



# BEST PRACTICE IN WORLD FISHERIES: LESSONS FOR BREXIT

REPORT OF A CONFERENCE AT FISHMONGERS' HALL, LONDON

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BLUE MARINE  
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## Executive Summary

The purpose of this conference was to look at how other countries around the world managed their fisheries and to consider what lessons the United Kingdom might learn from their experience and apply to its own waters in the event of leaving the EU and its Common Fisheries Policy (CFP). Four jurisdictions were chosen: the **United States, New Zealand, Australia and Norway**. Fisheries management has improved significantly in each of these. Even these leading jurisdictions have their problems, but all four can point to strong examples of stock recovery because of effective management. This is heartening in a world where many environmental problems seem to have no obvious solution.

International fisheries agreements which set catch limits for shared stocks are complicated, require cross-boundary liaison and should not be left to the last minute during any major political transition such as Brexit. Industry should take a lead in these negotiations to ensure a pragmatic solution is reached.

In the United States, Australia, New Zealand and Norway, national or federal government controls offshore fisheries. In the United States, management is devolved but with strong accountability to federal government. There are other good examples of regional government co-operation over inshore fisheries but, as the main Australian speaker pointed out, it was more effective for a single authority to manage key stocks than for multiple authorities to do so. He went so far as to suggest that Scotland could manage the UK's cod.

A science-based approach was advocated by all four countries, but different methods of assessing maximum sustainable yield were adopted, with the United States, New Zealand and Norway using deliberately conservative methodologies. All the main speakers and panellists favoured allocation controls rather than effort controls because of the difficulty of obtaining good data from effort control mechanisms.

The cost of good management should not be underestimated: in New Zealand and Australia

industry pays for the science; in the United States it was largely the federal government, with industry now carrying some costs. Trust is enhanced if fishers work closely with scientists. Inshore fisheries tend to have less reliable data.

There are contrasting approaches to ownership rights. In Norway, fish resources are owned by the people, not the government. New Zealand quota can be owned privately in perpetuity and only New Zealand citizens may own quota. In Australia, the commercial licence fee is the price exacted by the public for the appropriation of a limited public natural resource. The United States has a variety of rights-based approaches across all sectors, including small scale fisheries.

All four countries have examples of enforcement that differ from current United Kingdom practice, whether in terms of high levels of observer coverage, remote monitoring, or reporting catches. In New Zealand, penalties for serious breaches of regulations involve the confiscation of equipment and the right to fish. Norway said the European Union's discard ban was too inflexible.

In all four countries, marine conservation was more integrated into the fisheries management system than in the United Kingdom or the European Union. Australia compensated fishers for loss of access following the designation of marine protected areas. Some 30 per cent of the New Zealand exclusive economic zone is closed to fishing, to protect seafloor habitat.

Experts from all four countries said it was desirable that recreational angling should be more involved in fisheries management.

Successive speakers emphasised that choices needed to be made about the kind of industry and recreational sector a country wants. There is a value in stakeholders agreeing a response to varying conditions, including climate change, before they become disruptive.

## Risks and opportunities: how the conference arose

Leaving the European Union looks likely to involve the United Kingdom leaving the Common Fisheries Policy. For fisheries, the seafood industry and the marine environment, Brexit offers a welcome opportunity to rethink governance, improve transparency, respond better to the views of stakeholders and strengthen environmental protection. This is an exercise that has value in its own right, regardless of the outcome of EU-UK negotiations over the next few years.

The United Kingdom's accession to the then European Community in 1973 created an international framework within which to manage fisheries and set strategic objectives for all EU members. The United Kingdom was already a member of the European Union when Exclusive Economic Zones were declared, extending out to two hundred nautical miles or the midline between countries. It was European Union rather than United Kingdom law which drove the shape of the developing fisheries policy. However, there were opportunities to shape British law even within the European Union framework, for matters such as quota distribution and inshore management, which remained within the United Kingdom's authority. The United Kingdom has also played a key role in managing fisheries under the Common Fisheries Policy.

For each of the four featured countries there was a lead speaker with knowledge of the regulatory system, followed by comments from two panellists, representing civil society and the fishing community. The panellists considered how effective that management system had been. Participants in the conference then had an opportunity to probe the speakers. Subsequently, a review session was held to collate the threads from the four talks and to identify those key attributes of other nations' fisheries management that might be relevant to the United Kingdom, as it prepares its new laws.

As the United Kingdom has never had full legislative responsibility for its Exclusive Economic Zone, it cannot simply revert to a pre-existing system after Brexit. Legislative building blocks need to be put in place to house decision-making in the appropriate places and for those decisions to be taken in the right way. This will require dialogue and consensus with key governments and industries in other countries, and this cannot be left until the last minute in negotiations.

*"Fisheries management should be about baking a bigger cake to share out,"*  
Peter Gullestad, Norway.

## Lessons for the UK Conference conclusions

### Defining Best Practice

Although it is important for the United Kingdom to learn from others, we need to look inwards too. We have dealt with stock collapses in the North Sea and elsewhere, have allocated quotas in difficult circumstances and have managed our inshore fisheries. We can learn from our own experiences, as well as those of other countries. The main question is: how should we deal with the need for a new Fisheries Act, or possibly a new Marine Resources Act?

There are a number of important stocks that will be shared with our European neighbours from the European Union, Norway and other coastal states through membership of the North East Atlantic Fisheries Commission (NEAFC). **There will be a strong need for international cooperation on shared stocks, including the need for long-term stability in the allocation of fishing rights. The management of shared and straddling stocks will be a huge challenge for the United Kingdom.** It is all very well for the United Kingdom to take over its Exclusive Economic Zone, but many of the key stocks straddle other areas. Dealing with those shared stocks will be a dominant issue. **There will still be a need to cooperate with other countries, especially in agreeing national catch limits. It may be necessary to set up a formal treaty organisation with specific rules for allocation, rather than just muddling through.** The United Kingdom does have a formal treaty organisation under the Common Fisheries Policy, but it is hard to see what the next step will be. **It is important to account for the overall catch, wherever it is taken, and that will be extremely difficult without an effective treaty organisation in place.**

In deciding on management policies, we will need to be clear about the policy objectives, and how to measure achievements. It will be important to state what needs to be achieved. **Management can then take place through the preparation of fishery management plans. These plans should be aimed at setting catch limits, based on the best scientific information, and must include decisions on how to allocate the catches, both within the UK and between the UK and relevant neighbouring countries.** The management plans must also include provisions for monitoring catches and the implementation of control and enforcement measures. Legality, traceability and fairness are all important. **There must be a level playing field.**

It is evident from experiences in other countries that sound decision-making depends upon stakeholder involvement. **A balance has to be struck between “top-down” and “bottom-up” approaches to management.** Stakeholder involvement can be especially valuable in educating managers in the technical details of fishing. The Regional Councils in the US include representatives of the States and Federal government and also people knowledgeable about the fisheries, including recreational and commercial fishermen, members of indigenous communities, civil society representatives, and scientists. Governments need to involve stakeholders in making operational decisions. Managers have to be held to account to ensure they do not take decisions outside the scientific advice. It is also important to get the balance right between primary legislation that sets out the legal framework for management, and the need for flexibility that still meets conservation guidelines and science advice. **Fishing is particularly prone to unintended consequences.** It was pointed out that in Australia there is an infrastructure or skeletal framework in each state act, and a reasonable amount of flexibility in preparing management plans. It is important not to stuff an act with too many objectives. Typically, in Australia, plans are drafted through an interactive process with industry, and then with the NGOs. The industry is involved earlier because a lot of the provisions of management plans are actually quite technical.

Management in the past has often been based on single stocks, but management of multi-species fisheries and the wider ecosystem is considered to be especially important given the mixed-species nature of fisheries and the interactions of species in a dynamic marine environment. In considering management measures, the relative merits of quota control and effort control also need to be considered. **Input controls (which directly regulate the amount of effort which can be put into a fishery) might work as an adjunct for output controls, but never as a substitute.** They may involve restrictions on fishing gears and limitations on the number of commercial fishing vessel licences issued (called limited entry). Such measures were adopted in Australia in the 1980s, but they did not work as intended and rights-based management was later introduced, encompassing both ITQs (Individual Transferable Quotas) and ITEs (Individual Transferable Effort quotas - tradable vessel days, gear days etc.). **Where fisheries are run solely through input controls there is often not enough science to support management decisions. Moreover, effort control is a fairly crude measure and it can be difficult to ensure**

**fishing mortality does not exceed sustainable levels – particularly for a range of different species.**

In contrast, with output controls, including quotas, sensible harvest control rules can be developed. **Ideally, industry should be involved in the setting of those rules, although harvesting decisions must be based on scientific assessments and science-based advice, and not on politics.** Management procedures must be transparent and accountable. It is also important to have a resilient and flexible system that can adapt to changing circumstances. It may be necessary to change the rules if they turn out to be unsatisfactory.

### Sustainability is paramount

One of the important aspects of fisheries management is achieving sustainability, concentrating on conservation rather than the profitability of the industry. Each country emphasised that there should be sustainability criteria put in place – for example, maintaining stock size at or above a level to support Maximum Sustainable Yield, or a proxy for MSY. **It is important to adopt a science-based approach, similar to that required by the Magnuson Stevens Fishery Conservation and Management Act in the USA, which has led to the rebuilding of US fish stocks, resulting in some of the most sustainable fisheries in the world.**

Fisheries science is extremely important for supporting management. It includes stock assessment, the evaluation of impacts, and even examining the allocation of resources. Improvements in science are required to allow movement away from a precautionary approach. Fisheries science is never going to be perfect, and the fishing industry and fishery managers do not always trust the science, especially when there are adverse impacts on industry.

The US has encouraged cooperative research between industry and government. Participation and engagement does help, and transparency and peer review of the science is an important element. Benchmarks are also required for the science.

In New Zealand there is a strong and open peer-review process that evaluates the science and ensures it is fit for use in providing management advice. There are two key documents. One is the Harvest Strategy Standard which sets things like the minimum time for rebuilding, and target reference points for stocks that do not have enough science to set them on a stock by stock basis. There is also a

Science and Information Standard, setting minimum standards that the science has to reach before it can be used to advise on management.

There are also questions over how scientific data is best obtained. For example, in monitoring catches do we make use of human observers or do we use video/electronic means for data gathering? Onboard observer information was felt to be more accurate, but it is expensive to organise and consequently coverage can be limited. Electronic monitoring can produce a tremendous amount of data – but it is necessary to ensure that there are adequate resources to store the data and then to process it. Ideally, real-time or near real-time processing of data is desirable. Data collection by the industry can be especially valuable in this respect, especially in relation to catches and discards. Information from fishers can play an important role in the scientific process, although fishers may need to be familiarised with the science, perhaps through training workshops. In the US there is a Marine Resource Education Program, with workshops for fishers to encourage them to engage more practically in the management process. Trust is important and may be enhanced if fishers engage closely with scientists.

In terms of quota management, the monitoring of catches and control and enforcement of the regulations is very important. In New Zealand, the licensing of fisheries is a key part of the management system. There is a need for taking strong action on monitoring and control, as having fully documented catches can make a big difference.

In Norway, and many other countries, there is an ERS (electronic reporting system) for tracking and reporting from vessels. In Norway skippers have to estimate the catch when they get it onboard and report this to the authorities before they come in to land the catch. This estimate cannot differ much from the actual level of the landed catch because any excess will then be confiscated and there are financial penalties for skippers. Maintaining good regulation compliance by fishers is especially important. In New Zealand, this also involves the imposition of severe sanctions upon those who do not comply, including boat and quota confiscation.

**In terms of dealing with by-catch, and especially in establishing a discard policy, there is a question over whether the United Kingdom should adopt the well-established and flexible Norwegian approach, or remain with the developing European Union landing obligation approach, which is more complex.** Norwegian participants suggested that the European Union

approach may be too rigorous and that a simpler system is needed, with a range of different measures being developed to help fishermen avoid discarding, such as more selective gear and Real Time Closures.

## Recognising the costs

**The costs of fisheries management can be high. Consideration needs to be given to whether the industry should take on some of the costs, or share them with the government.** One of the advantages of industry bearing some of the costs is that fishers become more engaged in the science and in management. In New Zealand, the fishing industry pays for much of the scientific research and monitoring. Fishers attend the scientific working groups and they buy into the results, which in turn strengthens management. In Australia, commercial fishers also pay significant fees. Their response has been to increase efficiency, adopt new techniques, use onboard video cameras, introduce vessel monitoring schemes (VMS) and supply data directly to government agencies. As a result, the cost is dropping each year. The system in the United States is very different, where the bulk of the costs are borne by the government, not by the industry, with some notable exceptions in Alaska and west coast fisheries. The Act encourages cost sharing and this balance is evolving.

Access rights, including whether or not there is “ownership” of rights, is an especially important consideration. There are contrasting approaches in different countries. There is a question over whether fishing rights should be restricted to nationals only, or to fishermen only, or whether there should be a free market. In some cases, quota allocations are based on track records.

Norway does not allocate quota directly to individuals but instead shares the quotas between fleet groups, with those within those groups obtaining equal shares or an allocation based on the size of the vessel. In contrast, in New Zealand, access to the right to fish is provided to individuals in perpetuity. It is said that this gives the main players a real interest in making sure that the fish stocks do well. Ownership of the resource is by the fishers themselves – enacted through an Individual Transferrable Quota (ITQ) system that incentivises care of the resource. They have a percentage share of the fishery and a long-term interest. Owners are able to invest in their future and in the future of the fish stocks.

In New Zealand, you cannot own quota if you are not a New Zealand citizen or a majority New

Zealand-owned business. Also, if you are a corporation and you have more than 24.9% of your stock owned by non-New Zealand citizens, then you cannot own quota. However, it has been commented that in New Zealand little attention has been paid to the social implications of these arrangements, and that this system has led to a consolidation of quotas within the industry.

**Something for the United Kingdom to consider is whether there are different ways of looking at fishing use-rights, which might enable more communal forms of ownership, or more regional elements to the fisheries.**

The removal of rights when stocks decline can be quite contentious. There is a particular need for social and economic research to assess the impact of management decisions and actions upon both fishers and processors. There has to be some feel for the impact management measures have upon people and communities. It is possible to control the fisheries but it is not easy to cope with shifting demand and changing prices. Income and profitability is important to both the fishing and fish processing industry and to communities, and this must be kept in mind. However, it is possible for producers to add to their income by promoting sustainability and achieving accreditation, so that there is consumer confidence in the provenance of their seafood.

## Protecting all marine life

Everyone wants ecosystem-based management but no one really knows what that is. There is a need to define what it means and to develop a pathway for achieving it. There are examples of ecosystem-based management to learn from in many countries. Fisheries cannot be managed in isolation. There is also a need to look after ecosystems and wider marine resources. **There is a requirement for cross-sectoral planning with government departments cooperating with each other.**

The New Zealand Fisheries Act has environmental principles embedded in the legislation, focussing on long-term viability of the affected species, and not just the fish species that are being fished but also other species that are present in that same environment. There is also a requirement to conserve habitats and biodiversity.

Norway is also moving towards ecosystem-based fisheries management, as its Marine Resources Act shifts management from a single species focus towards an ecosystem perspective. The Act covers all marine life, with sustainable use and protection

of biodiversity as key principles. A Conservation Act has also been introduced. Taken together, there is a strong responsibility under Norwegian fisheries laws to look after both the ecosystem and marine resources.

The protection of endangered, threatened and protected species is especially important. **The imposition of by-catch limits may encourage fishermen to develop ways of avoiding the capture of protected species of fish and shellfish. However, there may also be problems caused by fishing for species that provide food for protected species, including seabirds and marine mammals.** In the North Sea the biggest single fishery by weight is the industrial fishery for the sand eel, a species that is an important source of food for seabirds. **An important issue in protecting endangered species is whether there should be a risk-based approach or whether a target-based approach is required.**

In New Zealand, risk assessments are undertaken to evaluate levels of interactions with seabird, marine mammal and shark populations. The risk assessments provide guidance on the levels of impact. The idea of setting a specific target or quota for capture of such species is considered inappropriate, as the target should be zero.

