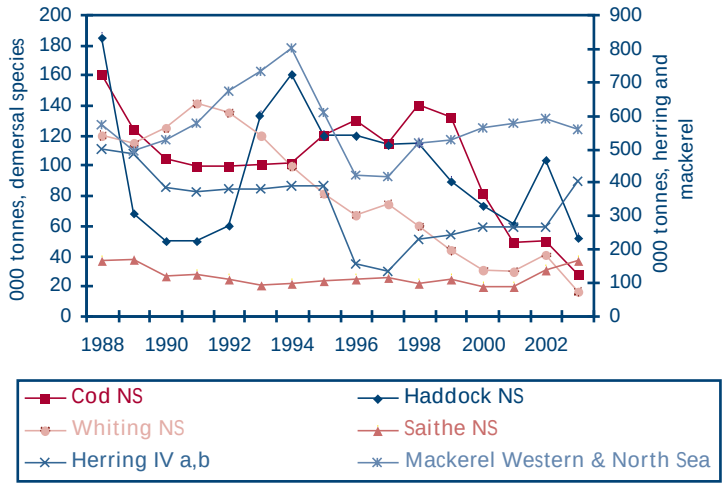
[51] Watson J and Martin (2002) "Economic Survey of the North Sea and West of Scotland Whitefish Fleet" Seafish,Edinburgh
Watson J and Seidel (2004) "Economic Survey of the North Sea and West of Scotland Whitefish Fleet" Seafish, Edinburgh

Short-term planning

At present the management system is geared towards the provision of annual management advice. This advice is agreed in December and implemented the following year. The total TAC set for a fishery can vary significantly from year to year. Figure D2-1 shows how the TAC has varied between 1988 and

1999 for a selection of species. TACs for cod, haddock and whiting dropped by 80%, 42% and 64% respectively between 1993 and 2003. As well as this decline in demersal TACs, there has been a constant and high degree of volatility. The standard deviation of TAC for the featured species has been around 15% of the average TAC.

Figure D2-1: Fishing TACs and quotas agreed by Fisheries Council and non-EU countries fishing in water, 000 tonnes



Source: European Commission, various years

This unpredictability of revenue affects fishermen's behaviour. In order to plan, especially for long-term investment decisions like the purchase of new boats, businesses value predictability in revenue. Predictability reduces the cost of borrowing, it makes staff recruitment and retention easier, increases the value of investing in training and hence improves the skills and calibre of crew. Without predictability, businesses engage in behaviour that gives short-term returns such as reducing crewing levels or increasing immediate killing power by, for instance, installing twin rigs.

There has been discussion for many years about setting multi-annual quotas to provide fishermen with greater predictability in income. The difficulty in implementing this idea is that a 'precautionary' multi-annual quota that is safe for several successive years of lower-than-average recruitment would have to be set much lower than the present TACs, further reducing fishing income. This is unpalatable to fishermen.

Race to fish

It is common for many fisheries to be closed for periods of the year. This might be to accommodate the natural migration patterns of fish or maybe to protect juvenile and breeding stocks. As soon as the fishery is opened, fishermen have an incentive to fish hard, since stocks will have recovered from the closure and fish will be at their most abundant. The mackerel fishery in north Scotland is open between October and March and the herring fishery from June to September. This seasonal access to the fishery creates an incentive for fishermen to concentrate their efforts as early in the open season as possible, when stocks are at their healthiest.

Even without formal closures there can be a race to fish as a result of cut-off dates. If fishermen are constrained in how much they can catch per year, they will ensure they use their quota before the end of the year. Consultees have commented that, because the fishing year closes in December, fishermen will often fish hard in winter to ensure they use up all their quota. Since this is the most hazardous time of the year, it can result in fishermen going out in unsafe weather conditions. If this is significant – allowing a small element of carry over from one year to the next, or simply changing the cut-off date, might be an appropriate policy response.

The race-to-fish can be exacerbated if fishermen are not allocated individual fishing rights as fishermen vie to do better than their competitors. The anticipation of new management measures can also encourage spiralling volumes of fishing activity. This type of incident was witnessed prior to the introduction of monkfish quotas in 1996 as fishermen strove to establish track records in anticipation of forthcoming quota controls.

Perverse incentives

Subsidies

Subsidies such as price supports and aid for new boat investment increase profits in the short term by increasing revenues or reducing the effective cost of investment. However, in the long term they are negative, as they distort economic signals in the fishery and so encourage over-investment and over-fishing. The CFP review in 2002 called for an end to government subsidies for new boats or modernisation by 2004. The World Trade Organisation is also looking to introduce worldwide restrictions on damaging fisheries subsidies in the current round of negotiations.

