

Strategy Unit Consultation on the UK Fisheries

August 2003

This document is the response to the Prime Minister's Strategy Unit Consultation on the UK Fisheries, published on 10 June 2003¹. This submission has been approved on behalf of the Royal Society Council, by Professor Sir Patrick Bateson, the Vice-President and Biological Secretary. The response has been prepared in consultation with both Fellows of the Royal Society and other leading experts in the field.

Following the reforms of the Common Fisheries Policy in December 2002 and a meeting between the Prime Minister and representatives of the fishing industry in January 2003, the need for a study was identified to develop a long-term strategy for the sustainable future of the UK fishing industry. To inform this project, the Prime Minister's Strategy Unit² issued a consultation seeking views on the present state and future of the UK fishing industry.

The answers in this response follow the format of the questions as asked in the Strategy Unit consultation document. The Society has only responded to issues where it has expertise and as such, not all the questions have been addressed.

1 What do you regard as the biggest challenge facing the fishing industry?

Many of the world's fish stocks are significantly overexploited. This has been the consequence of the continued difficulty in dealing with the common property nature of most marine resources. Common property is a term used to describe any resource, forests, fisheries, the atmosphere, where its use and access is unrestricted. This leads to damage of the resources as users seek to maximise their benefits. A key challenge facing the industry is to be able to enforce regulations governing the use of this common property resource. Unless this can be achieved, marine resources will eventually be reduced and potentially overexploited, which would effect the income of those dependent on them.

At the European level, when a scientific basis for reducing fishing is agreed, the level of reduction that is adopted is often less than required, due to lobbying by fishers and by disputes between policy makers from different countries. A key challenge facing the fishing industry is to reduce fishing effort on exploited stocks whilst addressing the social and economic consequences.

Government subsidies and other financial support must be withdrawn from the fishing industry. These subsidies and the short-term nature of politics are preventing sound fisheries management and restrain the effectiveness of any new regulatory approaches. Achieving this shift in fishing practice may require measures such as transitional aid to support the fishing industry. For introduced changes to be a success, it is important, that the associated behaviour of fishers is taken into account.

Current fish stock measurements are reasonably accurate, but the sizes of fish populations will always be uncertain as they are naturally highly variable, driven by a multitude of interacting factors, including the intensity of exploitation. It is vital that this uncertainty is explicitly incorporated into fishery management and underlying models.

¹ http://www.pm.gov.uk/files/pdf/fish_con_full.pdf

² <http://www.pm.gov.uk/output/Page3854.asp>

Fisheries management as a whole would benefit greatly from conservation goals that are more enforceable. However, regulations to achieve these goals are complex and difficult to implement. One achievable action would be to replace the traditional emphasis on methods of controlling catches with controls on fishing effort, a strategy that would also address the cumbersome and costly nature of enforcing current management strategies.

8 *What do you think have been the main problems with the Common Fisheries Policy (CFP) in the past? Have the recent reforms adequately addressed these issues? If not, what further measures are needed?*

For Europe to tackle the common property nature of marine fisheries the greatest challenge is to reduce access to the resource whilst addressing the associated social and economic consequences. From this basis, further research should underpin a greater emphasis on ensuring that environmental measures and wider stock management objectives are considered as connected parts of an integrated management system. For example, where no-take marine reserves are being implemented, as part of an overall management strategy, these should be considered together with stock measures, such as quotas, used to limit fishing.

Whilst the Royal Society welcomes reforms set out under the reformed Common Fisheries Policy (CFP) especially the provisions for the establishment of recovery plans for exploited stocks and long-term management plans for other fish resources, the Society finds these plans critically weakened as no deadlines have been set for when recovery plans must be established. Regulating access to the resource has usually proved to be a fraught and difficult problem.

