

WEDNESDAY 5 MARCH 2008

Present

Arran, E of
Jones of Whitchurch, B
Palmer, L
Plumb, L
Sewel, L (Chairman)
Sharp of Guildford, B
Ullswater, V

Witness: **Dr Joe Horwood**, CEFAS Chief Scientific Adviser and Defra Chief Fisheries Science Adviser, examined.

Q1 Chairman: Thank you very much indeed for finding the time to come and talk to us and to help us with our inquiry. I have to say a few formal things first of all: this is a formal session so there will be a record taken and you will get a transcript as soon as we can get it to you. Look through and make any changes that may be necessary. We are also webcast, whatever that might be; I usually say at this stage that there is a possibility that somebody may be listening to us. We have never had any evidence that that is the case, but given an error rate of plus or minus 40 per cent there might be someone somewhere. Would you prefer to start off by giving a general statement or would you prefer to go straight into the questions and answers?

Dr Horwood: I am quite happy to go straight into the questions and answers; any general statement is covered by the CEFAS and the Defra submissions.

Q2 Chairman: Let me start off. It seems to me that there is a desperate need and objective to make fisheries policy science-led and more evidence-based and that seems to be a sensible way forward. Could you outline to us briefly what fisheries science is all about: how the data is collected, how it is interpreted and how it feeds into the policy process and then perhaps

what the shortcomings may be and why we have what seems to be a continuing conflict between the producers and the scientists on interpreting the data and the results of the data.

Dr Horwood: Fisheries science has been established for quite a long while as a particular science in its own right. It is now much more merged with marine science as a whole but its initial inception really was because the fisheries had been so important to so many countries and it has always been a very quantitative science, you know, how much fish are taken and how much can be taken. It has also had a strong international character because we have all caught fish together, so the nature of fisheries science is really, firstly, that it was established quite early, secondly, it has always been fairly quantitative compared with many of the other comparable sciences and, thirdly, that it is essentially international. That is the broad context of it. When we talk about fisheries science and its relationship to policy and management, more often than not we come down to the stock assessments: how many fish are there and what are the quotas; that is only a small part of the work but it tends to be the most political and the rawest part. To start off with we have a monitoring system where at the ports the number of fish that are caught are recorded. They are sampled, so that we know what the catches are by species and length and we take their ages, so that we know for instance that from the Irish Sea we caught so many thousand tonnes of cod and so many one-year olds, two-year olds, three-year olds, four-year olds. At sea our research vessels conduct surveys in a consistent way and this produces two sorts of information. The first is the number of young fish which are about to enter the fishery, because we use nets that are smaller than the commercial fleet so we pick them up often a year before the fishery will see them, so that allows us to put them into our forecast. The second is that we actually see through these surveys the trends in abundance of the fish – are our catch rates going up or are they going down for particular species. That is the basic building blocks and all the different countries, say around the North Sea, will be doing the same and we all get together and pool that key

information. The stock assessment process is then to determine how many fish are there now. One of the ways we do this is mathematically complicated, but the principle is fairly simple. If we go back to fish born in 1990, say, they will have been caught as one year-old in 1991, as two years-old in 1992, three years-old in 1993 and we record all the numbers of fish that were caught at these different ages, and so after ten years we can add them all up again to say in 1991 we actually saw this many one-year-old fish. We can add a little bit on for those that died naturally and then we see what the catch rates of our research vessels or the commercial fleets were and we can actually calibrate it, so when our research vessel now is catching so many cod at age one we can compare that with what we saw there as the catch rate in 1990 and therefore infer the absolute number of one-year-old cod. It is basically a calibration method; there are quite a lot of statistics, but that is the key principle behind it. There is a second method which is less frequently used because it is much more expensive, but for instance for mackerel we will estimate the number of fish in the sea by going out and measuring the number of eggs in the plankton, so we tow plankton samplers behind the research vessels, capture the eggs and count them. We do this throughout the production cycle so over the entire area we will be sampling the eggs and over the three months that they spawn we will be sampling them to find out how many eggs have been put in the sea. We know how many eggs a single mackerel will produce, so you divide one by the other and that is another way in which we end up getting an absolute measure. From the basic data we can then do this mathematical exercise, and the output will be what is the absolute number of fish that we have now in 2007 at age one, two, three, four and five and what were the numbers in the past, so we have the history and we can see: has the stock declined significantly, has it increased or is it stable. Then if you say what is the forecast, so what can the fishermen take in the following year, we can project those numbers forward but also bring in the number of youngsters that we have seen through our surveys, the little fish, and add on to these estimates