Decommissioning

Decommissioning is a form of subsidy intended to reduce the amount of killing capacity. However, if undertaken regularly it can have the perverse effect of reducing the cost of exit and hence incentivise banks and fishermen to make riskier investments.

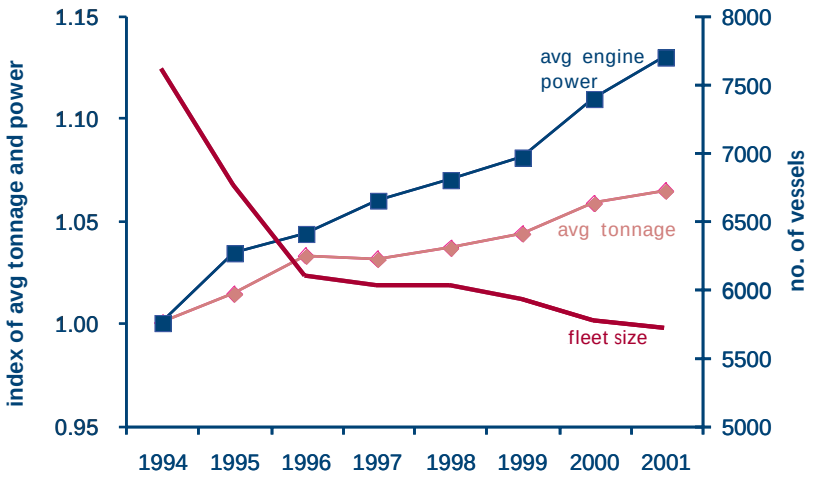
Decommissioning schemes have been in operation in seven of the last 11 years. The vessels decommissioned in the early years tended to be older, less active and less productive than average (Nautilus Consultants, 1997). Therefore, the impact of the scheme on fishing mortality was probably proportionately less than that indicated by the reduction in vessel numbers.

Super-under 10s

Under-10m vessels are more lightly regulated than large boats in order to ease the regulatory burden on smaller, often part-time fishermen. In particular, there is no obligation for under-10m vessels to record their landings. This has had the perverse effect of encouraging skippers of larger boats to switch to under-10s but to augment their capacity to make them ‘super-under-10s’.

Over the last decade, the size of the under-10m fleet has decreased significantly from around 7,500 boats in 1994 to 5,700 in 2002 (Figure D2-2). Despite this reduction in the number of vessels, the productive capability of the fleet, in terms of its average tonnage and engine power, has increased significantly. This increase in physical capacity and productivity is due to the emergence of a fleet of new, highly powered vessels which are 10m or less in length. Such behaviour will always occur when restrictions are applied only to certain classes of boat. A policy response might be to ensure that all sectors bear similar responsibilities.

Figure D2-2: Increased productive capability of under-10m vessels



Source: DEFRA, 2003

3. Key challenges and options

This section of the report analyses the key challenges in aligning the fishermen's incentives to the management priorities and discusses possible approaches to addressing these challenges.

3.1. Information

Under the current management system the fisheries manager needs timely and accurate information on the stock, and ideally stock forecasts for the forthcoming year.

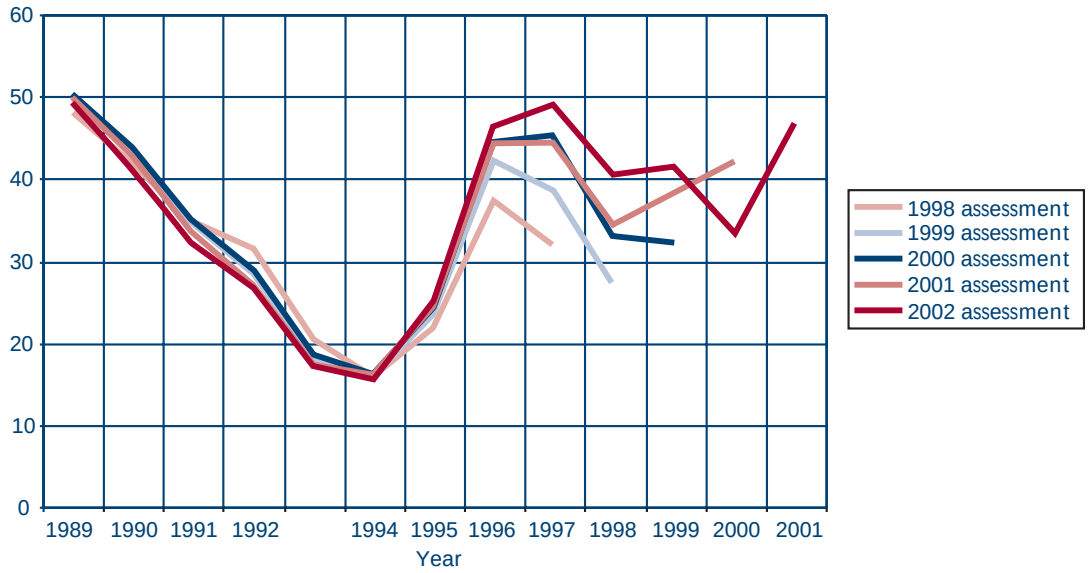
ICES carries out stock assessments for most of the key species and fisheries exploited by the UK. These stock assessments and the resulting management advice provided by ICES are highly influential in setting TACs for the forthcoming year. From the fishery managers' perspective, there are several important questions that need to be addressed:

- Is the quality of information fit for purpose?
- Should they be collecting other information?
- What effect does the process of information-gathering and stock assessment have on the management system?
- How can we improve the information?

Significant financial and scientific resources are spent on stock assessments but there are still wide confidence intervals in the current year's stock assessment, and even more in the forecast for the forthcoming year. The European Commission has funded work on the statistical quality of our assessment of the size of fish stocks. Stocks' standard error lie between 10% and 30% (EVARES, 2003). This error arises because of differences in fish abundance from the different sample points on the bottom-trawl survey. Other errors associated with forecasting (assumption on mortality, recruitment, etc) worsen our estimate of future fish abundance.

This is true even when the system has good quality information on landings. Figure D3-1 shows successive assessments of the Faeroese cod catch. The Faroes has good quality landings data with little under-reporting of catch. The figure shows that the 1997 catch was revised upwards by about 50% as better information came to light. This is not a criticism of the science – fish populations are intrinsically hard to model, especially when a high proportion of the fish are very young and are recently recruited. Such changes make the TAC advice based upon them unsafe. Rather than trying to modify TACs from year-to-year in line with supposed changes in stock, other approaches might be appropriate, making use of up-to-date information and closing fisheries at short notice if too many juveniles are being caught.

Figure D3-1: Comparing assessments 1998–2002 Faeroe Plateau cod



Source: Faeroese Ministry of Fisheries

As has been mentioned, the fishery manager needs to consider a wider set of issues than just the state of stock when deciding on the appropriate type of management response. Involving the fishing industry in determining research priorities, assessing the value of greater information and contributing a greater share of the funding would provide a better set of incentives to improve trust between fishermen and scientists.

Information about the economic health of fishing operations is also important. Seafish (Watson and Martin, 2002, Watson and Seidel, 2003) and CEMARE (Cattermoul, 2000) have been collating information relating to the economic and financial performance of fleets for several years. Such a database not only tracks trends but forms a crucial component of many other types of fisheries' economic research and analysis. However, the timing and source of funding is unsteady, reducing continuity and the ability to use these data in an ongoing way.

Research into other aspects of fishing activity, such as the economic and productive efficiency of fishing operations or the fleet's physical capacity, has also been undertaken in recent years. A few studies have been funded at a national level on specific issues, but the majority of funding is provided by the EU. Little funding is available from domestic sources to carry out or encourage in-depth academic and policy-related research. The UK is the only major EU fishing nation not to have an ongoing contract for research provision and policy advice with a dedicated fisheries economic research organisation (per com CEMARE).

3.2. Compliance

Compliance can be thought of as the people's spontaneous adherence to rules. It arises as a consequence of trust in the system and social and community pressures. The success of the fisheries management system depends not just on the quality of policy but also on the extent to which fishermen naturally adhere to its measures.

Managers have to develop systems of enforcement to ensure that people who do not comply with the rules are detected and punished. A successful system depends on the majority of fishermen trusting the system, not because of enforcement activities but because the majority regard the rules as useful.

By its nature, there is little hard data about the amount of black landings. In a recent survey, albeit smallscale, of English fishermen within a particular region, 43.5% of fishermen estimated their landings had been over-quota by 10% or less and 29% said their landings had been over-quota by 25% or more.[52]

Lack of compliance is caused by many factors. The risk and cost of being detected and fined is obviously an important issue. The recent NAO report, based on the analysis of offences that went to court in 2000–01, calculated that the present level of fines represents only 1.7 times the value of fish illegally landed and that only 122 fishermen were found guilty over this two-year period (NAO, 2003).

The table below shows results from interviews with Scottish fishermen conducted in 1997 and 1998. Other fishermen's behaviour, and financial necessity are the most important reasons. Evidence presented earlier in this report confirms the problems with lack of profitability in the whitefish fleet in 2001. This situation will have deteriorated further since then as a result of the reduction in whitefish quotas. Some fishermen argue that they simply cannot remain in business if they restrict their catch to quota levels.