The designation of marine protected areas and their subsequent protection is also an important issue. Marine reserves and no-take zones can be put in place to provide animals with refuges in which to forage, grow and breed. It is important to keep harmful fishing gear and other industrial activities out of sensitive habitats. The implementation of marine protected areas in Australia is held up as a leading example of protective management. However, implementation has not been without complication and the compensation of displaced fishers has involved a lot of taxpayers' money.

## Managing climate change impacts

**Coping with the effects of climate change will be important in the future, as it will affect ecosystems and their fish stocks.** There is agreement that climate change is happening and that it may be difficult to manage fisheries adaptively in a changing environment. The International Council for the Exploration of the Sea (ICES) is a global organisation that develops science and advice to support the sustainable use of the oceans. It is developing a strategy to deal with climate change. **UK scientists have played an important role within ICES in the past, and should continue to do so in the future.**

## Managing inshore fisheries

Inshore fisheries management requires specific policy considerations as different types of vessels and fishing gear are used. There are also considerations in relation to inshore catch monitoring and reporting, and whether external observers need to be used.

In New Zealand, it was said that monitoring of the inshore fisheries was poorer than for the offshore industry, with lower observer coverage (although that is being addressed by moving towards electronic monitoring). Inshore harvest strategies were considered to be less conservative, and the inshore fisheries rather more wasteful, than the deep-water fisheries. It was also said, however, that the New Zealand inshore fishery is generally well managed for a relatively data-poor fishery. Local decision-making, with stakeholder involvement, is very relevant to the management of inshore fisheries.

**In the United Kingdom many of the smaller inshore vessels are catching shellfish, and the value of those inshore fisheries can be very high. Looking ahead to a likely post-Brexit scenario, it will be an absolute priority to put more resources into managing the inshore fisheries. Currently, the United Kingdom has poor data and comparatively rudimentary management systems, and yet some of these fisheries are very important to coastal communities.**

## Managing recreational fishers

**Recreational fishers also need to be brought into the management process. The value of angling is important in inshore waters, and the recreational fishers can often exert strong political pressure.** There are large recreational fisheries in some countries, often targeting large and important species. Many recreational catches are taken by commercial or charter or party boats, and those fisheries should be treated as commercial operations. However, currently, recreational fishers are rarely involved in management.

It was said by one panellist that in the United States the recreational participants are about 25 years behind in their thinking from the commercial industry. Moreover, contributions of data by the recreational sector is often poor, and there is often an unwillingness by that sector to be regulated. It is important to accept recreational fishers as stakeholders, and to involve them in the management process in order to obtain sustainable

fisheries. If recreational fishermen want to have more say, then they have to be prepared to accept more regulation and to supply more data on catches.

In New Zealand, management of recreational fisheries is in place, based on bag limits, and it is reasonably effective but with poor overall catch and effort data and no licence or permit scheme. In Australia, where recreational fishers are given more of the resource, they have to be prepared to accept licences and bag limits. This is accepted and it significantly improves data collection and helps to define the status of the fishery. However, the imposition of such measures is unlikely to be welcomed by recreational fishers in the UK.

### Cross jurisdictional fisheries management

A major consideration for the United Kingdom is whether there should be a devolved approach to fisheries management.

**If management is devolved to Scotland, Northern Ireland and Wales, then it will be important to clarify the legal relationships between the different authorities. There will need to be full interaction between the devolved governments, with links back to a central United Kingdom authority and perhaps binding outcomes/back-stops in national legislation.**

**Effective cross jurisdictional delegations will also be important between the United Kingdom, the European Union and Norway. The United Kingdom will have to have procedures in its Act that enable it to adopt an integrated international approach.**

There is no legal reason why interlocking legislation cannot be developed, allowing for delegation of authorities in relation to the management of stocks. Internationally, perhaps the most appropriate model is the Norwegian one, in terms of how to work with the European Union in deciding how to split quotas and apply other management measures. **The United Kingdom will likely be sharing even more stocks with neighbours than Norway does, so international cooperation will be extremely important. There will also be a need to agree with neighbours on the size and health of fish stocks; which can best be tackled through the International Council for the Exploration of the Sea.** Stakeholder participation in management will also be extremely important.

It will be important following Brexit for the United

Kingdom to clarify its policy objectives and create some statistical indicators that can measure how well those objectives are being met.

There are three examples of indicators from Norway that may help to clarify this: The first is the aggregate spawning stock of the five most important groundfish stocks. Secondly, the Directors of Fisheries conduct annual profitability surveys of the fleets that show the average operating margin and total operating revenues. Third, in keeping with Norwegian social policy, there is a priority to keep both large and small boats profitable. This is done by monitoring the proportion of value achieved by the different fleet groups. The United Kingdom may consider adopting similar measures.

*Q: How does Norway deal with disputes over shared stocks?*

*Peter Gullestad: "To quote Mick Jagger - You can't always get what you want."*

## Review of the Conference

### Chairman's Opening Remarks

Professor Sir John Beddington, former Government Chief Scientific Adviser, joined Nigel Bankes, Prime Warden of the Fishmongers' Company, in thanking participants for attending the conference.

Professor Beddington noted that the United Kingdom was now entering a very interesting time. We have to consider how to take things forward and this conference would provide a rare opportunity to hear from four major regimes from around the world on how they address fishery management issues.

Some key issues need to be considered. One of these is improved sustainability, concentrating on conservation, versus the profitability of the industry. We now have to enact a new fisheries law, although the last time we did this was in the 1880s, and we have little recent practice in drafting such laws. We have the opportunity, however, to look at how other fisheries regimes have addressed the problems that exist.

We would have presentations from each of the four selected regimes, USA, New Zealand, Australia and Norway, to be followed by panels that would consider any of the flaws in these regimes. There would be a question and answer session at the end of each panel performance. At the end of the day we would have a summary of the points that had been made, to be provided by barrister Daniel Owen.

*To avoid boom and bust fisheries, management must prioritise science over economic factors in setting catch limits, Margaret Spring, US.*

## Fisheries Management in the United States

### Presentation by Margaret Spring

Margaret served at the United States National Oceanic and Atmospheric Administration from 2009 to 2013 as chief of staff and then as Principal Deputy Under Secretary for Oceans and Atmosphere. Previously, she was Senior Counsel in the United States Senate from 1999 to 2007.

Margaret had played an important role in reforming United States fisheries policy and writing federal fisheries law. The United States has a very large exclusive economic zone (EEZ), and is very diverse in terms of people, habitats and fisheries. The initial architects of the United States' federal fisheries law recognised that a one-size-fits-all solution would not work. Instead they built a system with strong overarching guidance and regional flexibility.

The United States fisheries policy has led to rebuilding of fish stocks, resulting in some of the most sustainable fisheries in the world. Much of this success is due to the science-based approach required by the Magnuson Stevens Fishery Conservation and Management Act, the primary federal law governing wild-caught fisheries in the United States. The success of the Act did not come quickly or easily – the US Government learned a lot from early policy decisions and failed management strategies, and made difficult decisions to turn things around and achieve sustainability. The United Kingdom has a great opportunity to learn from these lessons.

Inshore fisheries management in the United States involves coastal state co-operation and federal oversight. The United States has 23 coastal states, each independently managing their coastal fisheries out to three miles offshore. However, because there are three major ocean regions (Atlantic, Gulf of Mexico, Pacific), each involving many states, there are three Interstate Management Commissions, the purpose of which is to coordinate science and management approaches. An interesting feature of management arose from a disaster on the east coast of the United States, where the popular striped bass fishery plummeted in the early 1970s. Congress decided that individual states were working against each other and the Interstate Management Commission with jurisdiction, the Atlantic States Fishery Commission, was not able to enforce order.

In 1985, Congress passed the Striped Bass Conservation Act, that empowered the Interstate Fisheries Commission to set management measures that would be implemented by each state. If the individual states did not comply then the federal government could come in and close their fisheries. By 1995 the stock had recovered. That model became important for all Atlantic state fisheries and it was enshrined within the Atlantic Coastal Fisheries Cooperative Management Act of 1993, which holds inshore coastal fisheries accountable to each other and to the federal government. The states have limited budgets and face major challenges (research, enforcement, etc) so that inter-state cooperation is very important.

The major fisheries in the United States are the federal fisheries and these are managed under the Magnuson Stevens Act. The law has evolved over more than 40 years in three phases: 1) the first (1976) Act established the major framework that effectively closes the exclusive economic zone to foreigners, created national standards and stakeholder-driven decision-making bodies, known as Regional Fishery Management Councils. After decades of struggles with overfishing and declining stocks, Congress passes reforms in 1996 that marked the second major phase of the Magnuson Stevens Act. These reforms introduced new conservation requirements to shift the focus of the law to conservation and sustainability. Then, in 2006, we entered the current phase of the law, with changes to require accountability and adherence to science-based management. These changes have ensured progress in recovery and sustainability of United States fish stocks.

Several elements are fundamental to the success of the US fisheries management law, and have made it possible to recover and maintain stocks:

- Enforceable annual catch limits defined by science;
- End overfishing and rebuild depleted stocks within a defined time-period, with limited exceptions (factoring the life history of the fish, international considerations, etc).
- A transparent regional decision-taking process, and
- Required performance metrics and publication of national reports to monitor progress and provide transparency to the government, states, stakeholders and the public.

The three main players in management in the United States include Congress, the National Oceanic and Atmospheric Administration (NOAA) and the Regional Fishery Management Councils.

Congress establishes national rules through the Magnuson Stevens Act, including a science-based legal framework and sets standards. The main federal agency in charge of implementation is NOAA, which has to approve fishery management plans, manage the science, and oversee regulation and enforcement. Authority for design, approval and implementation of federal fishery management plans, and the taking of allocation decisions, lies with the eight regional councils. By law, they must follow scientific rules in setting allocations and limits to catches. It is essentially a bottom-up system governed by top-down principles.

There are ten statutorily defined 'National Standards', which must be met by fishery plans:

1. Prevent overfishing and achieve 'Optimum Sustainable Yield', which must be less than the Maximum Sustainable Yield (MSY);
2. Use the best available scientific information;
3. Manage stocks as units;
4. Allocation must be fair (no excessive share must be given to a particular State);
5. Efficiency (not the sole reason for allocation);
6. Allow for variation in fisheries and catches;
7. Minimise costs and avoid duplication;
8. Consider socio-economic factors (subject to #1);
9. Minimise bycatch and bycatch mortality;
10. Ensure safety at sea.

Members of the Regional Councils are appointed by the Secretary of Commerce, who oversees NOAA, with input from the governors of each relevant state. The councils include representatives of the states and federal government; people knowledgeable about the fisheries, including recreational and commercial fishermen, members of indigenous communities, civil society representatives, and scientists. The Councils are unique institutions which the federal government is still trying to get right. Some of the problems have included too loose a direction to these groups, and the reforms in 1996 and 2006 were designed in part to ensure a consistent, science-based approach was applied appropriately nationwide.

The federal management process begins with NOAA providing the best available scientific information to the councils. Councils set catch limits based on that information and make allocation decisions – all of this is captured in a fishery management plan that is approved and sent to NOAA. NOAA reviews each fishery management plan and ensures that it meets national standards within the Magnuson Stevens Act. If the plan does not meet the standards, it is returned to the council. Once NOAA approves the plan, it is implemented through a public regulatory process and enforced in co-ordination with the US Coast Guard. Catch data is collected and informs the ongoing scientific advice. It is all democratic: councils hold public hearings and engage with civil society.

A number of lessons have been learned. Firstly, the north east multi-species groundfish fishery (cod, haddock etc.), which showed a crash in 1992, resulted in the update of the law in 1996 by Congress. The cause of the crash was decades of overfishing, failure for years to follow scientific advice, adhere to total allowable catches and quotas, and ineffective effort controls. The outcome of these factors was a boom-and-bust cycle that was terrible for the industry and local communities and ultimately caused the fishery's collapse. This example was one of many that illustrated the need for explicit language in the law to end overfishing and rebuild stocks. In addition, science-based catch limits are the key mechanism to recover and maintain stocks, and the catch limits must be enforced. While the situation in New England continues to be challenging, other fishing communities more readily adopted the "Alaska model" that followed the scientific advice and had very different results.

A second example - the west coast groundfish – illustrates the importance of following the scientific advice and adopting a comprehensive recovery plan. The west coast trawl fishery crashed in 2000 as a result of overfishing within this multi-species trawl fishery. Poor scientific information, coupled with the overcapacity in the industry, led to the crash.

Congress responded by amending the law in 2006 to strengthen conservation and accountability requirements, encourage fishery innovation, and facilitate the transition to sustainable fisheries. These amendments emulated the successful model established in Alaska and followed recommendations of experts, including from National Academies of Science, as well as government-commissioned and independent reports. It became evident that the east coast

resistance to science-based management and accountability would not result in sustainability. Many of the elements adopted on the west coast were very innovative. A science-based catch limit was established, and a reduction in fishing capacity was achieved by fishermen themselves. An individual quota system was adopted and greater gear flexibility introduced. It was recognised that community impact had to be addressed in establishing quotas with regional entities holding quotas on behalf of the communities. Full catch accounting has been introduced, observers have to be employed and electronic monitoring of catches is being developed.

Habitat closures were also introduced to keep fishing gears out of sensitive habitats and by-catch limits have encouraged fishermen to develop ways of avoiding the capture of protected species. There has been strong by-catch improvement for constrained species. We went from a 2005 trawling ban to a dramatic turnaround in 2014, with new opportunities to catch groundfish and market sustainable seafood products.

Over the last decade, the United States has largely ended overfishing, has rebuilt or is rebuilding stocks, is reducing by-catch, and is helping to rebuild local fishing economies, despite some remaining challenges. The law's key success factors include:

1. It prohibits overfishing and requires depleted stocks to be rebuilt;
2. It mandates annual catch limits be defined by scientific advice and demands accountability to the limits;
3. It calls for federal investment in science;
4. It allows states, industry and civil society to shape management plans, but requires they meet federal science-based standards; and
5. The law encourages regional innovation to achieve conservation and social goals.

For fisheries beyond United States jurisdiction (highly migratory or shared stocks), United States law enforces management measures under 11 international Regional Fishery Management Organizations to which the United States is a signatory, and also targets illegal, unreported and unregulated fishing under the Magnuson Stevens Act and treaties such as the United Nations Food and Agriculture Organisation's Port States Measures Agreement.

There are a number of challenges that the United States shares with the United Kingdom, including:

- Management of multi-species fisheries: especially where some fish stocks are still in decline but others have improved;
- Climate: it is difficult to manage fisheries adaptively in a changing environment;
- Markets: you can control the fisheries but cannot easily cope with shifting demand and changing prices;
- Accountability: data are required to make things work and there are problems with monitoring and compliance;
- Cost of Management: there need to be rules for industry taking on some of the costs, or sharing them with government;
- Enforcement: legality, traceability and fairness are all incredibly important. There must be a level playing field.

Things that have worked especially well for the United States are:

- Requiring time-bound science-defined limits for all catches;
- Developing a regional robust, transparent, and accountable decision-making and planning process;
- Strong science, with adequate monitoring;
- Performance metrics that are reported publicly;
- Having a resilient system that can adapt to changing circumstances.

The United Kingdom is part of a global community and the United Nations' Sustainable Development Goals are especially important as an indication of the global expectation for science-based management, legality and accountability to ensure sustainability for future generations.

*"If I could just attempt to summarise the US system in one sentence, it is local original management held to account by authority under the law with high levels of observer coverage in order to make sure that accountability is there,"*  
Dr Ian Boyd, UK.

## United States Panel Discussion

Professor Ian Boyd, Chief Scientific Adviser of the United Kingdom Department of the Environment, Food and Rural Affairs, chaired the panel discussion. Ian introduced the United States panellists: Professor Andrew Rosenberg of the Center for Science and Democracy, and Stefanie Moreland, director of government relations for Trident Seafoods. We had heard what the United States system was like, but we now wanted to learn what the problems and challenges might be.