from the stock assessments the estimates of recruiting fish to give us a forecast of how many fish there are in the sea. That is the basic data and underlying principle and it is all done internationally, most of it at the International Council for the Exploration of the Sea, which brings these parties together to do the assessments. How good is it? There are, I guess, two elements of it. In terms of supporting a TAC system as a whole it is actually quite difficult to count the number of fish in the sea and we reckon that if circumstances are reasonably good, if we have a good assessment and there are not any major problems, then we will end up with what we call a co-efficient of variation of about 20 per cent. What that means is that one year in every twenty we could be out by 40 per cent more or 40 per cent less, which is still quite difficult for the fishery to handle. It could mean that we actually close the fishery in the middle of September in error, when in actual fact they could safely have fished until December, but I personally think that getting the number of fish in the sea to plus or minus 20 per cent is quite good, but even that as a good answer is still quite a strain for the TAC-based system in the best of circumstances. The shortcomings and support from the industry are really quite patchy. The question of the cod has really dominated the thinking now for the last ten years and it has been a major issue for us, but the Regional Advisory Councils held a major meeting last year on cod recovery and they concluded that there had been a decline in the cod caused by heavy fishing over a period when the recruitment of a number of youngsters had been reduced, so in some major instances we are seeing and saying the same thing as the fishermen. There was an article for *Fishing News* which I bought, produced as a letter in response to a fisherman saying last year our views are out of line with the scientists, but no, actually we are essentially seeing and saying more or less the same as you about North Sea cod last year. In some areas we are very much seeing issues the same; there are some problems which are difficult and seem to be intractable, which we have not conquered, and an example is the North Sea whiting where the quality of our assessment has been very poor for

a decade. At present in our advice we are saying that the whiting is in quite a poor state and the North Sea coast fishermen are saying that they cannot avoid whiting, and I have to say that I can see both sides of the argument. It is truly not clear in these instances what is going on. I am afraid that is a rather complicated answer to your question as to how good or how flawed it is, but it is quite a rich tapestry.

Q3 Chairman: Let us go one stage further. The industry is heavily regulated and there is clearly a need to manage the industry and catches. Really, at the end of the day, the only way that will be successful is if there is buy-in by the fishermen, if they take ownership of the whole regime. Essential to that is for there to be confidence between the producers and the scientists and the fishermen and the scientists; what could be done to improve that confidence, what could be done to have a better dialogue?

Dr Horwood: I do absolutely and wholeheartedly agree with what you say and it was a key theme underpinning the Net Benefits report and the Government response Securing the Benefits that there was a virtual spin-off of better trust, better compliance, better management as a whole. The first thing is for everybody to believe in that view and, certainly beforehand, the fishermen were hugely excluded from a system where the advice from ICES, which is commissioned by the EU, went straight to the EU and was turned into TAC and quota advice, which did not get altered an awful lot, and the fishermen just felt that they were nowhere in the system at all. There is an absolute issue of confidence and buy-in and involvement and we have recognised that. In terms of what we are doing about it, it is a great deal, because it is so important and so fundamental. First of all, the stock assessment process which I mentioned, the business of calibration and the calibration of the research vessels, we have only started to do that fairly recently because our research vessels were used in the past to only collect the pre-recruit, the young fish, information, which they did very well, but because there had been major corruption in the quality of the catch data and that would also mean the

catch rate data, how many fish per hour the commercial fleet were catching, those data are no longer used in the assessments, this being the trend worldwide. There are thousands of hours more fishing that the commercial fleet do compared with the research fleet, so one key thing would be a restoration of confidence in the accuracy of the catch and the catch rate data. A key feature underpinning the stock assessment would be the fishermen's own commercial data. That is one example, and there are more moves in the right direction. The Fisheries Science Partnership is a Defra-funded programme of £1 million a year which specifically puts fishermen and scientists together and two-thirds of that money is spent in developing their own time series, so instead of using our research vessels we are using their vessels and working with them to inform views on the state of the stocks. Those data are now just beginning to be sent into the ICES system and used in the stock assessment. The ICES is opening itself up to observers at a range of levels and through the Regional Advisory Councils and the NFFO representatives they are having greater access to that. There are, therefore, a variety of fronts that we are proceeding on for that, but the key thing is that we do actually recognise that it is fundamental to the management of this industry that they have confidence in the basic information.