Regulations aimed at achieving conservation goals are usually more complex and problematic to enforce. A move to assess and alter the way fisheries are regulated to ensure that conservation goals are met in a more easily enforceable way would be an appropriate first step to improving fisheries management. For example, substituting effort controls (such as days at sea) for catch limits and quotas has the potential to help enormously. Enforcing current regulatory approaches of Total Allowable Catches (TACs) and catch quotas is very difficult and costly, due to the level of information and inspection from fishing vessels and landing sites required. Using restrictions on fishing effort (for example days at sea and/or restrictions on equipment) would be much cheaper and with the extensive use of satellite monitoring, it would be far easier to enforce. Effort control would remove the need for detailed inspections and catch controls as all fish caught may be landed. This management strategy would therefore reduce the current discard problem. Individual Transferable Quotas (ITQs) and Total Allowable Catch are currently used as the methods to divide the resource between the users, providing a form of resource ownership. Similarly, effort control can be used to gain the economic benefits of establishing rights of access to the resource.

The reformed CFP has extended the use of effort controls, which have been historically difficult to introduce, as it is necessary for their implementation to equate different types of fishing effort and establish a fair allocation. This problem can be overcome as effort allocation can now be made in proportion to changes in the situation of the fishery. A more significant problem is that the introduction of effort control will often motivate fishers to improve their efficiency (technology creep), leading to increased overfishing. This trend must be carefully monitored, and responded to by progressive decreases in effort quotas, or alternatively by redefinition of a unit of effort. Criticism has been levelled at the reformed CFP for implementing a system of

effort control that had not been fully developed and by introducing effort as well as, rather than instead of, TACs and quotas, which has left fishermen confused over the use of effort control and diminished the potential contribution of effort control in implementing the CFP.

It is essential that politics enforce the use of sound science within fisheries management decisions. Politicians currently look to the short-term while fisheries management science is concerned with the long-term survival of fish stocks. The annual competitive bargaining over quotas by fishery ministers exacerbates this problem. This management strategy often sidelines the scientific underpinnings of management, by recommending higher annual quotas than advised. Scientific uncertainty is used politically as the basis for making risky decisions as opposed to being used as a tool to urge caution. Ultimately, fishery management must be based on science, not political bargaining if it is to succeed.

9 *Do you believe that fisheries scientists are accurately measuring economically important stocks? How could the system be improved within existing government resources? Can you cite any examples of how scientists and fisherman can pool their knowledge and improve stock estimates?*

We believe that measurements of fish stocks are reasonably accurate, given the resources available. The key modelling procedure used (Virtual Population Analysis) involves retrospective analyses of stock sizes, whereby historic stock sizes are estimated according to recent catch statistics and scientific surveys. Additional information gained each year allows ever-increasing precision and accuracy for estimates from previous years. This continual updating allows verification of how accurate previous assessments had been. If scientific assessments were consistently too pessimistic, this would have been revealed by the retrospective analyses. We are not aware of any evidence for a general pattern of this nature. However, it is important to stress that current overfishing is so damaging that even the simplest time series or models for single species demonstrate the need for massive reductions in fishing effort.

Current levels of uncertainty in fish stock measurement could nevertheless be improved. Most current models that underlie conventional management only consider one species at a time. These single species models are not completely adequate as they ignore the ecosystem in which the species is embedded. Fish populations are also highly variable with fluctuations driven by many interacting factors, particularly the recruitment of young fish. This is especially important in stocks that are heavily exploited because in these stocks recruitment of juvenile fish, which is fundamentally stochastic, is the major component of the biomass of the fish stock.

The system of regulation and management therefore needs to reflect the fact that there will always be uncertainty within models. One method of incorporating uncertainty into decision-making is to reflect it explicitly into estimates by using methods such as Bayesian statistical techniques. The use of decision tables would help managers to assess alternative management options. What is also required are regulations that ensure that there is feedback within management decisions to incorporate stock fluctuations.