Andrew began by dealing with how things in the United States actually worked out in practice. He had become the regional administrator just after the north east Atlantic fishery had crashed. Working through the fishery management council had been a real tug of war. There were many arguments, ostensibly about science but really about allocation. Fishermen wanted the pie to be larger, to achieve a bigger share for themselves. Allocation between inshore boats and offshore boats, small boats and large boats and fixed gears and mobile gears was an intense battle. Everyone wants to do their own thing without strong accountability. After the collapse of the groundfish, scallop and other fisheries in the North East, it became necessary to institute a recovery plan. The tug of war was only possible to resolve because amendments made to the law in 1996 defined overfishing and provided a clear mandate for management. The federal role was to approve or disapprove the management plans brought forward by the fisheries management councils. National standards had to be met by every plan. Politically the federal government was able to overrule decisions taken at a regional level. Regional management only works if there is a very strong limit to how far it can go. This problem exists whether it is between the regional and Federal government or a cooperative group working with the Regional Council.

As a regional manager, Andrew did not want to get too involved in all the management details and was happy for fishermen to decide on the details of fishing, staying within a fixed set of limits, although they have to be truly accountable for adherence to those limits. Government should not be too involved in operational decisions.

There is a large recreational component in some United States areas, but the recreational participants are about 25 years behind in their thinking from the commercial industry, which has accepted many of the principles of management. Recreational fishing continues to increase and often targets large and important species.

There is an Individual Transferrable Quota (ITQ) system in the United States, as there is in the European Union. The problem is that the system is split. Some people are part of the system but some are not. This is not workable.

Finally, a huge challenge for the United Kingdom, and sometimes the United States, is the management of straddling stocks. Taking control over the United Kingdom's exclusive economic zone will not address this challenge as many important stocks straddle other areas. Dealing with the North-East Atlantic Fisheries Commission (NEAFC) and other organisations is going to be important for the United Kingdom as this will continue to be a dominant issue.

Stefanie Moreland presented her views from her involvement in the North Pacific Management Council, representing the fishing industry. Stefanie works with Trident Seafoods, a vertically integrated seafood company which is based in Seattle and very dependent upon resources largely harvested off the coast of Alaska and also fisheries in the Pacific North West. She had previously worked for the State of Alaska on the North Pacific Fishery Management Council and also on the Pacific Council. Regional management processes are really important in the United States. It is often said that there are few problems in the Alaska region, and it certainly has healthy ecosystems, abundant resources and healthy fisheries. A lot of that is due in part to the industry and to the management system. There has always been a strong commitment to science-based decision-taking. However, when there are stock declines it is not possible to live with an overly precautionary approach for the sake of conservation. It is important to follow a science-based approach both in good times and bad times.

Margaret had mentioned that the federal approach is largely based on the approach taken in the Alaska region, and that is true. However, being on the receiving end of implementation of the federal approach in the Alaska region, it is evident that it has caused a lot of problems. Changes have had to be made in Alaska as the regulatory structure has been written as "one size fits all". Alaska is subject to some accountability measures. When the federal system was put in place for something like the octopus, there was an indicator with a loose limit which could result in closure of the fishery. Yet there was no conservation problem. It is really important to provide a regional input into the federal process and vice versa. The federal system was designed to allow continued deference to the State of Alaska, where there was expertise. Doing that while meeting all the points that Margaret has listed has proved quite difficult. Some aspects of the administrative

system are now being challenged by the courts. Coordination across jurisdictions is critical.

To make a bigger pie, under a system where science comes first, it is really important to consider how to reduce scientific uncertainty, and also to consider how to reduce management uncertainty, in order to provide additional fishing opportunities. We have become quite good in the Alaska region in reducing uncertainty in both of those, but on the management side it has been necessary to put cooperative processes in place. For example, there has been a programme where a third party has collected information from the federal observer programme, processed it very quickly, and turned it around to the fleet so that the fleet can make decisions on how it can meet certain management objectives quickly. This has allowed reduction in management uncertainty, improved predictability, reduced impacts and helped to make the pie bigger overall.

One of Andrew Rosenberg's experiences of the United States fisheries management system had been in Alaska and involved a meeting with the North Pacific Fisheries Management Council. He had noticed that there was an iterative process going on in the room.

## Questions for the United States

Daniel Owen, who would be preparing a summary of the meeting, asked about shared stocks. When the United Kingdom leaves the European Union, many stocks which were previously not shared will become shared. Can we learn from the United States' experience of stocks shared with Canada? The only United States/Canada shared stock he was aware of was one that has an international commission associated with it, the Pacific halibut. That commission is well-staffed and has a long history and is based on good science. What arrangements exist for other United States/Canada shared stocks?

Andrew Rosenberg commented that there were other shared stocks, like the Pacific whiting and in some cases there were individual commissions that were like treaty organisations, based on shared agreements. However, in some areas like the north east there is not a formal treaty organisation other than the North East Atlantic Fisheries Organisation which operates primarily for international waters. There is not actually a formalised agreement with Canada, even though many of the stocks like haddock are shared. There is a lot of science correspondence but much less management correspondence and that is a problem as the

countries independently set their catch limits. The challenge is that either you set up a formal treaty organisation with specific rules for allocation, or you just try to muddle through, which is what happens in the north east of the United States. The United Kingdom did have a formal treaty organisation under the Common Fisheries Policy but it is hard to see what is going to be the next step. You do ultimately have to account for the overall catch on either side of the line. That can be extremely difficult without a treaty organisation in place.

Stefanie Moreland said that the Halibut Commission is there to conduct the science and then work out how much would be available within each of the units that they provide catch limits for. All the allocations have been made under the federal structure including the allocation to commercial holders and the recreational sector. Then, for the recreational sector the state of Alaska is doing the dockside sampling and monitoring the catches coming through. The roles of each organisation are clear and that is why it works. There must be accountability so that all the information is fed into the scientific process.

Margaret Spring agreed with what had been said. She had worked on the tuna negotiations and had observed that it was really an allocation battle. It is important to have strong science, to ensure that participants report their catch, and to engage with all parties.

Barrie Deas of the National Federation of Fishermen's Organisations (NFFO) was interested in time-bound stock rebuilding plans. There had been mention of Optimum Yield and Maximum Sustainable Yield (MSY). How do you define the time frame? In the European Union at the moment we have a blanket MSY obligation across all stocks, which does not take account of the biology of the individual stocks.

Margaret pointed out that the 1996 Act did not impose a time line for ending overfishing. The law simply required that plans should aim to end overfishing and plan to rebuild the stock within a ten-year time line that could be adjusted, based on the recovery time and the biology of the stock. Now, with the 2006 Act, every single fishery management plan has to have an accountable catch limit that will end overfishing. The accountability measure has to be in place within two years. The ten-year time line for stock rebuilding is intended to be somewhat flexible, as it considers the biology of the stock.

Andrew argued there had been an enormous amount of controversy in the United States over the

ten-year time frame. There have been many cases where that time line hasn't been held to, and there is general unhappiness with the setting of a ten-year time line when in some cases stock recovery has taken over 20 years. He agreed that the number is indicative rather than prescriptive, and it ensures that immediate action has to be taken to reduce overfishing. It does not really matter how long the time line is.

Ian thought that one of the important problems was that timescales for recovery can actually be quite long. It was pointed out, however, that some stocks, like the west coast groundfish and the east coast scallop had recovered more quickly. It is the underlying economics that are important, however. The real problem is how long do fishermen have to adapt to a new system, and that can take quite a while.

Euan Dunn of the Royal Society for the Protection of Birds (RSPB) said that in the North Sea the biggest single fishery by weight is the industrial fishery for sand eels. In the United States there is a highly precautionary approach to industrial fisheries. Has there been any pressure to open up an industrial scale fishery and what would be their reflections on differences between the United States and European Union? Andrew replied that there is a menhaden fishery, which is effectively industrial. There has also been some pressure for an anchovy fishery. There has been a lot of work in recent years on trying to preserve forage for birds and other species along the coasts as part of the management plans, which has been contentious but which has been implemented on both coasts.

Bryce Stewart of the University of York had noted that focus on science is central to the United States management system but asked how any distrust of science was being dealt with. Science is never going to be perfect and the fishing industry and the managers do not always trust what is coming out from science.

Margaret replied that she had often been on the receiving end of complaints about science, especially when there were adverse impacts upon the industry. The United States has encouraged cooperative research between industry and government. That is not always a solution but the training of Council members and others in stock assessment can be helpful. There is a consistent challenge over science but participation and engagement does help. Stefanie added that in the Alaska region they have annual stock assessments, where transparency and peer review is an important element. Some stock assessments may be slow

in incorporating information and the industry gets frustrated by this.

Andrew agreed that it is important to engage fishermen in the assessment process. He had initiated a marine resource education program, with workshops for fishermen, to encourage them to engage more practically in the management process. Instead of being angry, the fishermen were able to sit down with the scientists and engage with them, and provide their own information. Stefanie pointed out that interaction with fishermen does not have to involve workshops. There are scientific and statistical committees within the regional councils, and making the scientific review meetings open to fishermen can ensure that any issues are discussed before the council decisions are taken.

Ian Boyd concluded that trust in science can be a real problem, as it was with the North Pacific Council in dealing with the Alaskan pollock stock assessment model. Fundamentally, only one person understood the stock assessment model and explaining it to others had been really difficult. Maintaining trust within the whole decision taking system is extraordinarily difficult. How do you tackle that?

Andrew thought things had now changed a little bit. Fundamentally, stock assessment is a very complex process and transparency is good, but expertise is also involved. The models can be quite complicated. Management could perhaps involve much simpler methods, especially if the data is better and is partly provided by the fishermen.

Charles Clover, from the Blue Marine Foundation, noted that Andrew had said the recreational fishers were some 25 years behind commercial fishermen. How could they catch up? Andrew confirmed that they were behind in their thinking and he did not know how they could catch up. Some organisations had caught up better than others. Some would not accept restrictions of any kind, which would continue to cause a lot of problems. Many recreational catches are taken by commercial or charter or party boats, and they should be treated as commercial operations. Their reporting obligations are essentially the same as those for commercial fishermen, especially for species like halibut and salmon.

Margaret remarked that the recreational sector did not believe that yield-based management reflected what they cared about. However, it is not possible to make models work unless we know how many trips these fishermen make. Their impact in terms of fishing mortality is important. However, many

of them believe that recreational fishing does not have an impact on the environment, although the sheer scale of their activities belies that. The more they can focus on supplying data, and the more accountable they are, the better. They must be part of the system. Ian agreed, and concluded that the United Kingdom would have to take account of its recreational fisheries at some point.

John Goodlad, of the Fishmongers' Company, asked about catch shares. Reference had been made to catch shares in the United States. We have a catch sharing system in the United Kingdom. One of the criticisms of sharing is catch concentration. Is there a limit to the amount of catch that can be owned by a particular company or vessel, and if you do does this vary from one regional council to another? Margaret reminded John that she had said earlier that there cannot be an excessive share of the allocation, and that is enshrined in law. Every Council, when it puts out a management plan has to define what an excessive share would be. Stefanie added that this can vary from fishery to fishery.

Hazel Curtis, chief economist of Seafish, had been struck by Stefanie's comment about reducing management uncertainty in order to increase the size of the pie, and that how you divide the pie affects the size of the pie. Are there any specific examples of this? Stefanie replied that if you were to design a catch share programme that has cooperative management with the sharing of real time information you can fish right up to a total allowable catch limit. But if management is rather coarse then there will be a lack of predictability of catch rates and fleet dynamics and a buffer might be needed to ensure that the target catch is not exceeded. Andrew then raised the issue of by-catch. Catch share programmes that still have some open pool, or allow access to vessels that are not part of the catch share programme, can take a large part of the by-catch because they are not accountable for their catch shares. That means you have to change the management structure because a small number of vessels may be taking a large share of the by-catch. If you can get that under control you might have a more efficient fishery. Margaret then added that both recreational fisheries, and also fisheries that are managed by effort, can create uncertainty because they are affected by weather and other things. That is the experience in New England where precautionary levels have to be very low and are continually going down.

Michael Park, of the Scottish White Fish Producers Association, said that accountability had been mentioned, with observers and with a move towards electronic monitoring. How did you deal

with the tensions created by this? Do the observers onboard vessels carry out any other functions? Who operates the observer coverage? Margaret remarked that in many fisheries there had not yet been a transition to accountability. Funding can be difficult and there are often insufficient observers. There are independent companies that can provide observers. Their role is to document the catch – it is not regulatory. Andrew added that the observers are not enforcement officers. Stefanie pointed out that in United States fisheries generally there is only partial coverage and it is necessary to extrapolate. Where there is 100 per cent observer coverage there is less of a government role, as the government does not need to decide who will have an observer on any particular trip. Such boats contract directly with an observer provider. An observer is needed on every trip.

Ian Boyd asked whether technology was changing this. Andrew answered that it was changing things. People were working hard to develop electronic monitoring systems but they were not replacing observer programmes. There are vessel monitoring systems (VMS) in place. Accountability is more than just observers. Observers are a fairly expensive data-collection tool. What is more important is to have accountability for the catch including by-catch, whether that is achieved electronically or coming from the vessels themselves. VMS is used a lot for closed-area monitoring. The fact that there is a defined action when you exceed the limits is the most important aspect of accountability. Margaret added that electronic monitoring together with dockside monitoring is there to confirm what you have on board. Electronic monitoring is usually in a video form, which takes a lot of time and effort. Technology has a role but no one has quite figured it out yet.

Aaron Brown, from Fishing for Leave, asked about compliance and enforcement in the New England fishery, which is probably the most comparable with the United Kingdom fishery. Landings within a quota regime will only ever reflect the level that humans set, not what is actually present in the sea. In New England how do you ensure that stock analysis and the level of quotas set is reflective of what is going on in the sea? Quotas can be out of line with the available stock. How do you ensure that there is then no discarding? The only way to ensure that there is no discarding with choke species is to use cameras, but if there is fully enforced monitoring of choke species the majority of the United Kingdom fleet is going to go bankrupt and few fishing companies will be left. It was mentioned that effort control had been used for a while, was that just days at sea, which will not work, or was it a more refined

system of effort control?

Andrew replied that he did not think they had solved the problem effectively in New England. What happened was that there was an estimate of how much black landings were occurring for both by-catch and target species. The enforcement problem continues to be a difficult one and there are still many black landings with many boats involved. So, enforcement is difficult because it is largely political. Industry sometimes think that enforcement is too aggressive. It is very difficult to account for landings. There is an observer programme in place that helps. The Canadian system with surveillance on the dock is very much more effective in terms of accounting for total catch but then there may be a by-catch problem at sea. The effort control or days at sea discussion is probably a longer one. It is much less precise than catch control but at the time it was the only system that the industry would accept. It did result in the first recovery plan that turned the fishery around. Initially, in starting to get fishing pressure down, it was a tool that could be put in place at the time. You have to do what is achievable at the time to obtain control of the fishery. There may be a better system out there but making the transition is very difficult. In New England there had been massive overfishing. In Alaska they had not been confronted with that same problem. Margaret added that in addition to days at sea there were also closed areas and changes to fishing gears, so there were multiple changes.

Ian drew the session to a close. We had heard a very eloquent expression of what the United States system was doing in terms of fisheries management and Margaret, Andrew and Stefanie should be thanked for their talks and their responses. To summarise the United States system in one sentence, it is local or regional management held to account by higher authority under the law, with high levels of observer coverage in order to make sure that accountability is there.

*“97% of western Australian fisheries are not at risk of overfishing and most major fisheries are MSC certified. Success is a product of partnerships and co-operation,”*  
**Guy Leyland, Australia.**

## Fisheries Management in New Zealand

### Presentation by Geoff Tingley

Sir John Beddington introduced Dr Geoff Tingley. Geoff worked at the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) in Lowestoft before moving to New Zealand where he was a principal scientist at the New Zealand Ministry for Primary Industries from 2011 to 2014. Then he started his own consulting company, Gingerfish, to pursue his interest in sustainability more fully.