Q4 Viscount Ullswater: Could I just put in one other factor? It seems that your research vessels measure the juvenile fish but the landings you can assess and measure and age the fish.

Dr Horwood: Yes.

Q5 Viscount Ullswater: What we have read in evidence is that in the North Sea maybe up to 50 per cent of fish caught are not landed; therefore, how much could that affect the science on the total population in the sea if actually you are not having a scientific evaluation of the by-catches, of the discards. I would have thought that if there are a whole lot of fish being

caught and then being put back into the sea without any form of calibration or appreciation, whatever you like to call it, of what has been taken, it then becomes slightly anecdotal, does it not?

Dr Horwood: You are quite right, that is an additional element. Again, unfortunately, there are several parts to an answer to that. First of all, if you had a situation where there was a traditional fishery that was discarding regularly ten per cent of catch and we did not know about it, for technical reasons that would not matter, we would still end up advising quite appropriately on the size of the catch. What is significant is if you have significant amounts of discards and they are very variable from year to year or there is a trend, that can then confound the assessments. For the key stocks we do have programmes to monitor the discards and certainly for North Sea cod and haddock they are counted through an observer programme and included in the assessments, but for many of our stock assessments the quality of the discard data is just too poor, there are too few to actually include in the regular stock assessments.

Q6 Baroness Jones of Whitchurch: I understand why you have said there is a big emphasis on quantitative measurement and the counting that goes on; you said that there is a mathematical formula which is always slightly above when it comes down to that. Really what would be much more useful for policymakers is an overall assessment of what is going on in a particular area. Take the North Sea, really for policymakers to be able to make sensible judgments it is not just about counting what is caught, which may just be that commercial fish at that particular time, we need to know which fish are unpopular at the moment but we maybe could encourage people to start eating, for example, or all the different trends of fish – some are coming up, others are declining, the impact of climate change. All those things mean that it is a moveable feast and we need to be able to make projections, so

how do the scientists go about helping to make some of those projections because just counting what is there now is only a very, very small part of the science.

Dr Horwood: It is only a small part of the science and I did say at the beginning that we do have quite a wide job and a wide remit, but politically the real problems and the hassles were always associated with the annual stock assessment. As you say, there are a lot more issues involved. We catch, I believe, getting on for 200 different species of fish on our surveys and we have had surveys that go back to the turn of the century, so we can actually monitor the major changes that are seen in our system. There is a recent report where people have brought together all the international North Sea surveys and have shown that over the last 20 years the diversity of North Sea fish has actually increased quite significantly. There are a range of things that we do as well though it is a bit difficult to deliver to you in this instance the entire package. The marine ecosystems are changing and the key surveys that we are doing provide the basic information to say that things are changing and provide a basis for speculating on the future.

Q7 Baroness Jones of Whitchurch: Would you say that those assessments are any more accurate than the quantitative surveys you are doing?

Dr Horwood: Our surveys which indicate trends are very much more robust than the need to say “and for this particular stock you have got 110,000 tonnes”. The indices themselves are really quite robust and they are independent of any changes in the fisheries, they are just what we are seeing out there on the ground.

Q8 Baroness Jones of Whitchurch: Amongst that 200 species are there some that you think that, with a bit of encouragement, the European population could be persuaded to learn to eat instead of cod, for example?

Dr Horwood: Yes. One of the points that we mentioned in the submission was that new markets are being found and also one species that is particularly heavily discarded in the South West at the moment is the gurnard, which is a lovely fish. It is a solid fish to eat, though not very big, they only tend to grow about that big (about twelve inches) but most of it is solid fish. They are now just beginning to find markets for it down in the South West and beam trawlers from Plymouth are beginning to land a lot more of their catch than just sole. Sole has totally dominated the beam trawler fleet, that is where all the value is and they have not particularly bothered with the other species, but they are now finding that in actual fact there is quite a lot of value with these other species and, of course, the more they land them the more the markets will develop. The haddock in the South West – there was never a market in Newlyn for the amount of haddock that could be landed there, they just were not getting any decent prices, and it costs a lot to handle the fish on board the ship, so they were discarded. Now they have found that the Plymouth market will take the haddock, so they are no longer discarding they are actually landing the haddock. There are, therefore, quite a lot of natural market forces driving the fishermen to land fish if there are markets for them.