Currently, industry collects much of the data itself, which may lead to bias in the information gathered. Data gathered also generally omit bycatch, discards and illegal landings of over-quota fish catches. These problems can be alleviated in two ways. First, better co-ordination of data collection with fishers will help improve the accuracy of the catch statistics, and thereby improve the stock assessments. Second, changes in the way in which fisheries are managed, such as the use of effort limitations instead of quotas, will reduce the rate of discarding and illegal landings of fish.

Further information about the ecology and behaviour of marine organisms would inform management efforts aimed at protecting habitats and incorporating species interactions into multi-species models. This would aid the development of an ecosystem approach to fisheries management. We also need to learn more about non-target species. For example, most European countries do not distinguish between individual species of skates and rays when collecting landings statistics. Yet, some species, such as the common skate, thornback ray, long-nosed skate and white skate have disappeared from large parts of their ranges (Dulvy 2000). Resources are limited for studying species with low commercial value that are affected by fishing activities through bycatch or their biological relationship with the target species. Funding should be made available to address this issue. Please see our response to question 46 for a further discussion on ecosystem management.

Well-enforced marine reserves should also provide good baseline information for comparison with areas that are fished heavily, including the time course of recovery. Conservation depends on developing the baseline data available to inform management strategies. As recommended in a recent Royal Society report on measuring biodiversity (Royal Society 2003), a framework is required to help co-ordinate the work of conservation practitioners to elucidate gaps in scientific knowledge. As scientific uncertainties are reduced, conservation efforts can be focused where fishing practice is having a significant impact on marine biodiversity.

12 *How effective are current UK enforcement measures, and what could be done to improve compliance? At what stage of the process is enforcement best targeted: at sea, on the market, during processing?*

(Please see our response to question 8).

16 *Is the catching industry a special case? If so why?*

Government subsidies intended to aid the fishing industry are now widely recognised as having perverse consequences in that providing funds for new vessels and gear is encouraging the overexploitation of fish resources. A consequence of the open access nature of 'the commons' is over capitalisation in the fishing industry. These subsidies often exacerbate the problems of over capitalisation and increase pressure on fish stocks. Eliminating subsidies is unpopular but essential for successful environmental management. It is important that measures are introduced that alleviate the social consequences of removing subsidies. In some industries, such as the forestry and petroleum sectors, users are required to pay negative subsidies, or royalties for access to a resource.

As raised in the response to question 8, enforcing current regulatory approaches of Total Allowable Catches (TACs) is difficult and costly. Regulating through effort restrictions would remove the high level of costs involved in obtaining information from fishing vessels and landing sites.

19 *What do you consider to be the most important issue facing marine environmental management?*

We consider over-fishing to be the most important threat to the marine environment. Coastal development and pollution are serious, but drastic reductions in fish stocks and changes in communities of invertebrates in many areas of the seabed have been primarily driven by fishing. Evidence of this impact is apparent in the contrast between intact, comparably pristine ecosystems, which often support high levels of biomass of

large-bodied and higher trophic level species with disturbed, exploited and polluted ecosystems, which can be characterised by the absence or rarity of such species, and by dominance of small-bodied species with high rates of population turnover, usually from lower trophic levels (Odum 1969; Christensen and Pauly 1998; Myers & Worm 2003). Ecosystem damage is rarely considered in fishery management strategies. Such damage can undermine the productivity of fisheries, aside from any effects on habitats and species of conservation concern. Behavioural changes by non-target species can also have an impact on the environmental effects of marine fisheries. This important topic requires more research effort (Dill 2003).

Some stocks are particularly vulnerable to fishing pressure. Typically these are slow-growing long-lived species which, due to their demography are vulnerable to overexploitation (Reynolds *et al* 2001; 2002). Such species can be placed in particularly problematic situations when they are part of the bycatch (fish caught other than the target species) of a fishery for more abundant resilient species. This is clearly the case for marine mammals, turtles and birds, which form the bycatch of many fisheries. This is also the case for certain slow-growing species of fish, particularly, but not exclusively, sharks, skates and rays (Walker & Hislop 1998; Dulvy & Reynolds 2002; Baum *et al* 2003).