Geoff pointed out that the exclusive economic zone of New Zealand is the fourth largest in the world. The fishery lands about 350,000 tonnes of fish per year, valued at about £1 billion. Most of the catch is exported. There are only two abutments with other zones (Australia) but there are few shared fisheries within those zones. There is one straddling stock, shared with the South Pacific Regional Fisheries Management Organisation, and a few highly migratory species. There are four fishery components:

- Deep-water (offshore) fisheries;
- Inshore fisheries;
- Customary fisheries (where rules are determined by local Maori groups under a treaty arrangement); and
- Recreational fisheries.

The deep-water fisheries comprise 76 large vessels, operated by four main companies. The inshore fisheries comprise 850 small vessels, using a wider range of fishing gears. The recreational fisheries include a freshwater fishery (mostly for salmonids), which is licensed and well-managed. The marine recreational fishery has similar issues to the US. It is considered by many New Zealanders that they have a right to catch as many fish as they want to. That makes management slightly challenging as there is no licensing arrangement and poor knowledge of how many fishers there are. There is no reporting scheme and it is difficult to estimate how many fish are being caught by this sector. Some management of this fishery is in place, based on bag limits, and it is reasonably effective. The fisheries for highly migratory species, including tuna and billfish are well managed. However, as Andrew Rosenberg pointed out, recreational fishers are about 25 years behind the curve. There are also some local peculiarities. In New Zealand; there is recreational gill-netting and recreational scallop dredging!

Management of the New Zealand fisheries started in the 1970s. The Fisheries Act of 1996 does a lot of interesting things. It relies on clear and enforceable legislation, solidly founded on sustainability criteria (maintaining stock size at or above a level to support maximum sustainable yield (MSY), or a proxy for MSY). There is essentially single government jurisdiction, as there are no Federal/ State divisions, and no near neighbours sharing the fisheries. That has some positives and some negatives. It is easy to manage the larger, well-understood fisheries, but it creates some problems in the coastal fisheries, where there are differences in the biology of the same species and where it may be necessary to have a different landing size from one area to another. There is a regional structure in the United Kingdom and it can perhaps be used to define a system that works well for those species that need a different approach.

The New Zealand legislation is managed by the Ministry for Primary Industries, but there is involvement by other departments including the Department for Conservation, which has responsibility for marine mammals. The Ministry of the Environment has some related responsibilities and there are also interlinks with the Ministry of Business which is responsible for cable laying and oil exploration etc.

Access to the right to fish is provided in perpetuity. This gives the main players a real interest in making sure that the fish stocks do well. Ownership of the resource is by the fishers themselves – enacted through a Quota Management System (QMS) which has as its core an Individual Transferrable Quota (ITQ) that incentivises care of the resource, especially in the deep-water fisheries, where the fishermen own the quota. It does not work quite so well in the inshore fishery where there has been some consolidation of quota and fishers are often fishing for other people that own the quota. This is very pertinent for the inshore fisheries in the UK. Indigenous commercial fishing rights are allocated through the allocation of ITQs, with Maori interests now owning >35% of quota and fishing enterprises.

This means there is a relatively simple and effective quota management system with multiple points of corroboration for monitoring catches, control and surveillance. The system incentivises the full reporting of catch and there are severe penalties for breaking the law. This system works pretty well, especially in the deep-water fisheries, where it maintains catches within permitted Total Allowable Commercial Catch (TACC) limits.

Broad ranging consultative processes apply across

both science and management decision-making. There are strong and open peer-review processes that evaluate the science and ensure its fitness for use in providing management advice against consulted and published benchmarks for science quality (i.e. Science and Research Standards). This specifically provides industry, recreational fishers, Maoris and NGOs with involvement in the planning and development of the science that informs management. All stakeholders have a voice in the peer-review process and it works really well. Time-bound recovery plans exist under the Harvest Strategy Standard.

Some elements of precautionary management are in place, as a default. For example, in the absence of specific stock-based information, there are default target reference points, the lowest being 40% of the virgin biomass (the biomass that theoretically would have occurred if the stock had never been fished) which can be changed based on stock-specific scientific information. Everything is consulted on and there are benchmarks that are published. All the harvesting decisions are based on open and transparent science. There are high levels of independent monitoring of catch, by-catch and discards in the deep-water fleet by ministry observers (45% observer coverage on trawlers, 100% for 'high risk' fisheries/vessels). This contributes to low waste fisheries with about 96% of the deep-water trawl catch retained, with very little discarding. Regulated species have to be landed; they cannot be discarded.

There is a strong deep-water sector, with an organised, well represented, coherent, engaged, and proactive industry, with clear strategies and objectives. The industry works in partnership with the government, research institutes and others. The harvest strategies are often conservative (increasingly based on Management Strategy Evaluations) to maintain stocks well above  $B_{MSY}$  (the stock biomass that would deliver the maximum sustainable yield). The industry does not want closures and large shifts in total allowable commercial catches (TACCs). Innovative science is directly contracted by industry from national and international science service providers (for example, the development of an acoustic optical system for estimating fish abundance to a high standard using fishing vessels). There is a strong commitment to external performance verification. 21 deep-water fisheries comprise 50 per cent of the wild fish harvest by volume, and take >70 per cent of the deep-water catch, certified as sustainable to the Marine Stewardship Council (MSC) standard, and with an additional five fisheries in fisheries improvement plans (FIPs).

The inshore sector is weaker. It is organised, and has good representation but it is less coherent. Strategies and objectives are less clear although some of the fisheries are well-managed. Partnerships are weaker. Monitoring of the fisheries is much poorer, with very low observer coverage (although that is being addressed by moving towards electronic monitoring). The harvest strategies are generally less conservative, and the inshore fisheries are rather more wasteful than the deep-water fisheries.

Overall, the system in New Zealand works very well and is well understood. One of the good features is that there is an innovative approach to developing science-based solutions to address the risks and uncertainties associated with difficult management issues (e.g. risk assessments to evaluate levels of interactions with seabird, marine mammal and shark populations). There are excellent examples of collaborative research and development between Government, industry and research institutes (e.g. Precision Seafood Harvesting, PSH, a collaboration between the Ministry and a group of companies to develop new fishing methodologies that bring up live fish and return unwanted fish alive). The Acoustic Optical system, mounted on commercial fishing boats had been developed between a New Zealand company and an Australian research institute to get really high-quality estimates of fish biomass.

Marine protected areas are currently a big issue in the UK. They are used appropriately in New Zealand to protect benthic habitats and species. However, Dr Tingley does not consider them a substitute for high quality fisheries management. About 30 per cent of the New Zealand exclusive economic zone is closed, mostly for benthic protection. Valuable science was used to set this up in about 2007/2008. About 90 per cent of this zone has never been trawled.

Who pays for scientific research and monitoring? Mostly it is the industry. It is very expensive, and the Ministry does pay for some things where there is societal good. The system is not perfect; some elements of it work well and some do not. A model with more government funding and slightly less industry funding might yield a better outcome. One of the advantages of industry bearing some of the costs is that they are engaged in the science. They attend the working groups and they buy into the results, which strengthens the management. The United States system is very different, where the bulk of the costs are not borne by the industry.

There are problems in defining adverse impacts. Fine scale management is also problematic, but it

is done in certain fisheries and it works. There are some conflicts between recreational fisheries and inshore fisheries, especially when they are fishing on the same stock. There can be issues about what fish are being taken, what size they are, who should get what and who should pay for what. These issues can be difficult to fix, partly because of lack of information about the stocks.

Geoff believes that the New Zealand monitoring, control and surveillance system is very good. It is cooperative with industry and it works really well. New Zealand is repeatedly rated in the top four fisheries management regimes. The orange roughy fisheries were certified last year and now produce half of the World's production of this species under Marine Stewardship Council (MSC) certification.

Things to be looked at from New Zealand by the United Kingdom include:

- Ownership of access rights.
- Industry organisation, vision and objectives.
- Partnerships.
- Involving industry in the science process – work with the best.
- Transparency in science & management decision-making.
- Accreditation to the MCS standard.
- Appropriate selection & use of MPAs.

For the United Kingdom, establishing partnerships is important. The United Kingdom has to have partnerships with the European Union and non-EU countries (Norway and others), the universities, research institutes and NGOs. Managers have to be held to account, especially when they are taking decisions outside the scientific advice. High quality monitoring data is needed – the best that can be afforded. MPAs need to be selected and set up, as appropriate. An at-sea data collection programme is required. There is not much of that done in the United Kingdom at the moment. Look at what is done in New Zealand and the United States. Improvements in the monitoring, control and surveillance system are also needed.

*“At-sea data collection is required: not much of that is done in UK at the moment,”*  
**Dr Geoff Tingley,**  
**New Zealand.**

### New Zealand Panel Discussion

Dr. Stephen Simpson, Associate Professor of Marine Biology at the University of Exeter, introduced George Clement, who is CEO of Deepwater Group, a non-profit industry organisation that works in partnership with the Ministry for Primary Industries to ensure that New Zealand gains the maximum economic yields from the deep-water fisheries resources. George would give us a New Zealand industry perspective.

George had spent his life as a fishery manager, starting off as a fishery scientist. He had worked for the government in bringing the quota system in. George believed that quota is the most successful form of management but for it to work it has to be allocated on the basis of good science, and not politics. There has to be a system to ensure that what is caught is within the allocation. Management has to be done on a conservative basis to ensure that stocks are being managed sustainably. The best definition of sustainability is for each of us to give our children the same choice as we have had ourselves. New Zealand started off from a good position and now just has to maintain its stocks conservatively rather than rebuild them. Within the industry, our idea of conservatism is often more conservative than the government's, as economics are taken into account, requiring larger fish sizes and higher catch rates than are provided for under a MSY harvest strategy (e.g. total allowable commercial catches set for hoki). Industry and government are progressing management strategy evaluations for each of the main deep water fisheries resulting in conservative harvest strategies (catches are around 3-8 per cent of stock size). The dynamic is working because the quota is allocated to individuals as a property right, and they have a

percentage share of the fishery and a long-term interest. It does not have to be a perpetuity quota but there has to be sufficient continuity for owners to invest in their future and in the future of the fish stocks – possibly at least 50 years or more (similar to the 99-year tenure of land).

Input controls (which directly regulate the amount of effort which can be put into a fishery) might work as an adjunct for output controls, but never as a substitute. With fisheries run through input controls there is not enough science or there is not enough temerity in the management. For output controls to work they have to be universal, and this is a problem. Andrew had mentioned that in his experience at least some of the recreational sectors were 25 years behind. There can also be large numbers of recreational fishers. The United Kingdom is now facing a number of choices and you have to be brave, and dig deep into the rights that people have and make sure that they understand that there is a conservation picture before there is a utilisation picture. In New Zealand the Fisheries Act has a single purpose, it provides for utilisation – with the caveat that it ensures sustainability.

Sir John Beddington had spoken about civil society versus industry. It does not have to be a dualism, and it will not work if it is. You need to have the industry leading the environmental NGOs. You need industry to say what is sustainable. In New Zealand we closed a third of our zone, largely consisting of pristine unfished areas – broadly representative of the range of marine benthic ecosystems. That is equivalent in area to the entire United Kingdom exclusive economic zone, and it has been completely closed to trawling, even though there was no statute to enable the Department of Conservation to establish marine protected areas beyond 12 miles from the shore. It is not often that you see the seafood industry's interest in conservation leading that of civil society, but New Zealand provides an example that is working. So, there does not have to be dualism – the approach can be integrative.

Stephen Simpson thanked George and introduced Karla Hill, representing civil society. Karla works for Client Earth, a group of lawyers committed to securing a healthy planet. Karla remarked that in New Zealand it is not only the fish but the people that are highly migratory. She had practiced environmental law in New Zealand but has been in the United Kingdom for 11 years.

New Zealand has a very solid basis for its legal framework, with a clear statutory purpose and principles set out in the Fisheries Act of 1996. There

is a very clear framework for sustainability but it also meets government and other requirements and also enables government to take into account factors beyond utilisation and consider environmental, social and other factors. The Supreme Court in New Zealand in 2009 confirmed that the statutory purpose requires a balance between utilisation and sustainability. However, utilisation must not be given such prominence that it jeopardises sustainability. The court confirmed that fisheries are to be utilised, but ultimately sustainability is to be ensured. The fact that the New Zealand system confers property rights in quota also incentivises and enables the industry to take a long-term view of the fisheries resource.

Discussions in the United Kingdom are going beyond fisheries and are also considering future environmental perspectives. The New Zealand Fisheries Act has environmental principles embedded in the legislation, focussing on long-term viability of the species, and not just the fish species that are being fished but also other species that are present in that same environment, and also conserving habitats and biodiversity. This is enabling for policy makers and sets a broader framework for policy. There is also a good reflection of a precautionary approach, in a set of information principles, which require government to rely on the best available science and enable decisions to be taken to provide for sustainable utilisation where there is uncertainty, rather than postponing or failing to take action until more information becomes available.

Part of the role of civil society is always to work with other stakeholders. It is also to look towards ambition. From an environmental perspective there is a clear wish to shift towards an ecosystem-based approach to fisheries management. In New Zealand the maximum sustainable yield (MSY) approach to setting take levels is one approach towards achieving sustainability, but that is not to say that New Zealand fully adopts an ecosystem-based approach. The foundation is there, but there is more that can be done. The public do have some concerns around some stocks that are still being overfished and over conflicts between fisheries and some protected species, including sea mammals. Things are not perfect and there is always room for improvement, although there is a good system in place.

*“The area closed to trawling for benthic protection in NZ is equivalent to the whole UK EEZ,”*  
Dr Geoff Tingley,  
New Zealand.

### Questions for New Zealand

Rodney Anderson, of the North Sea Marine Cluster, remarked that there had been a reference to clear statutory purpose in New Zealand. Does that embrace what the fishing industry is for? There is a lot of money spent on managing these fisheries, but who gains the benefits? What benefits are derived especially by coastal communities, and to what extent does this clear purpose include what happens on land as well as at sea? Much of the previous presentation has been about biology. There are people and socio-economic issues as well. How are these factored in?

George Clement replied that New Zealand had given quite a lot of thought to that. At that time there had been a move towards privatising things by the New Zealand government. Between 1983 and 1986 a policy had been developed to privatise, in perpetuity, the sustainable harvest rights to New Zealand's fisheries. In doing so, at the time, there was a large contingent of foreign owned vessels and foreign citizens fishing in New Zealand's waters. Today, you cannot own quota in New Zealand if you are not a New Zealand citizen. If you are a corporation and you have more than 24.9% of your stock owned by non-New Zealand citizens, then you cannot own quota. That was the first step put in place, and it works. My suggestion to the United Kingdom is that you should make this about the United Kingdom and not about the European Union.

Another issue is that when designing a sustainable utilisation system based on quota, do you insert caveats on the transfer of quota, other than citizenship? As in Alaska, should there be a limit? There is a limit in New Zealand of 25 per cent of

the quota shares for any fish stock, other than the rock lobster where it is 10 per cent. You can get dispensation to hold more from the minister. In particular, Maori interests, through their treaty rights, and through their own commercial acumen, collectively own about 40 per cent of the commercial fishing rights, and they have at times been granted dispensation to own more than 25 per cent of the quota shares from particular fish stocks. Another major issue is whether you want to protect regional communities. New Zealand decided that it would not, because we wanted a pure economic instrument, to achieve efficiency. As long as you are a New Zealand citizen and you do not own more than 25% of the quota, it does not matter where you live, or which kind of fishing gear you use, provided you fish sustainably and do not cause environmental damage. You can buy and sell quota. This works well for New Zealand.

Karla Hill agreed that New Zealand had made a very deliberate decision to create property rights through the individual transferable quotas (ITQs). There was little attention paid to the social side and this has led to a level of consolidation within the industry. Something for the UK to consider is whether there might be different ways of looking at the property rights that would enable more communal forms of ownership, or more regional elements to the fisheries.