Q9 Lord Plumb: Cynics might say that we can take reports that have been produced previously and most of them show that there is no change. The recovery and management plans were produced in 2002; presumably they are working but how satisfactorily are they working and what should happen. Secondly, from that, should they be improved and if so how should they be improved?

Dr Horwood: There are the two different sorts of plans, the recovery plans and the management plans, and the new basic regulation, the Common Fisheries Policy, actually stipulates that the fisheries should be managed as either a recovery plan or as a management plan, and you will already have found that we are not quite there yet. Dealing with the recovery plans first of all, it took quite a while to actually get to the stage of the 2002 plans.

We had problems in the early/middle 1990s before we actually got round to these formal plans and a great deal of work was done to actually look at the simulated nature of what these plans would deliver. Targets were basically set and were agreed, which seemed to be a sensible thing for any plan, and a means of achieving those targets. For cod this was that a quota should be set to allow the parent stock to increase by 30 per cent each year. You must bear in mind that the alternative that people were talking about was the complete closure of the fisheries on cod which in itself would be virtually a complete closure of the fisheries, as you will know from Scotland. The recovery plan itself was, therefore, a very severe compromise between no fishing and a plan that would allow some fishing and some quotas but at the same time recovery. If you look at what has been achieved, there seems to have been very little evidence of progress in the Irish Sea and to the west of Scotland. In the North Sea last year we saw for the first time that we do seem eventually to have reduced the fishing rate very considerably and hopefully this is a robust result which we will find out through this year's stock assessments, but the fishing mortality has been reduced to its lowest level for 40 years, which is a massive thing to have done. It has been at a huge cost, we have cut back our northern white fish fisheries by 60 to 70 per cent which has been a massive problem for the people involved, but before last year we were only seeing cutbacks in the amount of fishing effort at sea by about 20 per cent. However, it looks like the cuts that have been made have actually focused on the cod-type fisheries to achieve this big reduction in fishing. Having achieved that reduction in fishing we seem to have got a lot of cod in the North Sea, which is now a problem for fishing; it is a problem because it does look like in the North Sea at least that the recovery plan is working. One of the elements of the plan that was not clear was how the element of fishing effort was to be managed. Scientists, for a very long while, have said that managing by quotas alone will be ineffective: you can still go to sea, you can still catch and kill fish, it is just that you are only allowed to land a bit, so fishing effort had to be a key

element of it. From day one we did not see anything explicit from the Commission as to what the proposed effort levels were in relation to the target fishing mortality and the TAC, so they were two processes that went on in a quasi-independent way. We have not been able to reduce the fishing effort to the level which the targets implied, even though the quotas are consistent with the plans. Of course, what then appears is increased discards and it is a question of how you resolve those two. There have been and there continue to be, therefore, problems with the 2000 plan. For the individual fishermen as well this has been done on a vessel-based system so when they have so many days to go to sea, which could be half their normal days, they cannot just sell up one boat and put two half days on one vessel to increase their own efficiency because then they will lose their days entitlement, so there is an element of economic efficiency that is not addressed by the current plan. We have learned a lot about recovery plans and if we have to do more then hopefully some of these things will be addressed. The management plans are for stocks that are not in such a severe position and they are meant to give a framework for making decisions. We have one agreed for the North Sea flatfish, basically the North Sea sole and the North Sea plaice. The main people who catch those two species together are the beam trawler fleets, mainly in the southern North Sea, so they are linked, but one of the things that we have not done is to have plans that are developed for fisheries. It is not a lot of good having a management plan for haddock if it is not really well aligned with the management plan for whiting and for cod, so there is a lot more work to be done in understanding how to develop management plans for fisheries as opposed to a nice simple management plan for a fish.

Q10 Chairman: Do you think it is the way forward though?