Lack of respect for the rules and biological pressure (they could not avoid catching large quantities of saithe for which they had no quota) are also cited as reasons for non-compliance. Fishermen are particularly critical of rules such as lines of latitude or longitude acting as demarcations for stocks and the need to discard marketable fish, which they cannot avoid catching in a mixed fishery. In autumn 2003, substantial quantities of valuable monkfish were discarded because an underestimate was made of the state of the English Channel stock.

Table D3-1: Key motivations in fisheries offences in Scotland

	North east whitefish trawl	North east nephrops trawl	Shetland whitefish	Pelagic	West of Scotland nephrops	All groups
age/experience in fishing	5	3	4	7	4	4
financial pressure	1	1	5	3	3	2
biological pressure	6	6	3	6	2	4
inadequacy/irrelevance of legislation	2	5	2	4	4	3
experience of other fishermen's behaviour	3	2	1	1	1	1
inadequacy in enforcement	4	4	7	4	6	6
fear of the court process/ community reaction	7	5	6	6	7	7

Key: 1 = most significant, 7 = least significant
Source: Nautilus Consultants, 1998

[52] Hatcher, A. (2000) 'Normative and social influences affecting compliance with Fishery Regulations' Land Economics, 76 (3): 448–461.

Non-compliance is a problem because it disrupts efforts to recover stocks, because it undermines trust in the system and because it corrupts incentives within the industry: fishermen who would prefer to be in compliance have less incentive to remain in the industry. To address the issue of non-compliance it is necessary to address each of the above issues: the lack of profitability, lack of trust in the system and the difficulties in enforcing the current regime.

The key questions are:

- How can we enhance trust in the system so fishermen believe the rules and restrictions placed upon them are in their interests?
- How can we improve profitability in the whitefish sector so most fishermen can make a reasonable profit most years within their quotas?
- How can the enforcement system be designed so there is a high probability that non-compliant fishermen are efficiently and fairly dealt with?

Legitimacy

Legitimacy in the system can be improved only by responding to fishermen's complaints in a constructive and inclusive manner. The industry should feel ownership for the system and that they play a significant role in determining the management rules. At present they feel remote from the decision-making process.

The relationship between fishermen and scientists is strained. Fishermen organisations have attempted to bring ideas and information to the table. The Europêche / North Sea Partnership survey, in which the SFF participates, asked a sample of 778 fishermen who fish in the North Sea how the state of the stock changed between the first half of 1999 and the first half of 2000. An assessment by ICES suggests that there was broad agreement in the findings of scientists and fishermen in terms of the change in the state of stocks (ICES, 2002). However, there is still very limited integration of fishermen's observations and data into the official system, and in some respects less use is made of fishermen's information since catch per unit effort is no longer used and official landings data is supplemented with an assessment of unaccounted for removals.

The situation is arguably worst for species where no formal stock assessments are carried out and 'precautionary TACs' are determined by historic landings. As we know these often greatly understate real landings or reflect a lack of demand rather than a lack of supply (SFF, 2003) such as landings of nephrops and monkfish in the early 1980s.

Discarding of marketable fish is a particular problem, especially in mixed fisheries where fishermen have little control over which species they catch. 99% of fishermen regard the discarding of marketable fish as wrong (Hatcher & Gordon, unpublished). This practice also brings the industry into disrepute with the public. The challenge is how to allow fishermen to land accidentally caught fish for which they have no quota, without creating the incentive to target these species.

Enforcement

An enforcement system which gives fishermen a strong incentive to comply, requires a number of features, most of which will seem obvious. The rules being enforced should be easy to understand by fishermen and by the enforcement agency. The action that is being restricted should be under the direct control of fishermen. Non-compliance should be easy to detect. The punishment should be in proportion to the crime.

Fishermen regard the present system as being overly bureaucratic. This may or may not be a fair criticism. It is certainly the case that many rules (days at sea, TACs and gear restrictions) apply to particular ICES regions, making it difficult to comply with them and difficult to enforce. Species quotas are intended to reduce effort on vulnerable stocks; however, in many fisheries fishermen cannot target species with sufficient discrimination to remain within these quotas – resulting in over-quota fish either being discarded or illegally landed. In such mixed fisheries, the management system is seeking to restrain actions outside the fisherman's direct control. Lastly, landings limits are intrinsically difficult to enforce: fish can easily be disguised by under-reporting the weight of catch, mislabelling the species of part or all of the catch, misreporting the area or illicitly landing fish. There are other ways of restricting fishing pressure (effort-days) which are easier to measure and enforce.