The specific environmental impact of fishing practice on other species and habitat is still poorly understood and is likely to remain so. It is highly unlikely that in a reasonable time scale information will be gleaned on the way in which habitats are affected by the operation of fishing gear. However, some particular solutions can be considered to regulate fishing practice, which is manifestly destructive. Examples such as the ban on high seas drift netting or dynamite fishing are manifestly sensible. More problematic are proposals for a ban on bottom trawling.

New research suggests climate change is affecting fisheries, with significant northward shifts by a number of fish species in the North Sea over the past 20 years. If present trends continue, some species that are currently important, such as cod, will become less available to fishers. On the other hand, some southern species, such as sea bass, will probably continue to shift northwards. So, at the very least it can be predicted that the species composition of the North Sea will change.

20 *Are there any coastal or marine sites near you that deserve to be protected for nature conservation or cultural reasons? How does fishing affect them, and do they need greater protection?*

We believe that no-take marine reserves hold considerable promise for fisheries and environmental management (Gell 2003; Houde *et al* 2001; Roberts 2000). A large quantity of evidence, mostly in the tropics, suggests that these reserves can be a powerful tool to help rebuild stocks and habitats damaged by fishing. For example, a meta-analysis of studies has shown recently that the overall abundance of fish inside reserves is on average 3.7 times higher than outside reserves, and most of this effect is due to increases in target species (Mosqueira *et al* 2000). Further research is required to improve our currently limited knowledge about the use and potential positive impacts of no-take marine reserves, especially on commercial catches in temperate areas.

Using reserves is one of the best ways of adopting a more ecosystem-based approach to fishery management. We also consider it important to embed reserves within general marine strategies to avoid simply displacing fishing mortality to other locations.

Reserves can be important for a number of reasons; firstly reserves could build insurance into management. Insurance is needed as a result of the scale of uncertainty in fisheries. Reserves can put fishery management on a more precautionary footing. Secondly and critically, they will also address many of the concerns over conflicts among fishery sectors. For example a conflict may arise where one fishery catches and discards species of interest to another fishery sector, a reserve would ensure a certain quantity of the species is protected. One way in which they can achieve this is by protecting important nursery areas from fishing. A further benefit of reserves is supplying an important recreational value, which can provide an alternative source of income in some areas.

However, to be effective, marine reserves may need to be large – perhaps up to 25% of fishing areas. Prevention of illegal fishing could become an increasingly difficult task as the attractiveness of these areas increases. However, enforcement is becoming easier with the use of satellite tracking system for vessels.

It is essential that no-take marine reserves are used conjunction with, and not in isolation of management approaches that are primarily aimed at reducing fishers' effort. Research is required that considers the effects of combining these measures rather than posing them as alternatives.

21 *Does present fisheries policy take sufficient account of biodiversity/environmental considerations? What new measures would you favour to redress any perceived imbalance?*

We believe that current policy does not take sufficient account of biodiversity and environmental considerations. The consequences of historical European and UK legislation on the marine environment are considered in the answer to question 19. Fully incorporating risk and uncertainty within fisheries management are answered in questions 8 and 9.

22 *Do you believe that current EU stock recovery plans will work, and what are the main risks to their success? Are there better ways to promote stock recovery? Do you expect stocks in the following species to rise, fall or remain the same in your area? Do you think the cod recovery plan will work?*

As mentioned in the response to question 8, the Society believes that a weakness with current stock recovery plans is that no deadlines are set for when the plans must be implemented.