Dr Horwood: There certainly needs to be something like that to give a framework so that the industry understands what the medium term future is, because they are investing in boats and capital that will last for 20 years and the more that you can help the fishermen see the future,

the more they will be prepared to defer taking their revenue now to avoid the risk of what goes on in the future, effectively applying a high discount rate, so I think a management plan framework of some sort is important, but underlying this as well we have a commitment to move to maximum sustainable yield levels by 2015 through the World Summit on Sustainable Development; what that means is fishing levels probably quite a lot lower than we have got at present, so again if we are developing plans one needs to keep in mind some of the things that we have already signed up to.

Q11 Lord Plumb: What about the stock management plans outside the EU? The Norwegian plan for fishing apparently is supposed to fit in with the EU policy; what effect is this having and can we work together?

Dr Horwood: I do not think there is anything at all contradictory between the plans that have been agreed for the EU/Norway shared stocks; they are consistent and they set management targets for cod and haddock, for the cod when it is fully recovered and the haddock for now. They are very simple plans, that we will fish at a particular rate and if the stock begins to fall we will reduce fishing. It is a framework which imposes some discipline on those setting the quotas.

Q12 Chairman: Can I just do a general one on the emergency conservation measures. I will give you the opportunity of really saying what you want to say on emergency measures and their effectiveness or ineffectiveness and scope for improvement.

Dr Horwood: One has to say things are an awful lot better than they were before they introduced in the new basic regulations a power to introduce measures on an emergency basis but it does seem that the system is still particularly sluggish. If you imagine the difference between how we handle some of the animal diseases where, if you have a trigger event then things across Europe immediately go into a form of action, you would expect any business to

manage itself with appropriate risk plans and risk management plans, and this just does not seem to be a culture in the management of fisheries where it would seem that there are predictable types of emergencies, shall we say, which could be a very big year class of haddock that arises. The last time we had a very big year class of haddock we actually discarded over 100,000 tonnes of North Sea haddock in one year; these things can be avoided but you would need to plan for them because they just take months and months to go through the EU. I would have thought that there needs to be a slightly different way of handling, shall we say, fishermen's business in the same way as any other business would handle itself in terms of risk management.

Q13 Chairman: Could you say a little bit more? What would it look like?

Dr Horwood: You would have to agree that there are various events that would arise which would have a negative effect in some sense. We could say that when we get a very big year class of haddock we are really not happy that we are going to lose 100,000 tonnes of it, so you would actually trigger if you like an emergency response plan in this instance by the scientists having identified early on that there is a very big year class of haddock.

Q14 Chairman: That would be an in-year assessment, would it not?

Dr Horwood: The scientists will tend to see the little haddock a year before the industry start to capture them in their net. When they are too small and they go through it is not a problem, and when they are big and above marketable size then they can land them, but they will also capture very large numbers of small fish which are not marketable and those are the ones that we want to avoid capturing. You probably have actually got six months or maybe a year's notice of this event coming through. If you have already got a plan on the shelf which says in the event of this, these are the actions that we will take and there is some way of triggering this plan so it does not come as a huge surprise to everybody, even though it has occurred

every ten years for the last 100 years, it would be a lot easier to implement, so you could actually develop a plan. Experience has shown that these plans are very difficult because in the case of haddock it would affect a particular locality a lot more than others – the chances are that the Netherlands would be totally disinterested. The people around Scotland would want a huge amount of discussion on the fine detail of that and it might take two or three years to actually develop a plan where there is a significant buy-in and it is useful, but then having got it on the shelf you could actually implement it quite quickly.

Q15 Viscount Ullswater: In your evidence that you have given us this morning I think you are indicating that you are critical of the effectiveness of TACs. TACs may be useful in some fisheries, in the pelagic fisheries, but in the mixed fisheries, which is most of the fisheries round our shores, they seem to be rather a blunt instrument and increase the number of discards. In evidence you have been saying that fishing effort is probably a more effective way of coping with mixed fisheries. Perhaps you would like to comment on the effectiveness of TACs. Is there a way of overcoming the discards which TACs impose on these mixed fisheries?