Improving compliance

Some offences might occur because fishermen obtain the tacit support of buyers. If compliance is improved, this system of collusion will be weakened and many types of illegal activity will become harder to organise. Many of these issues could be addressed by having a more open system of recording information and mechanisms for checking consistency between different information sources. Introducing cost recovery for the costs of control and enforcement would also provide positive incentives for fishermen to tackle non-compliance themselves. Reducing levels of non-compliance would then directly benefit fishermen by resulting in lower levels of cost recovery. If the level of contribution were also proportional to the scale of the problem, with 'high-risk' sectors paying higher fees, the incentive to improve compliance would increase.

Even if rules are changed to improve the incentive structure and we successfully deal with non-compliance, a minority of fishermen will continue to break the rules. For them, the level and probability of fines must be sufficient to deter non-compliance. In some countries non-compliance is handled by administrative procedure rather than through the courts. Typical punishments include confiscating the fishing licence for a defined period of time, or fining. Both of these can be faster to implement and less expensive than the current criminal procedure (the average fine paid in England and Wales in 2001 was £3000 (NAO, 2003)).

Risk management

Some sources of risk are within fishermen's control (eg state of repair of their boats, freshness of fish) and others outside their control (weather, national TAC). At present, the cost of these risks is borne largely by fishermen in the form of high volatility in individual incomes. A more rational response by fishermen would be to manage the risks by reducing the volatility of those variables they have control over, and hedging the risks for those variables that are outside their control. It would also be helpful for risk management to be more explicitly built into the fishery management design to ensure that the management system does not impose undue extra uncertainty on the industry.

Specific measures to improve compliance include:

- allowing fishermen a greater role in the management of fisheries and allowing management decisions to be made closer to home;
- profitability can be increased by reducing the number of boats active in the fishery, either by permanently removing boats, supplemented by tying up a proportion of boats until stocks recover. Clearly, a judgement needs to be made about the extent to which stocks will recover in the near future, and hence about the balance between tie-up and structural removal;
- stocks which have high bounds of uncertainty or for which no scientific assessment is made should be managed in a more adaptive way. Data can be collected by observers, or from landings data. The management system should also permit a straightforward and routine means of revising the TAC as new data becomes available;
- fishermen should be allowed to land fish for which they hold no quota but they should pay a 'deemed value' to the fishery manager so they make no profit or loss from the sale; and
- using administrative procedures rather than criminal fines to punish non-compliance.

3.3. Profits

Fishermen are profit seekers. Some operators remain in the industry as they place a high value on the way of life and on the maintenance of family traditions and connections; however, the overriding aim of being an active fisherman is to generate an economic return. Fishery managers, therefore, do not have to directly encourage actions to improve profits; however, it is extremely important that they are aware of the impact that different types of management tools will have on profitability.

Encouraging a sense of ownership of fishing access and use rights encourages a more collective approach to using such rights in a sustainable manner. Individual allocation of rights is the obvious extension of this approach. Allowing individual rights to be fully and freely transferable enables fishermen to adjust

their holdings of rights to match their productive capacity. It is well known that an ITQ system encourages fishing rights to be concentrated in the hands of a reduced number of operators who are probably the most efficient fishermen and/or the most dynamic businessmen. This concentration may be at the expense of offshore employment numbers[53] or employment in vulnerable communities if the effects are not directly mitigated. However, ITQs generally result in higher profits for the remaining individual fishermen and the fishery as a whole.

An analysis of the extent of excess capacity in the Scottish fishing fleet found that, if fishing rights were allocated to the most economically productive operators, whilst maintaining their current productive capacities (ie boat, engine, gear, etc.) and sticking to traditional species mixes, then 2001 Scottish catches could have been caught by around half the current number of vessels with around 40% less crew (Tingley and Pascoe, 2003). However, the profit gain would have been nearly double that made in 2001 (78% increase).

Input controls that are individually allocated and transferable may stimulate a similar concentration in the hands of the most efficient and productive operators. However, there are added complications compared to individual output allocations which may affect profitability in the long run. The relationship between inputs and expected fishing mortality is difficult to quantify. Fishermen become incentivised to increase their productive capability if input controls are used in isolation. This, in turn, affects stock levels in the long-run and hence profits. Technological developments tend to result in 'technical creep' which leads to increased fishing mortality, as opposed to cost savings or value-added. Managers need more and different information (on catch per unit effort) to determine appropriate controls and limits on input transferability between vessels and fisheries.

3.4. Capital entry/exit

Over-capitalisation is a problem because it reduces the profitability of vessels, inhibits modernisation and puts pressure on stocks. SU analysis suggests a substantial reduction in the whitefish fleet is required to ensure that the fleet is profitable, competitive and sustainable (in terms of its alignment to resources) in the long run.

Fleets become over-capitalised for a range of reasons:

- subsidies directly aimed at increasing the productive capacity of a fleet;
- management policies that do not limit or incentivise fleets to be in alignment with available resources;
- indirect subsidies (ie not recovering management costs) that incentivise against limiting over-capitalisation; and
- technical creep.