Considering that the consensus advice provided by scientists from the International Council for the Exploration of the Sea (ICES) was that there should be a complete ban on fishing for cod, the EU recovery plan adopted is very timid. The experience of the Canadian 'Northern' cod stock(s) off Newfoundland is not encouraging. This stock still shows little sign of recovery, despite a nearly complete cessation of fishing since 1992. The reasons are not well understood, but they may involve major changes to the ecosystem that occurred in response to the removal of over 99% of the biomass of the cod in the 2 or 3 decades leading up to the closure. This provides an important lesson in that recovery after reductions in fishing cannot be taken for granted. It also emphasises that there is only a limited understanding of the processes that govern recovery. Pelagic stocks usually recover quite well when fishing is reduced, but for demersal (bottom dwelling) stocks, reducing fishing does not guarantee recovery, at least within 10-20 years.

24 *What is the impact of UK fish consumption and aquaculture on fish stocks and the environment outside the EU? Is this sustainable?*

The consumption of some species, such as large shrimp, is having an extremely bad impact on the environment of many tropical countries. These animals are usually grown in coastal ponds, to the detriment of native habitats such as mangroves. This is effectively 'slash and burn' aquaculture.

In the UK, there are a number of serious difficulties with aquaculture. These include the problems of disease, which can be passed between domestic and wild stocks, the excessive use of antibiotics and other chemicals to combat such diseases, the overexploitation of wild species to provide food for aquaculture, and the introgression of genes from domestic to wild species. A few studies have shown negative impacts of captive-reared salmon on wild populations.

34 *How do you see the Common Fisheries Policy developing over the next ten to fifteen years?*

In terms of the issues raised in question 8 we would view that the CFP should develop and implement stock recovery plans for exploited species, and introduce management plans for other stocks. We would envisage that these plans would be based on sound science and fully incorporate the stochastic nature of fish stocks. European policy should also seek to make conservation goal more easily enforceable. As mentioned in question 8, this can be progressed enormously through policies that further introduce effort as opposed to catch controls.

36 *Does current Government policy adequately balance the different public interests in marine resources and the environment? How can biological, environmental, economic and social issues be addressed in an integrated manner?*

An integrated management approach, should combine environmental measures with wider fish stock objectives that incorporate the social and economic consequences of effort reduction.

Integrating biological, environmental, economic and social issues, such as the behavioural responses of fishers to various management scenarios, needs to be underpinned by sophisticated bioeconomic models. However, in cases where data is not available or complete, purely qualitative models, (as opposed to bioeconomic ones) can still be extremely useful.

Generally speaking, in a common property situation the users will always find ways to circumvent management objectives. It is important to note that the problems associated with a common property resource, outlined in our response to question 1, do not just apply to unregulated areas, but to any fishery with multiple users without individually assigned rights. The question of why fishers often oppose suggested regulations designed to improve their long-term economic prospects still deserves careful study. It will be useful to determine the effect of fishers' dependence on government subsidies, or other factors such as disbelief in the authorities' ability to control illegal fishing (given the relatively low probability of being detained). It is already clear that to act as any deterrent, fines and other punishments need to be significantly higher. However, more easily enforced regulations with an associated higher probability of the detection of illegal fishing can act as a deterrent with more modest fines and punishments.

Economic incentives will be required to modify fishers' behaviour towards the protection of fish stocks. Economic data are, however, fairly inaccessible at the UK and European level. Those associated with the fishing industry and resource conservation have called for an increased collection and use of economic

information by Government. Currently, long-term management decisions at the European level are being taken without sufficient economic information.

Achieving any change in fishers' behaviour may require measures such as transitional aid to support the fishing industry. These measures can financially compensate the industry to accept short-term losses as the industry moves to a permanently lower level of fishing effort and capacity. This aid should only be available during times where conservation measures enforce catch levels to be below future permanent levels. Transitional aid needs to be linked to a timetable of stock recovery, which allows for flexibility in the aid if the stocks have not recovered. A problem with transitional aid is how to ensure that the aid does not end up contributing to a maintained or even increased capacity of the fleet, so-called technological creep, at a time when it is vital to reduce capacity. This would lead to the situation where stocks are allowed to recover only to be fished by a more powerful fleet financed by transitional aid. Another difficulty has come to light through the results of recent bioeconomic models, which have shown that the proposed billions of pounds (euros) to be spent on fishing vessel buybacks, may be ill advised, because fishers may come to anticipate such payments, which then play the role of additional subsidies (Clark *et al* 2003).