Andrew Brown from Marine Scotland (a department of the Scottish Government) remarked that New Zealand has a large area of water through which many boats are scattered. How many vessels checking compliance do you have? How does compliance operate over such a large area? George replied that the government has required global positioning systems (GPS) so that all the boats in the deep-water fishery have a GPS transponder system, so that it is clear where they all are. At the moment there are some policy changes and the Government is asking for such a system to be extended to the inshore boats. There is also quite high observer coverage on the offshore boats for two reasons. There is a need to collect a lot of scientific data on the catches to inform the scientific stock assessments. We are also, as in the United Kingdom, tasking fishermen to self-report their catches, so some form of audit system is needed to make sure the reporting is accurate. The Government assesses whether a particular vessel is deemed to be high risk. One or more observers are placed on a boat at the vessel owner's cost in order to specifically monitor those that are high-risk. There is also a very rigorous paper trail. When you catch fish you have to log it, and this is very carefully checked at the point of landing

and point of discharge. We are lucky that we only fish New Zealand waters, we are not landing into neighbouring states, and as a quota owner you are obliged to tell the state the port you will land at. This works well, and is particularly tight, especially for the inshore sector.

George Clement added that if your crew is convicted of not reporting catch, then the vessel and the quota will be forfeited. This is automatic upon conviction and not at the discretion of the Court. This provides an enormous incentive for quota owners to focus their minds and for them to think about the downside risks of them or their crew being convicted for not obeying the law. Geoff Tingley pointed out that there are also overflights using military aircraft and ships to monitor at sea activities of fishing vessels, so the large New Zealand zone can be fully monitored.

Torben Foss, from PWC in Norway, agreed that it was important to discuss socio-economic questions when regulating the fisheries. If you have an individual transferable quota (ITQ) system, and this is given to the company for ever, do you take any resource interest out of it? Is there any special tax? George replied that this discussion had taken place in New Zealand and you will need to have it in the United Kingdom. The state, on behalf of civil society, owns the fish stocks within the territorial waters. Beyond the territorial waters, from 12 to 200 miles, the state has no ownership but it does have priority management rights under the United Nations Convention on the Law of the Sea (UNCLOS).

New Zealand has privatised the small proportion which is the annual yield. For example, the annual catch of orange roughy amounts to 2 to 4 per cent of the standing stock. Hoki catches are catching 6 to 8 per cent of the standing stock. That quota, or share of the annual commercial catch, is a property right and it belongs to the quota owner not to the State. This became really clear when the indigenous Maori came to the Crown and asked for the Crown to give effect to their treaty rights. It was deemed that there would not be resource rental, but there is a return to the State through taxation, and there is also a management fee for services. In the deep-water fisheries the Crown recovers almost the total cost of managing fisheries from the participants, including the costs for science, monitoring and compliance.

Angus Stirling from the Fishmongers' Company noted that Geoff Tingley had said that the science is benchmarked in New Zealand. What are the principle benchmarks that you use and does that provide any guidance for the United Kingdom? Geoff replied that there were two documents that were developed, consulted on and then published

in about 2008. One is the Harvest Strategy Standard which sets things like the minimum time for rebuilding, and target reference points for stocks that do not have enough science to set them on a stock by stock basis. There is also a Science and Information Standard setting minimum standards that the science has to reach before it will be used to advise on management – and dealt with through peer review. These documents are available on the website of the Ministry. Things are open and transparent.

Duncan Vaughan from Natural England asked whether the needs of other protected species like seabirds are taken into account when setting quota allocations. George replied that management of endangered and threatened species is based on a risk assessment approach at a species or population level. The idea of setting a specific target or quota is inappropriate. The notional target should always be zero. The number of New Zealand sea lions taken by deep-water fisheries is now almost down to zero. There had been a problem with the albatross that feed opportunistically on factory waste at the stern of trawlers and, in doing so, at times come into contact with the wire trawl warps, causing death or injury. The numbers of interactions have been reduced by 75% and mitigation measures will continue to be refined until the incidents are as close to zero as possible. Good management depends on risk assessments not on setting targets. The population is looked at and an assessment made of whether the number being taken is detrimental to that population. The risk assessment approaches developed in New Zealand are beginning to be recognised as world-leading and are being adopted elsewhere. Geoff added that risks to the marine environment – interactions with seabirds and marine mammals in particular - are taken into account when setting quotas. Marine protected areas and no-take zones are also in place to give animals space to forage and breed in.

George Clement pointed out that New Zealand has a squid fishery and seabirds love squid. Some sea birds have benefitted from the squid offal that is discarded by the fishery – the Buller's albatross in particular whose population has doubled in size substantially as a result of increased food availability – two thirds of the regurgitate to their young is offal from the adjacent squid fishery. Less squid offal is being discarded as part of our efforts to reduce offal in the water as an attractant, in order to mitigate interactions with and harm to seabirds. However, we may now be seeing declines in some seabird populations as we are providing them with less food. The effects of fishing on seabirds are not always adverse.

Tom Appleby, of the Blue Marine Foundation, said that the individual transferable quota (ITQ) system seemed to be working well offshore, but it looked as if management of the inshore sector could be a bit of a mess. Could Karla reflect upon that? Karla replied that there did seem to be a lot of problems inshore. There is a very strong science-based system around the setting of quota and Total Allowable Catch, and there were opportunities for managers to establish management measures to deal with other environmental effects. But there is not a fully-fledged ecosystem-based approach. Inshore in New Zealand it would be great to see where that could be developed better. There is a much more complex legislative picture inshore, with not just fisheries but a lot of different competing uses and also the interaction between the land and sea, with sediment issues, so a much broader perspective is required. Clearly there are some problems on the recreational side, where fishing is regarded as a right that is held dear. What role might government and industry play in terms of cleaning up that sector and moving the inshore fisheries on a little bit?

George agreed. The inshore fishery is 20 per cent by volume. The important inshore fisheries by value are those for rock lobster and abalone, which are very well managed single-species fisheries with very little environmental impact. The issues are mainly with the multi-species fisheries involving trawlers, set nets and long liners. It is easy in the deep-water fisheries, where the indigenous fishing interests are quota owners. There are remaining issues to be addressed in inshore waters. In the 1990s the government set quotas on the basis of landings not on catches so the quota levels did not reflect levels of fishing mortality. Fishermen who were fishing legally before quota were implemented, when it was not illegal to discard fish, now found themselves unable to get quota to cover their normal catch levels and either stopped fishing or discarded some of their catch illegally. When the quotas in multi-species fisheries are not "balanced" with catch mixes, then you have fisheries management challenges. The New Zealand government has found this to be a very challenging conundrum – one of its own making. For a quota system to have integrity there must be reliable catch reporting. In New Zealand's inshore fisheries there is no catch reporting from recreational fishermen. For inshore commercial fisheries, apart from rock lobster and abalone, there are concerns that catch reporting is not robust and that fish are being discarded at unacceptably high levels without reporting. So, how does one tidy that up? The process the government is going through at the moment is to put global positioning systems (GPS) on all those boats, require electronic logbooks, and put cameras

onboard as a cheaper alternative to observers. That process will be monitored over the next few years and there will then be a discussion on whether it is working.

Another component that needs to be factored in here is "ecosystem management". George would like to know what that means, what would it look like, and how is it going to be brought about? Perhaps some policy guidelines might be developed on what that might be. Geoff made some comments on the ecosystem approach. Like many other regimes, New Zealand is part way down the route to having ecosystem management. There is good understanding of the populations of some of the other organisms that are impacted by fishing and the populations of fur seals, sea lions and seabirds are being studied. The risk assessments provide guidance on the levels of impact and also the levels of acceptable impact that fisheries can have on these populations and not drive them away from sustainable levels. The problem in operationalising it is about how you manage quota or removals from mixed stocks, where you end up, as on the west coast of the United States, with choke species which create real problems. The key components of science and management are there, and they are working, so a lot of good stuff is being done, just as it is in Alaska.



*"If recreational fishers want to have more say, they need to provide more data,"*  
Dr Bryce Stewart, Australia.

Bruce Shallard from New Zealand pointed out that one major "revolutionary" change as a result of the 1996 Act had been to establish FishServe as a fishing industry owned company, to which had been devolved the government functions of managing catch reporting, catch against quota reporting, quota trading, licencing of fishing vessels and permitting of commercial fishers. FishServe has undertaken these management functions since 2000, and reviews have shown their operations have been far more

efficient and effective than previous Government management had been. Data are now available in real time and provide value-added opportunities for industry and Government.

Bruce was also critical of some of the comments made about the inshore fisheries not being managed well under the quota management system. Whilst acknowledging that multi-species inshore fisheries are more complex to manage than deep water fisheries that tend to target single species, Bruce suggested that the New Zealand inshore fishery is quite well managed. The inshore fisheries are fished by over a thousand fishing units whereas the deep water by less than fifty. The inshore fishery has, however, provided good catch and effort information over many decades. A “deemed value system” provides for fishers to pay a penalty fee if they catch over their quota allowance, but provides for fishers to balance their catch by acquiring quota from other fishers within the 12-month fishing year. As a result, overall catch against quota across the system balances well.

*“What would Australia do differently if it was starting again with a blank sheet of paper? Count everything in units, limit joint authorities, invest early in sustainable benchmarking,”*  
Prof George Kailis, Australia.

## Fisheries Management in Australia

### Presentation by George Kailis

Sir John Beddington introduced George Kailis, Professor of Management and Law at the School of Business at the University of Notre Dame, Australia. George had previously been managing director of the MG Kailis group, one of Australia’s largest fishing and aquaculture businesses, from 1992-1999.

Australia is bigger and more complex than New Zealand but not so big and complex as the United States. In the Australian Fishing Zone, the Federal (Commonwealth) waters extend beyond three nautical miles. State waters extend from low water out to 3 nm, or as agreed by the Commonwealth through what is called the Offshore Constitutional Settlement (OCS). The State alone controls waters above low water mark, and the internal waters. These lines bear no relationships to stocks whatsoever and this is a problem in relation to jurisdictional issues which may be of interest to the United Kingdom.

In Western Australia there are about 50 commercial fisheries with a gross value of production at the wharf of about £325 million. The fisheries are highly regulated with individual transferable quotas (ITQs) and individual transferable effort allocations (ITEs) for the major fisheries. Western Australia does not necessarily apply a quota management regime but it does apply a regime for multispecies fisheries that picks a suite of indicator species to assess the overall impact of fishing activity. There is a risk-

based ecosystem fisheries management approach. The fisheries include a very significant and politically influential recreational sector.

Up until the early 1980s the principal focus of fisheries management was the prevention of commercial overfishing, typically achieved through restrictions on fishing gears and limitations in the number of commercial fishing vessel licences issued (called limited entry). By the 1980s it was clear that a number of those schemes were not working, or certainly not working as intended. Key issues were excess capital, known as capital stuffing, using bigger vessels to catch the same amount of fish; sometimes for taxation reasons, sometimes for comfort of the fishers, but often in order to get a bit more of the catch. Western Australia started in the 1980s to look at quota management but also more generally at rights-based management, encompassing both ITQs and ITEs (vessel days, gear days etc.). There was widespread adoption of these schemes. “New Directions for Commonwealth Fisheries Management in the 1990s” was a key Government Policy Statement that really set up the economic, social and political rationale behind rights-based management. As in New Zealand, there was a clear statement of what the intentions were in relation to the changes in fisheries legislation, and since 1988 that legislation has changed in all Australian States and has incorporated a rights-based management approach.

In Australia, in contrast perhaps to a number of other jurisdictions, the High Court came out very strongly and specifically in support of such schemes. It stated: *“What was formerly in the public domain is converted into the exclusive and controlled preserve of those who hold licences...it is an entitlement of a new kind created as part of a system of preserving a limited public natural resource in a society which is coming to recognise that, in so far as such resources are concerned, to fail to protect may destroy and to preserve the right of everyone to take what he or she will may eventually deprive that right of all content...the commercial licence fee is properly to be seen as the price exacted by the public, through its laws, for the appropriation of a limited public natural resource”*.

Australia therefore has a clear policy directive, supported by a clear legal statement underpinning the changes. There was strong political, legal and social support for right-based management of the fisheries. Australian fisheries have developed in that context since 1988. A key feature is having multiple jurisdictions, but common approaches. Each Australian state was founded before the Commonwealth of Australia, and they remain states,

subject to the Australian Federal Constitution. In 1976 there was a court case which surprised everyone by stating that the Federal Government had control of all fisheries below the low water mark. It had been thought that the states had control between the low water mark and the 3 nm limit or out to 12 nm. That created a crisis in the system of management of fisheries in Australia. The Offshore Constitutional Settlement was then developed and this points out that authority for the management of the fishery shifts to one of the jurisdictions. There are still joint authorities and they generally decide who has the authority, not necessarily reliant on the 3 nm or 12 nm zone. There is negotiation between legally separate jurisdictions as to how fisheries should be managed and who should be managing them.

The principal focus of Australian fisheries legislation is achieving a balance between exploiting and conserving fish. Since 1988, new fisheries legislative schemes have been created in all Australian marine jurisdictions. A fundamental underlying principle of these new schemes is that there is public interest in maximising the benefits gained from the use of limited, but renewable, natural resources. These schemes also recognise the importance of creating private statutory rights to resources in achieving that objective. So, rights-based management is applied to the commercial sector. There is long-term secure access, tradeable rights, application of economic concepts, quota management and so on. Sustainability objectives are increasingly important and are being set out in legislation and also practised in the management of the fisheries. There is increasing formal stakeholder consultation enshrined in legislation, but in actual fact there is decreasing stakeholder engagement.

There are six jurisdictions, and they all have their own separate Parliaments. Effectively, each state is allowed to manage its inshore waters as it wishes. There are broad objectives in legislation, with general provisions including licensing and enforcement. Very wide discretion is given to the Minister and the Secretary of the Department and typically the real work is done through a statutory management plan, which is subsidiary legislation under the Act, and rarely but possibly disallowable by Parliament. Rights-based management is increasingly being applied to the commercial sector. As fisheries come under management, the allocation of rights becomes a key issue. There is a lot of political manoeuvring on allocation, but if the allocation problem can be fixed then all the other problems are resolved to a significant extent. Generally, the state compensates commercial fishers for taking their rights and re-allocating

them to other parties. Funding comes from consolidated revenue by general taxation but also from commercial fishers, with limited charges upon recreational fishers at this stage.

Although there is the possibility of jointly managed fisheries across jurisdictions, in most cases Australia has gone down to one jurisdiction. So the West Australia Government controls the rock lobster, out to the territorial limits and then out to the edge of the exclusive economic zone, whereas the Commonwealth manages the southern bluefin tuna fishery up to the low water mark. So these things are traded back and forth between jurisdictions.

How well does the “fishery management ecosystem” work, with all the agencies working together? Some states are behind others. In Western Australia more than 90 per cent of fish stocks are not at risk of overfishing. All the major stocks are now Marine Stewardship Council (MSC) certified. Assessments of public views of how well things are working have shown that the commercial fisheries score 5.8 out of 10, the recreational fisheries 4.9 out of 10, customary fisheries 3.7 out of 10, and aquaculture 6.0 out of 10. So this rigorous assessment shows quite low scores. Why so low? Because community expectations are increasing. Performance is better on things like marine protected areas, understandability, and other things, but the community has a whole new range of interests in the marine environment. There are some key issues:

1. Complexity and Community Demands: the trend is for more science, more complexity, and increased community demands for sustainability. The response in Western Australia has been to adopt the Marine Stewardship Council framework (in terms of target stocks, fisheries, environmental impact and governance).
2. Legislative Changes: catching up with community preferences requires legislative change and requires everyone to row together. Changes have gone well when they have been joint activities, but poorly when government or a community has gone off on its own. That may be a problem for the United Kingdom, especially as the clock is ticking away.
3. The Long Tail: what should be done about the small inshore fisheries? There are difficulties in managing the smaller fisheries. There are no easy answers for the smaller community-based commercial and

recreational fisheries in Australia, the United States, New Zealand or the United Kingdom.

4. Who Pays? In Australia there are pressures on budgets, increasing expectations, and commercial fishers are already paying significant fees. The response is to increase efficiency, adopt new techniques, use onboard video cameras, introduce vessel monitoring schemes (VMS) and require data entry directly by fishers. The cost is dropping each year. The fee base can also be extended to obtain recreational and community funding.

What would Australia do if it started again from scratch?