The fishing industry is structurally prone to 'boom and bust' cycles, driven by biological fluctuations in stock availability and the possibility of generating super normal profits[54] (also known as resource rents) when stock levels are high. Operating profits in the pelagic industry are substantial – average revenue per boat was £3 million in 2001 while the cost of a new vessel is £10–16 million, meaning that capital can be accumulated rapidly through retained earnings and borrowings. If fishing mortality is not restricted, new entrants can be attracted into the fishery by the potential to make high profits, or existing owners can expand their own vessels. As new fishermen enter, profits become eroded as stocks decline and the cost of catching extra fish increases. Unless vessels can move out of the fishery when stocks fall (ie into other fisheries or by decommissioning the vessel), the over-investment in productive capacity becomes 'stuck'. It is, therefore, crucial that fisheries are managed to limit fishing mortality and so protect resources in the long-run.

Management policies aim to restrict fishing mortality. This can theoretically be achieved by controlling the amount caught, placing limits on the amount of fishing effort or limiting investment. We argue that the least costly and simplest option might be to limit the amount of investment so killing capacity is broadly in line with long-term average stocks.

There are three possible options available to management and/or fishermen to help minimise the risk of a 'boom and bust' capital cycle:

[53] But not necessarily onshore or total industry employment.
[54] Investors consider profits to be 'normal' according to the rate of return on invested capital; often between 5%–15% for low to medium-risk industries.

- Option 1: voluntary withdrawal of capital;
- Option 2: industry-organised contributory scheme; and
- Option 3: tax on resource rent.

Option 1: voluntary withdrawal of capital

It is normal business practice in any industry to review the size of production activities and adjust them to align capacity with opportunities. Individual fishing vessel owners do this at the boat level, eg reducing crew numbers when fishing is poor. However, the individual operator is restricted by the amount of change that can be made to the size of the operation – a vessel cannot be cut in half (although many small vessels have been physically reduced in size to squeeze into the under-10m length category). Owners who operate more than one vessel can downsize activities by removing whole vessels from their fleet. Beam-trawl operators owning more than half a dozen vessels used the 1993–96 decommissioning schemes to rationalise their activities in this manner (Nautilus Consultants, 1997). Voluntary restraint occurred at the fleet level in the Australian nephrops fishery: the fleet took a collective decision to reduce vessel numbers from 300 to 90 on purely commercial grounds. By reducing capacity, stocks were conserved and regrown and total fleet profits increased as a result.

Voluntary restraint by the industry works best when there is a small number of players who are willing to act together, or where many boats are jointly managed by a single company, allowing for actions to be co-ordinated. This type of collective action will only work where direct benefits flow back to the group of operators who are reducing capacity. In the UK context, perhaps the pelagic fishermen are best placed to develop such co-operative actions to restrict capital. Clearly, the actions need to be consistent with UK and EU competition policy and demonstrate that there is no detriment to the consumer in terms of higher prices. Similarly, some shellfish fishermen may reap the benefits of co-operative action.

Option 2: industry-organised contributory scheme

The second option involves the industry, perhaps through a trade association, paying a share of their profits into a fund when biological stocks are above average levels. This would prevent supernormal profits giving rise to over-investing in the industry. The fund could be used to self-finance tie-up periods or decommissioning programmes if stocks became depressed or if fleet productivity rose unsustainably.

Such mutual insurance is found in other industries. For instance, travel agents assure one another's liabilities through the ABTA[55] scheme, which protects customers against the insolvency of individual travel agencies. A system like the ABTA scheme works well when there is a large number of individual operators and a powerful industry body. Therefore, this type of scheme would be best suited to fisheries that consist of many individual fishermen. Success would be based upon the ability to establish a central organisation to facilitate the mutual insurance scheme and ensure buy-in to the idea by individual fishermen.

Option 3: tax on resource rent

Options 1 and 2 effectively allow fishermen to retain profits within the industry. The third option involves fisheries managers actively withdrawing a proportion of super normal profits (known as resource rents) generated when stocks are healthy and economic returns are good. By withdrawing money in this way the government effectively reduces the amount of profit left in the industry which could be used to over-invest in capital. It therefore helps to control a build up of capital overhang in the good years, which exacerbates over-fishing in the bad years.

Besides helping to minimise capital overhang, there is a point of principle involved in taxing resource rents. Fish stocks are a natural resource and so are effectively 'owned' by society as a whole. Other users of marine natural resources (ie oil, gas, mineral extraction, etc) pay charges to government for being allowed to make economic returns from socially owned resources. There is an argument that fishermen should be charged in a similar way. Such a charge could be extracted as a tax on high profits and the money 'returned' to the tax payer, ie the real 'owner' of the resource.