38 Who should be involved in fisheries management and at what level?

It is our view that all stakeholders should be fairly considered within management decisions. As discussed in a Royal Society report on *Measuring Biodiversity for Conservation* (2003), when planning research and consequently devising appropriate management strategies, an essential first step is to decide on the different interests of the stakeholders. In this case, while fishers have a substantial interest in the future of the industry, it is crucial to also consider the interests of the many people who are concerned about conservation of biodiversity and the importance of trying to protect and restore ecosystems. This report also states that scientists have a key role, in assessing and analysing marine biodiversity, which includes an understanding of the trends, states and interactions between different species, populations and habitats. The traditional practice of giving major weighting to management on impacts on welfare of fishers has not worked so far, either in terms of achieving sustainable exploitation, or in terms of preserving marine ecosystems. It is also absolutely critical to confront the question of intra- versus inter-generational conflict. Today's fishers will need to make serious sacrifices for tomorrow's fishers.

Working together with conservation practitioners, economists, lawyers and other social scientists, science has a key role to play in developing ever more effective conservation and sustainability practices.

We support the use of Regional Management Councils in developing a more regional fisheries policy less restrained by the current process of annual fish quotas.

39 How can we ensure that investment in the catching sector is better matched to biological resources, and avoid destructive "boom and bust" cycles of investment and fisheries stocks?

Boom and bust cycles are a consequence of the difficulty in managing stock uncertainty and the common property nature of marine fisheries. Regulatory, scientific and economic strategies to address this problem have been raised in questions 8, 9 and 36 respectively.

40 How should fisheries managers deal with technological advances which improve catching efficiency?

Part of the response to question 8 outlines the potential problem with the introduction of effort control with the consequence that it will often motivate fishers to improve their efficiency (technology creep). In question 36, technology creep is also considered as a potential problem resulting from transitional aid.

43 What policy instrument(s) and management system(s) would you favour in your catching sector?

(Please see our response to question 8).

44 Are there other countries that the UK and the EU should be learning from in terms of fisheries management? What are the attractive features of these systems? How transferable do you think they are to the UK situation?

The total allowable catch (TAC) for cod stocks in Iceland is set each year at 25% of the assessed spawning stock biomass, which is believed to be a sustainable level of exploitation. The Icelandic policy is subtly and substantially more restrictive than it sounds because spawning stock biomass does not include juvenile fish, which are not yet able to spawn.

In Iceland, Australia, New Zealand and South Africa there are examples of excellent practice in establishing long-term approaches to management. Simple “control rules” for operational use have been adopted after extensive simulation studies of both the stock dynamics (including the possibility of recruitment failure) and the effects of both natural fluctuations and observational errors on the whole assessment process.

46 What are the practical consequences of adopting an ecosystem approach to fisheries management? What type of management tools should we use?

The underlying science of marine ecosystems is poorly developed. The fundamental uncertainty inherent in any stock assessment applies even more in the context of ecosystem management than in more simple management approaches. However, there are sensible principles in ecosystem management that can be incorporated into fisheries management. Two good examples are, the methods for attempting to control the bycatch of marine mammals and other species and the practice encapsulated in the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) of distinguishing the importance between the trophic levels of targeted species.

Much has been learned about impacts of fisheries on ecosystems during the past decade, and this information, combined with further research into marine ecology, should make it increasingly feasible to use ecosystem-based management. Specifically, we need a better understanding of fish, recruitment, juvenile and adult interactions, competition within and between species and predation-prey interactions to be able to incorporate ecosystem information with management advice. We recommend further long-term research to understand the complex interrelationships within marine ecosystems.

Please send any comments or enquires about this submission to

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