- Unitise everything - to allow for future adjustments, whether to quotas or individual transferable effort allocations (ITEs).
- Limit “joint authorities” as much as possible. Effective cross-jurisdictional delegations are important, and they will be within the United Kingdom and between the United Kingdom and the European Union and Norway. The United Kingdom will have to have procedures in its Act that enable it to adopt an integrated approach.
- Invest in timely economic/sociological research to inform of likely impacts. There has to be some feel for the impact that management measures have upon people.

Looking forward, a harvest strategy approach has been adopted in Australia. In its simplest form, a harvest strategy provides a framework to ensure that fishery managers, fishers and key stakeholders think about, and document how they will respond to various fishery conditions (both favourable or unfavourable), before they occur.

*“It is difficult for the [UK] government to share what it is doing with its Fisheries Bill, but it would be advisable if they were to do so with the broader community,”*  
**Prof George Kailis, Australia.**

## Australian Panel Discussion

Professor Martin Attrill, a marine ecologist at the University of Plymouth, introduced the panellists: Dr Bryce Beukers-Stewart of the University of York (originally from Australia) representing civil society, and Guy Leyland of the Western Australia Fishing Industry Council.

Bryce queried whether Australia has such a wonderful management system. He had left Australia in 1999, and his memory of the system was not entirely positive. One issue was trust in the science. He had worked on orange roughy and oreos, both deep-sea fishes, and when people were told that the fish lived to 150 years this was met with disbelief. The year after that, all of the catches started to crash because they were being fished much faster than they could replace themselves. There is a lesson there, and we have heard today that this challenge still exists in many places and particularly here in the United Kingdom.

In the State of Victoria, there is a system of both federal (offshore) fisheries and inshore state-managed fisheries. Boundaries between inshore and offshore fisheries, and between states, can cause problems. For example, the rock lobster stock straddles the border between Victoria and South Australia, but in the 1990s the two states imposed different size limits. Fishers would often land in a different state to get around that problem. Such divisions in fisheries management are necessary but they need to be thought through. They are never going to be perfect but they need to be done at a level that works biologically. Looking at the United Kingdom, the most logical way forward is to extend inshore fisheries management out to 12 miles from the current six miles and have almost two different systems (inshore and offshore). We have heard from George that we are still going to need a cross-sectoral negotiating table as well, because there will still be issues between the inshore and offshore areas.

Another development that has been taking place in Australia is the implementation of marine protected areas (MPAs). Australia is held up as a leading example of MPA management, but implementing these areas has not been all plain sailing and to compensate the fishermen has involved a lot of taxpayers’ money. Is that the right way to go? Should we be doing that here in the United Kingdom?

Finally, recreational fishing is a big deal in Australia and recreational fishermen have a lot of say. In Western Australia and Victoria this has become a

political issue, and even an election issue in some cases.

There is talk about the public resource that we have in the United Kingdom and how it should be managed. It should be managed for the good of all, but everyone has to take part. For example, if recreational fishermen are to be given more of the resource, then they have to be prepared to accept licences and bag limits. These things are very common in Australia. They are accepted. But when you talk about them in the United Kingdom they are not so welcomed. However, if we are going to share the resource more widely then that is something that needs to be looked at.

Guy Leyland continued on George Kailis’ theme of rowing together, and how this was achieved, particularly in Western Australia. Guy works for the Western Australia Fishing Industry Council that has been in existence for 37 years. It is a very mature organisation and its membership is made up of various sector bodies: rock lobster, abalone, prawns and scallop as well as fishermen’s associations and also individual members. Members elect a board each year. The Council is involved in the development and adoption of fishery management policies and legislation, as well as engagement with other sectors, the recreational sector, non-governmental organisations (NGOs), the oil and gas industries. Funding comes from a royalty that the industry pays each year. The Council is regarded as a very credible organisation by the State and Commonwealth governments.

The Western Australia Marine Stewardship Council (MSC) initiative is a joint initiative between the government of Western Australia and the fishing industry. It was put in place as a result of a number of policy drivers, one being the growth in MPAs. Some of the more extreme NGOs had been promoting the need for large no-take zones and demonising the fishing industry as a means of justifying this call. There had also been substantial growth of oil and gas developments in Western Australia in offshore waters and the government was keen to put in place offsets for those developments. Hence the desire to develop State marine parks as well as Commonwealth or Federal ones.

As George indicated, polling had been done in the community, where it was found that fishers were not well-regarded and were not thought to be a credible source of information to the public. The public simply did not believe us. There has been a growth in the recreational fishing sector in Western Australia, which has proved to be a very powerful political force. As a result, the industry was poorly positioned

to participate in public debates surrounding these drivers. To reposition the industry, we convinced the government to fund, in part, the formal Marine Stewardship Council (MSC) assessment of all the fisheries. Currently about 90 per cent by value of all our fisheries are now MSC certified, and this has demanded a close working partnership with the regulatory body. We are all rowing together, we are subject to the MSC principles, and the whole process is quite transparent.

With regard to sharing stocks with the recreational fishing sector, there is a policy in place called integrated fisheries management, and that was the result of an inquiry by a former High Court judge. For selected stocks the Government has formed inquiries to examine those stocks and the shares in those stocks and to determine the best benefits in terms of those shares. As a result, for example with rock lobster, 95 per cent are allocated to the commercial and 5 per cent to the recreational fisheries. The real challenge of that is having allocated shares how do you measure the catch by the recreational sector and how do you manage them to stay within that share? There are measurements in place in terms of telephone surveys, censuses, and boat ramp surveys etc. However, how do we contain those recreational fishers to their particular share?

Harvest strategies set out the economic and biological objectives for a particular fishery. This is done in consultation with the commercial industry and also with the recreational sector, setting out the decision rules for that particular stock. The process is transparent and it minimises political interference. That is the path we are going down and it is going to be very important in the future.

The Offshore Constitutional Settlement arrangements mentioned by George, are intended to deal with jurisdictions and with the competitive federal and state systems of government and the diversity of approaches. Some states are doing better than others in terms of fisheries management. Guy asked George to reflect on the key ingredients that will ensure good governance.

George responded that it is the size of the fishery and its importance to the economy that is the key factor. In New South Wales and Victoria, which have the worst fisheries management in Australia, they have the smallest fisheries sectors proportionate to the general economy and massive populations by Australian standards, which means that the pressures upon management are much greater. Some of the differences relate to circumstantial aspects. The convoy is moving on and there will

be laggards, but eventually the pressure within the system on the laggards will build up and they will move forward. Their harvest strategies will set proper targets for biomass at maximum sustainable yield (MSY) and all of those other features of good fisheries management. It is a problem, but it works in the sense that eventually they will get to the same destination.

### Questions for Australia

Charles Clover, of the Blue Marine Foundation, was fascinated by the way the Australian system had managed to minimise political interference. However, if the system is so good, why has Australia not been able to manage one of its most conspicuous international stocks, the southern bluefin tuna? Secondly, George was saying that there should be one authority for managing each stock, perhaps as a response to that problem. But are you really expecting Scotland to manage England's cod?

George Kailis replied that the southern bluefin tuna shows problems as a result of multiple jurisdictions operating within the international forum. Also, there is timidity in the Australian Commonwealth Agency about managing the recreational take. Sometimes, authorities that have the jurisdiction just do not want to do anything. In Australia that is often the case in relation to the southern bluefin tuna. On the second question, again it is an ideal that you could move to. It is all to do with good management and organisational behaviour. If you want accountability you need to know who you are accountable to. If you are accountable to a joint authority or multiple authorities, then the accountability problem keeps on increasing. There is no legal reason why you cannot have interlocking legislation within the United Kingdom which allows for delegation of authorities in relation to the management of stocks. Also, it should not be too difficult to set up appropriate procedures in United Kingdom legislation to do delegations outward and inward with the European Union and other countries in relation to the management and enforcement of stocks. These things can be difficult, as they do have to be negotiated, and they can be messy as you trade back and forth in jurisdictions, but in the long run, when you get a single authority, then accountability is much easier to achieve.

Andy Rosenberg, of the Center for Science and Democracy, asked about the straddling stocks issue. Australia does have some issues on straddling stocks besides bluefin tuna, and that may be critical for discussions in the United Kingdom. Australia seems mostly to deal with straddling stocks through joining treaty organisations. Could you reflect on

that, as backing away from the Common Fisheries Policy is essentially saying that we should set up a different type of relationship with neighbouring states?

George replied that this is a two-way street. The way the Offshore Constitutional Settlement works is that both sides put in place the structures that they need to move jurisdictions back and forth, and they do it in a clear and legal way. But it is often done on a political level not a legal level, and it is left to each party to decide politically how they enforce it. There is a case for single jurisdiction, but there may be difficulties in achieving it.

George had made a good point in suggesting that the United Kingdom needs to work with the systems around it. Probably the most appropriate model is the Norwegian one, in terms of how to work with the European Union in deciding how to split quotas and other management measures. And likewise through the North East Atlantic Fisheries Commission (NEAFC). The United Kingdom now has an opportunity to create a whole new system, and that is basically where it is going to have to aim to go.

Jennifer Ashworth of DEFRA remarked that in Australia there was a trend for more science. How is the scientific data being collected and how are stakeholders involved in the science? The reply was that there is collaboration with industry. Industry operates in partnership with the researchers and they assist in collecting data on fishing activity and catch returns etc. So it is a highly collaborative approach, based on trust. It had been mentioned that the government is not really trusted in terms of its views on management performance and neither is the industry, so who is trusted? George replied that it was likely to be scientists, the universities and the Marine Stewardship Council that were trusted most. Guy added that a lot of the community do not know a lot about how fisheries operate and had read reports from overseas about overfishing and all sorts of ghastly outcomes for protected species like turtles and they judged local fisheries in that light.

Stephen Simpson asked about recreational fishing. Bryce had said that in the United Kingdom we might perhaps consider having licences or bag limits for recreational fisheries. How were these implemented in Australia and received at the time, and how well are they observed? Guy replied that they had been developed in stages. In some cases, the need had become apparent, for example for abalone, and so limits had been accepted because they were necessary. In that case, the commercial fishery had been prioritised. It is really about education, and it shouldn't be that hard to grasp that you need to

have size limits and bag limits. The thing that is harder to put in place is getting data. We have heard that from several speakers today. Involvement in the regulation of fisheries is important. If recreational fishermen want to have more say, then they have to be prepared to supply more data. The same is true for commercial fisheries. Mobile phone technology is really helping and we just need to see it rolled out more. George agreed and commented that one of the advantages of licensing for recreational fisheries is not revenue collection. Licensing significantly improves data collection and it helps to define the status of the fishery. The United Kingdom needs to concentrate on improving data collection.

Barrie Deas from the National Federation of Fishermen's Organisations thought that one of the biggest challenges we face as we leave the Common Fisheries Policy and give our own legislators responsibility for managing our fisheries is how do we get the balance right between primary legislation, that sets the top-down structure, and the need for flexibility. It seemed to him that fishing is particularly prone to unintended consequences. You think you are doing one thing and then you find that there are knock-on effects elsewhere, so you need to change direction. How do you build an adaptive system? We were told we should not stuff legislation with too many objectives and can understand that. We were also told that the Australian Minister has wide powers of discretion. How do you get the balance right? This is going to be one of the key questions as we develop the new United Kingdom Fisheries Bill.

*“When speaking to government, the fishing industry needs to be organised, coherent, and needs to speak with one voice whenever possible.”*

**Dr Geoff Tingley,  
New Zealand.**

George replied that in Australia there is an infrastructure or skeletal framework in the Act, and a reasonable amount of flexibility. It is important not to stuff a fisheries act with too many objectives. When you then drill down to a fisheries management plan

or even further to a harvest strategy then you tend to end up with a much smaller set of objectives. Basically you just put the skeleton in the act, with a certain number of things that have to be done, but leave it to the management plan to set things out. It was said for the United States fisheries that you should not be too strict on what you have to do, and he would certainly agree with that. In Australia we had been guilty many times of making management way too complicated for simple inshore fisheries, for example. We tend to roll out the same management plan when what they need is a much more simplified structure that relates to a proper risk-assessed weighting of the likelihood of impact of that fishery. Guy added that when you are getting down to the nitty gritty in terms of technical measures there is a need to talk to the fishing industry and to the people actually out there on the deck, to make sure that any decisions are actually practical. They won't work otherwise. This has not always happened in the past.

John Goodlad of the Fishmongers' Company mentioned we had been told that in New Zealand if you are not a citizen then you cannot hold quota. Is there anything similar in Australia? George replied that the answer was basically no. The protection the Australian fishing industry has is an effective property rights regime, which means that property rights are expensive and foreigners cannot come in and buy things at a discount. Because there is a deep Australian market of both current fishers, investors and crew wanting to buy a boat they keep market prices high. There has just not been a problem over foreign ownership. The main issue has been complaints from young fishers that the prices are too high for them to invest.

Tom Appleby of the Blue Marine Foundation asked how the fishery management plans were drafted. Is there a stakeholder process that they go through? George replied that most fisheries of significance are under one single jurisdiction and typically plans are drafted through an interactive process with industry, and then with the NGOs. The industry is involved earlier because a lot of the provisions of management plans are actually quite technical. There is a reasonable amount of interchange of managers across different jurisdictions and that tends to even out changes over time.

Geoff Tingley, an earlier speaker, remarked that one of the things they found in New Zealand was that they had a very similar consultation process with the basics thrashed out between the relevant authorities and the industry before going out to broader public consultation. One of the issues that comes back from that is that if some of those sectors do not

get what they want they are disaffected with the outcome over the plan. Do you find that in Australia as well? George replied that on occasions yes, but by and large it was smooth sailing as long as you consult with industry. It is quite exhaustive, but you do reach a point where the parties come to an agreement. Guy added that generally they have relatively reasonable NGOs in Australia and that makes a significant difference because they are prepared to work with others. Industry has to be prepared to interact with the NGOs, and the NGOs have to be prepared to interact with the industry. Interacting through the government doesn't seem to be working as well. It always seems to end up with the pendulum swinging back and forward so the industry has a huge swing over NGOs and in the next round the NGOs have a huge swing over industry. Bryce added that on occasions the regulatory agency acts as a filter, so the parties can come together and negotiate, and their concerns can then be worked out and addressed. There is second-guessing by the agency, and that is reflected in the legislative proposals. This does not happen very often however. Direct negotiations with NGOs and other interests can resolve matters.

Lord Teverson, an Marine Management Organisation Board member, said that one of the obligations that we all have is around unregulated and unregistered fisheries. The Southern Ocean is a very big place and he was wondering how that is tackled in terms of the contraventions that we have seen there in the past, and how you get this area of policy right and get prosecutions. George said that basically an industry-based system had been put together to put pressure on illegal operators. The industry led by an Australian company, did not just wait around for government to do the right thing, it went proactive on it. If you go to the Austral Fisheries website, they have won a number of national and international awards for their advocacy. When industry members are given rights they have the incentive to spend a significant amount of money to get rid of illegal fishers. Guy added that in the northern part of Australia they do have intense surveillance, not so much for fisheries management purposes but to prevent illegal or other boats coming to Australia.

Erin Priddle from the Environmental Defense Fund said that George had mentioned that small-scale fisheries are a mess in Australia. He had also mentioned that they were a mess in other countries as well, like New Zealand and the United States. Could George say anything more about the small-scale sector and what can be done with them? George remarked that all politics is local, sometimes fisheries management is local and inshore fisheries

are very local. We made a mistake in Australia in pursuing rights-based management, focussing too much on individual stocks and encouraging extent the small-scale fishers to specialise in one sort of fishing technique. We could create a more flexible arrangement whereby as a small-scale fisher you might have a points system – you have got to have 100 points to fish; but those 100 points could be made up of a number of different small-scale fisheries. Trying to address a way of sorting out the scale issue, the cost issue and the licensing issue would mean less small-scale fishers but they would be more resilient and easier to manage. The biggest problem we have with these fishers is that the public purse is not unlimited in relation to investing in the research and management required. Increasingly in Australia the government does not want to invest in this.