Alternatively, the money could be retained by fisheries managers and used to finance management, science and enforcement activities. However, from an

[55] Association of British Travel Agents.

economic viewpoint, providing these services free of charge effectively means that the government is subsidising the industry. If the money was used to this end, it is more correct to call it a cost-recovery charge rather than a resource rent tax.

Cost recovery

Failure to recover the costs of managing a fishery is a form of indirect subsidy. Therefore, cost recovery should be introduced gradually in most fisheries as a matter of course. Many countries with relatively healthy fish stocks recover their management costs. For example, in Australia's offshore fisheries the industry pays for costs relating directly to the fishing activity. However, costs related to exploratory, collapsed or developmental fisheries are only partially recovered (Tingley & van Santen, 2001). New Zealand operates a full cost-recovery programme and Iceland recovers some costs (eg quota transfer, fishery monitoring and vessel inspection fees).

4. Managing change

This paper has examined the incentives on fishermen and the need for the fisheries management system to address the four key flows of profits, information, compliance and regulation of capital. The policy and institutional changes required to effect a successful fisheries management system are developed in detail in the body of the main report. But effecting change is about more than simply finding a solution and implementing it. Policy develops through a series of incremental choices, each of which is rational in its own right but which can lead to a policy that does not produce the required outcomes. The perverse incentives produced by such incremental reform can get institutionally locked into the system. Evolutionary responsibility is needed over time. This section looks at the process of implementing change by presenting four case studies and identifying the common themes to draw some general conclusions about adaptive policy-making.

4.1. The Faeroe Islands

The early 1990s saw a disastrous collapse in fish stocks in Faeroese waters. Denmark agreed a loan package, but with the condition that the Faeroese implemented a quota system. This was seen as an outside imposition and resisted by the industry and parliament. When it was finally agreed and implemented in 1994, fishermen responded by refusing to comply with the rules. This resulted in substantial discarding and misreporting of catches. Reorganisation of control and enforcement failed to solve the problem.

The fishing industry was asked to come up with an alternative to the quota system in 1996 and developed a system based on fishing effort (time spent fishing) rather than catch limits. This system restricts vessels of a certain size and gear type to particular portions of the waters around the Faeroes. All fish that are caught during a fishing trip can be landed and legally sold.

The system is strongly supported by the fishing industry and has, so far, produced good results.[56]

4.2. Iceland

Iceland regulated fisheries using effort quotas in the period 1977–83. These encouraged a 'race to fish' whereby vessel owners rushed to maximise their catch in the available fishing days. Meanwhile, loose controls on fishing capacity allowed this to increase and the number of fishing days had to be reduced (from 323 in 1977 to 215 in 1983).

By 1984 the cod stock had declined to its lowest point. In response, the government introduced individual vessel quotas with limited transferabilty. These evolved into a system of individual transferable quotas (ITQs), a process made uniform by the Fisheries Management Act of 1990.

The introduction of ITQs in Iceland has had considerable economic benefits. Over-investment in fishing capacity has been restrained, the fleet has contracted and fishing effort has been reduced. At the same time whereas most fishing firms have become profitable, previously many made heavy losses.[57]

The new system is not universally supported. The small boat sector and fishermen's unions have complained that the cost of renting quota has reduced the crew's income. Consolidation has left a profitable fleet but has left some vulnerable fishing

[56] Reinert, J. (1998) Faroese Waters: Environment, Biology, Fisheries and Management.
[57] Gissurarssan, H.S. (2000), Overfishing: the Icelandic Solution, Institute of Economic Affairs

dependent communities exposed as quota has left their communities.[58]

4.3. The Netherlands

Before 1976, fisheries were mainly controlled by minimum mesh and fish-size regulations. These were not effective – stocks declined and profitability suffered. Individual vessel quotas were introduced for flatfish along with engine power restrictions and a limit on the maximum number of days vessels could spend at sea. Initially quotas were attached to vessels, but the system became more transferable and in 1985 developed into ITQs.

From 1988, the Dutch increased their enforcement effort to make exceeding quotas more difficult. This led to an acrimonious relationship between the government and stakeholders. There were clashes with police and even riots in some fishing ports.

Reconciliation came in 1991/92 with the Ministry and fishermen agreeing to enforce quota limits jointly and fairly. Fishermen's Fisheries Management Groups were set up to co-operate in management and enforcement. Considerable expertise and peer pressure has been brought into the enforcement process.

The Netherlands is considered to have fairly high degrees of compliance. In part this is due to the factors that make enforcement more straightforward (such as the limited number of ports) but it is also due to the acceptance of the fairness of the system by fishermen.[59]

4.4. 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 inshore sector. This led to a decline in fish stocks and poor profitability.