Bryce said that we had heard from New Zealand that the inshore fisheries are in a bit of a mess and they are in Australia too, and they are not really worth very much. It is a very different situation here in the United Kingdom. About half of what the United Kingdom catches is shellfish, so it is outside of the quotas, and that is predominantly what the small boats catch, so the value of the inshore fisheries is much higher. Looking ahead to Brexit, it will be an absolute priority to put more resources into the United Kingdom's inshore fisheries. We have poor data, pretty rudimentary management systems, and yet these fisheries are very important here. George added that in Australia by small-scale we generally mean fisheries where the gross income from the fishery is low. It is not about the size of the boats, because we do not work on that basis in Australia. The abalone fishery uses small dinghies operating from the shore, but it is considered a major fishery because it is highly valuable

Sam Stone from the Marine Conservation Society remarked that he knew there were some good examples of co-management in Australia, for example in the northern prawn fishery, and he was wondering if there were some reflections on co-management and what role it might play in the United Kingdom. It was pointed out that these were classified as large fisheries, based on the value of the catch. Co-management works best in Australia where there is a cost recovery system. It gives fisheries a big incentive to participate in driving down the cost of fisheries management and research. Where the costs are not recovered from the fisheries, and they are not in Western Australia, there is an incentive to get the State to invest as much as possible, and to take political action in order to achieve this.

Matthew Cox from the National Federation of Fishermen's Organisations did not wish to belittle any of the achievements of Australia or New Zealand or even America. It seemed that one of the key success criteria for all these countries was that you have your own exclusive economic zone (EEZ), which you do not really share with any other nations. Therefore, all of the management strategies that you put in place can be effectively policed, especially with the offshore sector, as has been pointed out. That is not the case for the United Kingdom going forward. We have to share our EEZ to some extent with our European neighbours. What advice would you have for UK administration in controlling our EEZ in the future?

In 1868 the Sea Fisheries Act in the United Kingdom, following a treaty with France, put in place joint restrictions, and delegations to French officials to manage and arrest English fishing vessels. This may seem a new problem now but it is not a new problem in the big picture. It is a matter of stepping up to the plate. Guy added that the UK should pick its targets. For some fisheries there is not a huge conflict. Quotas are roughly in line with what they should be by zonal attachment. In other fisheries there are big issues – with hake for example. Focus on those and let some of the other things go because you need to keep good relations with your neighbours for more reasons than one - but obviously trade remains fundamental.

Martin Attrill thanked the three speakers for their contributions. We could take some of the things we had learned and could perhaps apply them. Our next session, with Norway, one of our neighbours, might give us some further assistance with that.



*“Today ecological sustainability is seen as the top priority. That is, it is seen as the prerequisite for achieving anything else,”*  
Peter Gullestad, Norway.

# Fisheries Management in Norway

## Presentation by Peter Gullestad

Peter Gullestad was Director General at the Norwegian Directorate of Fisheries from 1996 until 2008 and had been involved in the development of priorities for management plans. Peter is still attached to the directorate.

Norway has already negotiated many bilateral agreements with other countries because 90 per cent of the value of their fisheries are already shared with others, including Russia, Iceland, Greenland, and the European Union. Things are about to become more complicated for Norway as the United Kingdom is added to that list.

Peter pointed out that fish resources of Norway are owned by the people, not the government, and they are not private property. Most of the important stocks are shared and many are straddling stocks. Furthermore, the stocks migrate within the Norwegian waters, both north and south and inshore and offshore. Fishermen are also a migratory species, following the fish and participating in seasonal fisheries.

Norwegian fisheries are managed at one level, the national level. There is a Ministry with two Ministers, one of them responsible for fisheries. On the research side, there are the universities and others that carry out marine research but there is also an Institute of Marine Research, which gives advice based on science both to the Minister and the Directors of Fisheries. On the control side, the Directorate of Fisheries is responsible for the coordination of fisheries inspection, doing inspections at ports and on land, while the Coastguard, which is under the Navy, conducts inspections at sea. There are six fishermen's sales organisations, the Norwegian equivalent of producer organisations, and they have an important role to play in control by collecting all data on landings and sales. They are also responsible for accounting for individual vessel quotas.

The Directorate of Fisheries has a dual role, giving professional advice to the Ministry on policy, and afterwards implementing political decisions. The legal framework consists of four major Acts pertaining to fisheries:

1. The Act relating to the Economic Zone of Norway (1976);

2. The Act on Participation in Fisheries (1972/1999) introduced as a result of the collapse of the Norwegian Spring Spawning Herring stock. It provides the legal basis for regulating the participation in commercial fisheries and includes measures to restrict fishing fleet capacity;
3. The Marine Resources Act (1983/2009), which provides the legal basis for regulating the actual fishing; and
4. The Fishermen's Sales Organization Act (1938/1951/2013), which gives a monopoly to six "Producer Organisations" to set minimum prices and to conduct all first hand sales of fish. They collect data on all landings and submit them in real time to the Directorate of Fisheries. One of their duties is to withhold payment for fish over quota.

These laws give the Minister quite wide delegated powers from the Parliament, and further delegation can be made to the Director General of Fisheries. For example, Parliament would never be sent a question about mesh sizes in fisheries, although apparently the European Parliament does deal with such things. These laws have been amended many times, and they now include a precautionary approach, an ecosystem approach etc.

Looking at the fishery policy objectives of Norway, if you go back to the 60s and 70s the social dimension was priority number one. The fisheries sector was given major responsibility for the maintenance and development of settlement and employment in coastal communities, safeguarding a fleet structure with many small coastal vessels. Profitability was priority number two. The fisheries sector had to be sufficiently profitable, being able to secure wages and living conditions similar to those of other sectors of the Norwegian economy. This was achieved by means of substantial subsidies.

Then, with overfishing and collapse of the Norwegian spring spawning herring stock around 1970, a third policy objective gradually and painfully emerged: fish stocks should not be depleted. Ecological sustainability came into the picture. There was a very steep increase in Norwegian catches in the 1960s due to technological advances, first in the pelagic sector and then in the demersal sector. There were peaks and troughs in the 70s and 80s as one stock was fished down after another. In the 1980s there were no more places to go to find more fish and tougher management measures were then put in place. Stocks then recovered. However, there was a peak in catches in the mid-1990s and they

then had to be reduced again. Current fishing levels are ecologically sustainable.

Over the last 40 years the three dimensions of sustainability have gradually and painfully reversed their order of priority as policy objectives. Today ecological sustainability is the top priority, that is seen as a prerequisite for achieving anything else. Achieving biodiversity has also become more important. Economic sustainability and achieving profitability without subsidies is priority number two. The next priority is to achieve social sustainability. This involves a number of policies:

- A fishing fleet predominantly owned by the fishermen themselves;
- A diversified fleet of offshore as well as larger and smaller coastal vessels;
- A fair distribution of fishing opportunities between fleets and regions;
- Increasing the volume of national processing/ value added production and the income from export of fishery products;
- Employment and rural settlement;
- Cost recovery.

One of the main questions is how to spend the resource rent.

It will be important post-Brexit for the United Kingdom to clarify its policy objectives and create some statistical indicators that can measure how well the objectives are being met. There are three examples of indicators that might help to clarify this. The first is the aggregate spawning stock of the five most important groundfish stocks. Then, the Directors of Fisheries conduct annual profitability surveys of the fleets that show the average operating margin and total operating revenues. It is Norwegian social policy to keep both large and small boats in business and this is done by monitoring the proportion of first hand value achieved by the different fleet groups. These indicators work very well in many areas of Norway, and the United Kingdom should consider adopting similar measures.

Fisheries management boils down to six basic issues, all equally important:

- Managing the structure and capacity of the fishing fleets – reduction of excess capacity;
- Improving exploitation patterns and reducing unwanted fishing mortality and waste, reducing discards for example;
- Implementation of sustainable and precautionary harvest levels (quotas) through harvest control rules and management plans, a very important

step that is also enshrined in European Union law;

- The sharing of resources – both internationally and nationally is an important part of management. It is not just about sharing a cake but about creating a bigger cake. The United Kingdom will probably be sharing even more stocks with neighbours than Norway does and international cooperation will be extremely important to the United Kingdom. There will also be a need to agree with neighbours just how many fish there are, and this can be achieved through the International Council for the Exploration of the Sea (ICES). Stakeholder participation in this is also extremely important;
- Moving towards an ecosystem-based fisheries management;
- Effective monitoring, control and enforcement – with sanctions.

Managing coastal fisheries has probably been the largest issue in Norway. Limiting access for coastal vessels started originally as a crisis measure when the cod fishery crashed in 1990. There are still a lot of fisheries that do not have limited access, where there is open access for smaller vessels (less than 11 metres).

The development of fisheries management started in Norway in 1970 and now it has gone on for nearly 50 years. It will probably take another 50 years to make further changes. We are going from open access to something else, and do not really understand what the final position will be.

In terms of sharing of resources a lot of credit must be given to the Norwegian Fishermen's Association, which has played a crucial role in hammering out broad compromises when it comes to the national sharing of resources, and establishing compromises that by and large have been honoured by changing Ministers, Cabinets and Parliaments. The Fishermen's Association has been close to break-up several times during that process. In terms of recreational fisheries, the United Kingdom has nothing to learn from Norway. Regulation of recreational fishing is as yet underdeveloped and will be an important task for the next decade.

The annual regulatory cycle involves regulatory meetings where all stakeholder groups are involved before the annual regulations are decided on. In fisheries management there is now a move away from a single species approach to an ecosystem-based approach, although nobody really knows what that means in practice. In the past, the setting of quotas was very *ad hoc*, with a short-term perspective. The introduction of a precautionary

approach in developing a Management Strategy and associated Harvest Control Rules has been a huge step forward. If you do not like the outcome of a Harvest Control Rule, then you have to take extra steps to revise that rule. This often happens. The rules are going to be revised over the years as more knowledge becomes available. This is perhaps one of the most important things that has happened in European fisheries management.

New challenges have arisen in the past 20 years: New dimensions have been added to fisheries management. In the last century it was saving cod and herring that was the priority. But now fisheries management has a duty also to look after non-commercial species of fish, birds and mammals as well as vulnerable bottom habitats, which may be affected by fisheries. How is that handled? In 2009, the old Act governing Seawater Fisheries was replaced by the Marine Resources Act, the new law covering all marine life and with sustainable use and protection of biodiversity as bearing principles. A major Conservation Act was introduced at the same time. There is responsibility in fisheries law to look after the ecosystem and marine resources. To follow up and include these extended responsibilities, two tables, one for stocks and one for fisheries, have been developed. This tool provides an overview of known possible issues and challenges to fisheries management seen from the perspective of both fisheries and conservation interests. The tables, updated and discussed annually with stakeholders, provide a basis for decisions on which issues should be given priority by science and management with regard to further improvements in fisheries management.

Peter Gullestad has recently published three articles on Norwegian fisheries management:

- Changing attitudes 1970–2012: evolution of the Norwegian management framework to prevent overfishing and to secure long-term sustainability. ICES Journal of Marine Science 71 (2014) 173-182; P. Gullestad, A. Aglen, Å. Bjordal, G. Blom, S. Johansen, J. Krog, O.A. Misund, I. Røttingen
- The “Discard Ban Package”: Experiences in efforts to improve exploitation patterns in Norwegian fisheries. Marine Policy 54 (2015) 1-9 ; P. Gullestad, G. Blom, G. Bakke, B. Bogstad
- Towards ecosystem-based fisheries management in Norway – Practical tools for keeping track of relevant issues and prioritising management efforts. Marine

Policy 77 (2017) 104–110; P. Gullestad, A. M. Abotnes, G. Bakke, M. Skern-Mauritzen, K. Nedreaas, G. Søvik.

### Norwegian Panel Discussion

Independent consultant, Melanie Siggs, introduced the panellists: Torben Foss, a former director general in the Ministry of Fisheries and now a director of PWC, which provides audit, advisory, accounting, tax and legal services to Norwegian Industry, and Jan Berger Jørgensen, the assistant general secretary of the Norwegian Fishermen's Association.

Torben set out to be critical of the Norwegian model, and to consider where it has weaknesses and which aspects of it the UK should not adopt. He agreed with Peter that you cannot get everything. You have to make a choice and you have to set priorities. Legally and technically, the United Kingdom when it is leaving the European Union is no longer bound by the four freedoms: the freedoms of establishment, free transfer of goods, free transfer of capital, and working force. George Clement had advised the United Kingdom to adopt a policy, as in New Zealand, where owners of fishing vessels are national passport holders. In Torben's view that was going back to the past. There are many other ways of ensuring that your resources are benefitting your country, by landing obligations and by crewing obligations, as the United Kingdom has already. Imposing a nationality requirement would be a step backwards.

Torben agreed with those saying that when the United Kingdom leaves the European Union it will need to be clearly decided how much the country owns of the different stocks in the North Sea, west of the Hebrides, and also in the Celtic Sea. That must be clearly defined. When Norway did the same exercise the North Sea was divided during one year in the late 1970s. There was a similar exercise with the Russians. This was considered by some to be very unfair to Norway when it came to cod. Some say that Norway got 10 per cent too little of the cod stock.

Torben could understand that the compromise that was agreed in The Hague at the beginning of the 1980s was not good for the United Kingdom. Then the United Kingdom's first interest was to protect what was left of the old distant water trawling fleet from Humber side. The catch shares the United Kingdom got from the North Sea and other regions were not very good. There is a lot for the United Kingdom to rectify.

That does not mean that the fishing pattern of western Europe will be revolutionised. There is an important principle that access to resources leads to access to markets. Norway fought very strongly against that principle in 1991, but lost. But the United Kingdom was in favour of such a principle. Fisheries are often the last item left on the negotiation table in trade negotiations. If you are strong that is a good thing, if you are not strong, then fish issues need to be resolved earlier in negotiations.

Melanie introduced Jan Berger Jørgensen. Jan said that the Norwegian Fishermen's Association organises most of the fishermen and fishing vessels in Norway and has participated in the process of developing the management system in Norway for many years. To a large extent the fishermen support the different elements that now make up the management system. Discussions about limiting access in the inshore or coastal fleet had been especially hard. Even within the Association there were difficulties in finding solutions that everyone could support, but solutions were eventually found.

Quotas have limitations, as you cannot now fish for as long as you want, and it places limits on the number of vessels. Some parts of the Norwegian inshore and coastal fisheries have now been closed. The Fishermen's Association took responsibility for deciding how to share the national quotas in Norway. Discussions began in the 90s and now sharing arrangements have been decided for most of the stocks. Shares are divided between the inshore and offshore fleets and also between smaller groups in the inshore fleet. The quota sharing system is very detailed within the inshore fleet. The result after many years is a very complex quota management system that has been a real challenge to implement and follow, and it involves a lot of administrators. There is a need to simplify the system.

Another issue is control and enforcement and how the vessels in Norway are monitored. There is VMS (vessel monitoring systems) in Norway down to 13 metre vessels and now it is also being introduced for even smaller vessels. The catch reporting system will be introduced for all vessels in the near future. Skippers have to estimate the catch when they get it onboard and report this to the authorities before they come in to land the catch. This estimate cannot differ from the actual level or the catch because any excess will be confiscated and there are financial penalties for the skippers.

*“I think the EU discard ban may be too rigorous. Industry and management should focus on the development of more selective gear and measures like Real Time Closures in their efforts to reduce discarding”*  
Peter Gullestad, Norway.

### Questions for Norway

Rodney Anderson of the North Sea Marine Cluster was interested in the way in which fishery plans are developed in Norway, and the extent to which they deal not only with harvesting but also the infrastructure and land-based side of the industry. One of the problems increasingly in the United Kingdom and particularly in England has been that, as the fisheries have been run down, the industry has had to compete for space. Ports and harbours often see themselves as property developers. It is a lot more profitable to build flats and houses than to provide berths for fishing boats. There is also competition for space from more profitable industries such as renewable energy, windfarms and such like. To what extent do fishery plans take into account the entire supply chain and the supporting structures as well as the harvesting of the stock?

Peter said that in ports, within the baseline, it is the local community that has the planning responsibility. It is decided locally whether they want to have a fishing harbour or not. In Norway the pressure on the coastal zone is increasing from various user groups like wind farms and aquaculture. In the open ocean there are cross-sectoral plans which are revised every five years or so, and which are led by the Ministry of the Environment. Oil and gas developments, fisheries, conservation or environmental issues, shipping are scrutinised by the Minister and debated by Parliament. These plans so far have mostly been about where oil and gas should be developed. There has been an alliance between the greens and the fisheries side because they want to install developments in the Lofoten area, which is very valuable as a spawning

area for the cod stock, and the continental shelf is very small at that location.

Melanie remarked that in some sea areas there are lots of competing interests and there is a need for cross-departmental agreement. Financial institutions are also involved in terms of their investments in these areas. The panel felt that financial institutions are also interested in whether the vessels they have financed will have sufficient shares in the fish stocks in the future. Brexit negotiations are already having an impact on business, as the banks are trying to understand these new risks.

Jeremy Percy from the Coastal Producer Organisation said that in the opening presentation it had been pointed out that the policy objectives included a fair distribution of fishing opportunities between fleets and regions, and also employment and rural settlement. How did you go about achieving that and what actually constitutes a fair distribution?

Peter replied that the basis for distribution had been who was involved in the fishery at the time of the closure and the introduction of quotas. The quota had to be shared between existing fishers and not those who were not there. The Fishermen's Association played a vital role in making compromises between all these users, including inshore/offshore, north/south, and different gear operators in the coastal zone.

The outcome was not necessarily fair seen from every perspective, and there were many possible outcomes, but it was fair to give the Fishermen's Association a role in undertaking this task. The other option would be for the Minister to do it. Peter added that in most countries sharing is done on the basis of individual track records. Norway did not do that but shared quota between fleet groups, and then those within those groups got equal shares or maybe an allocation based on the size of the vessel. Someone who had fished a lot would just get the same allocation as a neighbour with the same type of boat who had fished less.

Dale Rodmell of the National Federation of Fishermen's Organisations had noted that there were lots of institutions and legal arrangements for managing fisheries and we had seen that there were top-down arrangements for managing those fisheries. What was less clear was the use of bottom-up management. Peter had said there was a shift taking place between the top-down and the bottom-up approaches. What is driving that and how is it being achieved? Are there any clear examples of a bottom-up arrangement? Peter replied that

it has to do with fishermen coming from an open-access, free-for-all situation, into a completely different environment. As one example, the harvest control rules which are important for fishermen were typically top-down when they were introduced. The last time we revised the rules for cod, haddock and capelin it became a process with industry and other stakeholders involved. The rules are very technical, and when they were first introduced the fishermen did not understand what it was all about. Now, they understand it very well and they have good arguments to put on the table which can then be included within the harvest control rules.

Jan confirmed that management is now more bottom-up and fishermen are involved from the beginning in developing management strategies. With stocks in the North Sea, fishermen from Norway, the United Kingdom and other European countries have been involved a lot in management discussions and we hope to introduce new strategies for these stocks in the near future.

*“Target bycatch of endangered, threatened and protected species should be zero.”*  
Dr George Clement,  
New Zealand.

Charles Clover from the Blue Marine Foundation asked Peter about the 90 per cent of the value of Norwegian fisheries that are shared stocks. Charles hoped to hear more about how it is possible to resolve disputes when you do not get what you want. Who do you appeal to?

Peter replied that, as with Mick Jagger, “you can't always get what you want”. The sharing of stocks in the Barents Sea took place on a purely political basis in the mid-1970s. There was no scientific basis for the sharing. There were cod on both sides of the border and there was a huge disputed area at that time. There were also arguments with the European Union in the late 70s where everything was based on zonal attachment. Then, there was

a disagreement in the 1980s on herring, where the European Union said that 2 per cent was in Norwegian waters and Norway was offered 4 per cent. Norway would not accept this. Norway then started fishing and the European Union came back to the table and Norway was given a share of around 29 per cent. Bilateral sharing, both in the Barents Sea and the North Sea, has actually been very stable over decades. But the position in the North Sea is now going to be re-opened by the United Kingdom. The big problem has been with the large pelagic stocks of mackerel and herring in the Norwegian Sea, where there are many coastal states involved and some of the areas are international waters. There is no easy answer to this challenge.

Ian Gatt, Chief Executive of the Scottish Pelagic Fishermen's Association, asked how the international negotiations were carried out by Norway. There are officials here from Marine Scotland and DEFRA who will be interested in this. The position currently within the European Union is that the European Commission undertakes the negotiations on behalf of the Member States. They consult the Member States through the process and sometimes fishermen can speak to them during the negotiations. However, fishermen feel a bit distant from the whole process. Looking at the Norwegian model, and some others in the North-eastern Atlantic, we can see that the industry is very much integrated into the process. How are the industry representatives chosen and what role do they play during the negotiations? Does Norway feel that there are benefits from having the industry as part of the delegation?

Jan replied that the Norwegian Fishermen's Association has two persons in the delegation and they choose the persons, so it is not the Government who decides who will participate on behalf of the industry. The organisations that are represented are chosen by the Ministry and the actual persons chosen by the organisations themselves. It has been a tremendously good thing to have the industry onboard during the negotiations. It gives industry ownership of the result. Torben added that what we saw in the 70s and 80s was that when you had officials at the table who were reporting directly to their Ministers the questions were resolved much easier and we were able to solve a lot of problems which today often end in deadlock. Pelagic stocks are difficult, and if you really want to resolve an issue then you should give that task to someone who is very close to the decision-makers.

John Goodlad said that as a Shetlander he lived

very close to Norway and he was very interested, as most Shetlanders were, in Scandinavian social democracy. In Norway you have to be a fisherman to own quota. With your modern highly sophisticated fleet do you think that this is a sustainable position, going forward?

Torben replied that this was a very good question as there were indications that this might be in peril in years to come. Norway is the only country in Europe that practices this. Denmark has a variety of it. It is a choice and it leads to a fleet that is completely different to the one in Iceland or the United Kingdom. It is an important political question. We had 120,000 fishermen 70 years ago. Now we have 10,000. There will be further discussion of this issue in the future.

Helen McLachlan of the WWF said that we had heard from Margaret Spring of the United States about accountability in the fishery and the importance for that to include both monitoring and reporting. With discards it is important to have monitoring at sea and with the discard ban in Norway what type of at-sea observer programme do you have? Do you have human observers going to sea, or video/electronic monitoring? What provides that accountability?

Peter replied that Norway does not have extensive human observer programmes and the reason for that is historic and political. Norway has a much larger Coastguard than any other country and the reason for that is that in the 70s, when territorial waters were extended to 200 miles, because Norway had a border with Russia it had to show the flag. Norway has had more science-based studies of discarding in recent years. What Norway has found so far is that discarding is fairly low, just a couple of per cent. Norway is less interested in counting discards than doing something about the problem. The United Kingdom has quite good statistics on discards but quite high discarding rates, for example in the haddock fishery. This seems nonsensical to Norway.

Jan added that Norway does have some *ad hoc* observers in some fisheries, for example the mackerel purse seine fishery, where they observe how the fishery is being conducted. Also in some areas where there are small or young fish Norway also has observers on board vessels, especially where there are real-time closures, which are extremely important in Norway.

Mike Park from the Scottish White Fish Producers Association, had fished in the Norwegian zone for 30 years. In recent years Europe has embraced a

discard ban, where European Union vessels must land all their catches. Norway has for many years maintained a successful discard ban but has not landed all catches. If the United Kingdom is now bringing forward a new fisheries plan or a catching policy do you think it should be aligned with the Norwegian policy or do you think the European Union policy is more relevant?

Peter thought that the European Union plan may be too rigorous. Industry and management should focus on the development of more selective gear and measures like Real Time Closures in their efforts to reduce discarding. In 1987 Norway started with cod and haddock and then gradually extended it to other species, until in 2009 the Minister changed the rule to embrace everything. Torben thought that sometimes the Norwegian system went too far. Jan agreed that the European Union discard plan may be too rigorous and a simpler system was needed, with different tools to help the fishermen avoid discarding.

## Review Session

Sir John Beddington introduced Daniel Owen, a Barrister at Fenners Chambers, who specialises in the law that governs our use of the world's seas and oceans. Daniel would provide a short synopsis and would then seek feedback and additional comments from participants.

### The Synopsis

Daniel considered the key points arising from the conference, and he grouped these points under the headings 'Recurring Themes' and 'Other Issues Arising'. He emphasised that his list of points would be subjective and incomplete.

### Recurring Themes:

Building outcomes/back-stops into national legislation, especially in relation to stock status (e.g. one country case study referred to using 'consistent with maximum sustainable yield (MSY)' (or similar) in its national legislation).

Fisheries science is important for supporting management and includes science for stock assessment, the evaluation of impacts, and allocation of resources. The scientific issues include, amongst others:

- How do we obtain scientific data? For example, in monitoring catches do we make use of human observers or do we use video/electronic means for data gathering?

- Improving the real-time, or near real-time, processing of data can be beneficial.
- There is a need to take into account recreational catches as well as catches taken by the commercial fishing industry.
- Data collection by industry can be important, and can be facilitated by familiarising fishermen with the science.
- Improvements in science can allow movement away from a precautionary approach.
- Benchmarks are required for science.

Decision-making, with persistent themes including stakeholder involvement, transparency and accountability. The issues include, amongst others:

- Decision-making must include a management response when a limit is approached or exceeded;
- A balance has to be struck between top-down and bottom-up approaches to management;
- There is room for stakeholder involvement in establishing science benchmarks.

Cost recovery from industry (which has already been introduced in some countries) brings buy-in by industry to the management process (e.g. regarding how the science is used). There should be a balance between costs borne by industry and costs borne by government.

Access rights, including whether or not there is "ownership" of rights, is another recurrent theme. There are contrasting approaches by say, New Zealand and Norway. The issues include, amongst others:

- The use of constraints on who can own rights. Should fishing rights be restricted to, say, nationals only, or to fishermen only, or should there be a free market?
- How should they be allocated initially; for example, should they be based on track record?
- In terms of transferability, should access rights be free to be bought and sold?
- The scope for removal of rights, for example as a sanction for certain breaches of the law (see the New Zealand example).

The Inshore sector. In a majority of the four countries, the governance approach towards this sector seems to be not as rigorous as for the offshore sector. The issues include, amongst others:

- Catch reporting and monitoring;
- The use of observers or electronic monitoring;
- The conservativeness of management

strategies;

- The need for greater flexibility regarding gear types.

The Recreational sector. This sector is large and politically important in at least some of the four countries. The issues include, amongst others:

- Acceptance of recreational fishers as stakeholders, who should be engaged in the process of management;
- But if that happens, potential corollaries include contributions of data by the recreational sector and willingness by that sector to be regulated;

Should there be a devolved approach? The issues include, amongst others:

- The need for clear identification of the different components or "layers" and the legal relationships between them;
- The need for clarity on the interactions between the layers;
- Linking back, from any given layer, to binding outcomes/back-stops in national legislation;

### Other Issues Arising:

The importance of encouraging innovation (e.g. as in New Zealand).

The need for social and economic research, including for the purpose of evaluating the impact of management decisions and actions.

The relative merits of total allowable catches (TACs)/quotas and effort control.

The designation and management of protected areas.

Maintaining good compliance by fishers with the regulations, including the adoption of sanctions (noting some very strict sanctions in the case of New Zealand).

The protection of endangered, threatened and protected species. For example, should there be a risk-based approach or a target-based approach?

Is there a need for more social and economic research? We need to understand the likely impact of management measures.

The importance of fleet capacity

The importance of discards policy

International cooperation with neighbours on shared stocks, including the need for long-term stability on allocation: it should not be necessary to renegotiate the allocation key from one year to the next.

Harvest control rules, including:

- The involvement of stakeholders in the setting of the rules;
- Acceptance of results of the rules;
- Changing the rules if need be, but only by due process.

## Closing Comments

Sir John Beddington thanked the organisers for what had been an exciting day. It would be important to analyse the information that had been provided by the speakers and panellists. We should reflect on this at our leisure. We now have an opportunity to completely rethink fisheries policy within the United Kingdom.

A number of comments were then made by participants:

- There is a need to build trust in the system and to maintain transparency in discussions and negotiations, and in decision-making.
- Fishermen innovate, and they may work around the rules and regulations. There is a need to ensure that the rules and regulations work well, and to set up performance measures, especially once the United Kingdom has left the Common Fisheries Policy.
- There had been strong emphasis on the management of inshore fisheries. Local decision-making, with strong stakeholder involvement, would be very relevant to this.
- There had been discussion of the need for a new Fisheries Act, or perhaps a Marine Resources Act? This is something that will need to be considered, bringing ecosystem conservation and fisheries management together. Interesting developments had taken place in Norway in relation to this.
- In terms of quota management, the monitoring of catches and enforcement of the regulations is very important. There are devolved powers of reporting in New Zealand, where the licensing of fisheries is an important part of the monitoring and management system.
- There is a need to be clear about fisheries policy objectives, and how to measure achievements. It is not always possible to maximise jobs and economic efficiency. When designing a management system, it is important to state

- what you want to achieve.
- It had become apparent that everyone wants ecosystem-based management, but no-one really knows what that is. There is a need to define what it means and then to develop a pathway for achieving it.
- Little had been heard from the commercial seafood sector. Although it is important to improve fish stocks, income and profitability are also crucial to the industry. It is possible to add to the value of seafood and improve income by promoting sustainability. Processors buy from fishers and then add value to the fish products. Supply chains must conform with the law and must promote sustainability. There is a need for strong legislation and effective and transparent monitoring and control, as having fully documented catches can make a big difference.
- There will be a need for the United Kingdom's fishing industry to reach a consensus with industries in other countries, rather than simply leaving things to the politicians. Reaching consensus will be a big step forward and it cannot be left until the last minute.
- Trust in the scientific advice is important and fishers need to engage with scientists, perhaps through training workshops.
- Fisheries cannot be managed in isolation. There are wider issues over marine resources and there needs to be cross-sectoral planning. Currently, departments are competing with one another rather than cooperating. There is a need for an integrated approach.
- Although it is important that we learn from the experiences of others we need to look inwards too. We have dealt with stock collapses and fishery management problems in the North Sea and elsewhere, and can learn much from our own experiences as well as from those of others.
- It is important to decide how recreational fishers can be brought into the management system. The value of angling is important in inshore waters, and recreational fishers have a lot they can bring to the table. The government needs to involve recreational fishers more as stakeholders, in order to obtain sustainable fish stocks.
- In the United States scientists are working closely with fishery managers in developing management strategy evaluations. This is important in evaluating the outcome of management decisions.
- Managing the inshore sector is a problem in the United Kingdom, as it is in other countries like Norway. Rights-based management is fine, but not all inshore vessels have quotas, and it is difficult for such vessels to cope with current management systems.

- Coping with the effects of climate change is important, as it will affect ecosystems and their fish stocks. There is agreement that climate change is happening. The International Council for the Exploration of the Sea (ICES) is a global organization that develops science and advice to support the sustainable use of the oceans. It is developing a strategy to deal with climate change.

Sir John Beddington concluded that there is now a need to think carefully about different scenarios, and what changes will happen in the different fisheries after Brexit. We will need to negotiate seriously with other countries and if the outcomes are successful then we could see enormous improvements in the United Kingdom fishing industry.

Sir John thanked Charles Clover of the Blue Marine Foundation, the conference steering committee, the Fishmongers' Company and all participants for their involvement in the meeting.

***"We in Norway know what it is like when fish is the last thing on the negotiating table. Good if you are strong, not if you are not that strong,"***  
**Torben Foss.**

*This report has been written by Prof Anthony Hawkins and the Best Practice in World Fisheries steering committee: Dr Thomas Appleby, Blue Marine Foundation; Charles Clover, Blue Marine Foundation; Barrie Deas, National Federation of Fishermen's Organisations; Adrian Gahan, Blue Marine Foundation; John Goodlad, the Fishmongers' Company; Mike Park, Scottish White Fish Producers' Association; Jim Pettipher, Coastal Producer Organisation; Erin Priddle, Environmental Defense Fund; Andrew Wallace, the Fishmongers' Company.*

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