The Fisheries Act 1983 attempted to deal with these problems. The current ITQ system gradually evolved from these beginnings.

Initial resistance to ITQs gradually led to acceptance as the rewards became clear. This has evolved into a consensus supportive of property right-based management. In 1990, following protracted negotiations with the industry, ITQs were adopted across all fisheries.

An advanced system of co-management and even self-management by the industry has evolved. The industry is active in enforcing fisheries rules. The Challenger Scallop Enhancement Company has taken over compete responsibility for the southern scallop fishery, carrying out all management functions as well as stock enhancement activities.[60]

4.5. Lessons learned

This section does not draw conclusions about which set of fisheries management tools have proven to be the best in different countries. This choice can be informed by international comparisons and consideration of the specifics of the UK situation. This paper looks at the process of policy formation to inform the necessary discussions that need to take place between fisheries departments and the catching sector.

Fisheries managers need to provide the strategic direction for fisheries policy and work with the fishing industry as management partners. Partnership involves the fishing industry paying for some or all of the costs incurred in fisheries management in return for a greater say in how that money is spent. In the examples cited above, industry co-operation, or the lack of it, was crucial to the success or failure of the measures used. A simple command-and-control approach is unlikely to work in this field, not least because most activities are carried out in circumstances which make thorough surveillance impossible. Regulators cannot implement effective fisheries management without the consent of the governed, but this does not mean that fisheries managers do not have a leadership role. As the New Zealand case demonstrates, the initial attitude of the fishing industry to reform is likely to involve resistance. The regulator needs to provide a clear strategic direction and adopt the attitude that the fishing industry is a partner in this enterprise, not the object of government regulation. True partnership between fisheries departments and the fishing

[58] Source: Strategy Unit interviews.
[59] Arnason, R. (June 2002) A review of international experiences with ITQs, University of Iceland, CEMARE.
[60] Arnason op. cit.

industry will require sharing responsibility for decision-making and the costs of management.

Improving trust and responsibility is an evolutionary process. The response to a crisis from government produces a response from fishermen and this response is not necessarily simply to obey. Any new system of management sets up a new set of incentives. Fishermen adapt their behaviour to the new system, sometimes in unpredictable ways. The system needs to be able to learn and adapt. Developing a system that works is an iterative process – problems cannot be solved in one go.

5. Conclusions

This annex has examined the problem of managing fisheries from the perspective of the fisherman

To date, policy has concentrated on the measuring, regulating and enforcing of the amount of fish caught by individual fishermen. This is necessary because, even though individual fishermen are making rational decisions from their own private perspectives their aggregate actions can damage the fisheries. A single fisherman's actions are constrained by lack of information and limited freedom to manoeuvre. Ideally, fisheries managers would like the industry to take a more collective and less individualistic approach.

This annex argues that a broader range of information needs to be analysed – on profits, fleet structure, quality of information and compliance. The issue for policy makers is whether, viewed from this broader perspective, fisheries management would look any different. This analysis has argued that the two most substantial issues facing the industry are **non-compliant behaviour and the tendency for fleets' killing power to grow beyond the resource base.** Neither concern is easy to address. Both will require a package of approaches that go beyond counting fish and regulating the number of boats and the amount of fish caught.

The team undertook some initial modelling of a representative UK fishery. While many of the data needed to accurately reflect fishermen's behaviour are not available, the model still provided some useful insights. On the issue of compliance, the modelling suggested that, if profitability is low and there is a low risk and cost of being caught it financially possible and remunerative for fishermen to cheat. This has two perverse effects. Firstly, the least honest fishermen tend to prosper and hence remain in the industry. Secondly, the newest boats – with the heaviest debt repayment costs – make heavy losses, forcing their owners out of business. Neither of these is attractive if the desire is to foster a high-compliance, modernised, entrepreneurial industry. The introduction of policies to increase the cost of non-compliance is to be welcomed, though it is likely these will be insufficient to address non-compliance by themselves. Our modelling suggests that even with a substantial increase in the probability of detection and the level of fine (which may or may not be achievable), many fishermen could remain non-compliant.

A second dynamic model, which linked the killing capacity of the fleet to the biological characteristics of a different UK fishery, was used to analyse the decommissioning and tie-up policies. More work needs to be undertaken to calibrate the model but the early results suggest that the killing capacity in the fleet is too high in relation to the stock and only an aggressive policy to decommission would allow the stock to recover. A tie-up scheme without decommissioning has no long-term benefit since the structural excess capacity remains. With further development and calibration, such models could be used by fisheries managers and industry to analyse particular fisheries and anticipate the impacts of changes in the fishing system.

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