Dr Horwood: Certainly there is an issue about getting the TAC right for the mixed fisheries. If we have an accuracy of a plus or minus 20 per cent for each one of these species, it is really very difficult to get a package where at least one of them is not significantly off and is not causing quite a lot of discarding. It is certainly an imperfect conservation tool. Its ability to get countries to agree to a quota, however, is extremely strong through this relative stability concept. Everybody knows what a tonne of fish is. For a long while scientists have looked to the effort system and said surely this is a better way of going about it, but they have never had the responsibility of implementing it. We have seen under the current system that implementing effort control is really hugely complicated. You have a whole range of different sorts of vessels and gear which are exerting different sorts of fishing pressures. You

have actually to manage that mix. Whereas everybody understands what a tonne of fish is, do we all understand what a day of sea time is for a beam trawler, a netter and a potter? All these things that the scientists are not paying a lot of attention to become hugely important and the fishermen will focus in on them and will be able to spot where their ability to increase their effort within the current rules is extremely quickly. Conceptually effort control has an awful lot of good going for it because you can regulate the amount of effort going into a fishery and then hopefully they can land it all, but our experience with the cod recovery shows that in truth this is not a simple process. It may well be that a more reasonable answer is one where our fishing capacity, ie the basic size of the fleet is much more in line with the size of the resource, so even if they are working flat out they cannot cause a significant amount of damage to the stock over one or two years. That would allow a lot more flexibility with the TAC-based system. So if it was overshoot by ten or 20 per cent one year maybe you would not have to discard, you could land and you could work out some system where you would pay it back over a while. I think what I am suggesting is that there needs to be probably a combination of the two but underpinned by the basic fishing effort and capacity being much more commensurate with a size that the stocks can sustain.

Q16 Viscount Ullswater: If there is this large amount of discard, what happens to the dead fish? Do they just float to the bottom and get wasted or are they eaten by crabs or lobsters?

Dr Horwood: They turn into lots of fulmars. Fulmars have increased enormously over the last 100 years. That being said, I know the RSPB do not think that discarding should be maintained to maintain fulmars. There are a few instances where discarding has had a really bad effect, particularly when you talk about high grading from the big pelagic vessels because they can dump a huge net full of dead fish down in one spot and other vessels have trawled through it and it is a mess and is not doing anyone any good. Most of the other discards really are just assimilated back into the ecosystem.

Q17 Earl of Arran: Is it not possible with technology to be able eventually to throw more fish alive back into the sea than is currently happening?

Dr Horwood: We are working all the while on different gears to help that. Let me give two examples. We have been working on some panels to put in beam trawlers and we have been trialling them down in the south-west. There are two different panels, one on the bottom and one on the top. The one on the bottom gets rid of a lot of the shellfish and the one at the top gets rid of a lot of the fish. What we have found is that they virtually lose none of their catch but the quality is improved because the fish are not abraded by a whole load of mess in cod end, so you are getting more for it at the markets. The entire south-west is now switching over to these panels. It has really been quite remarkable. When it is shown to be in the fishermen's interests they are not slow to take these things up. The other example, which is still being trialed, is something called the eliminator trawl which we found out about through one of our environmentally friendly fishing competitions. It is a net with lots of holes around the first part of it and it catches virtually no cod. We have been trialing that off the north-east coast of Scotland. There is a Scottish interest in it. One of the things we are particularly concerned about is can we fish in a way that avoids catching cod. There is something called a separator trawl, which is a normal trawl but with a horizontal mesh panel because fish behave in a different way when they enter the net. The haddock will swim upwards and in this instance would go in the top half of the net whereas cod and plaice tend to head downwards. Years ago we developed this net where the bottom panels had holes which were a lot larger, but it is such a delicate gear. The fishing industry could use it but it is very open to abuse. A key element is the desire of the fishermen to want to reduce discards. There are quite a few gears about which can help them do it. It is always a lot easier if your target fish is not a small fish and unfortunately for the sole fisheries, sole tend to be quite small and can get through quite small holes. Most of the sole fishermen are very reluctant to move to anything

more than a 90 millimetre mesh for the sole fishery, which means a lot of other fish do tend to get caught in it.

Q18 Viscount Ullswater: This could make a huge difference to stocks, could it not, if more of the throwback is alive than dead?

Dr Horwood: Absolutely. If we reduced the fishing effort down to the size consistent with the World Summit targets, which could be significantly lower, then the fishing mortality rate may halve. Your discard would immediately halve. Not only that, the size of the fish would be larger and the size of the stock itself would be a lot larger, so your discard rate will plummet. Lower fishing rates are probably more important than small changes to the mesh size.

Q19 Baroness Jones of Whitchurch: Could you just explain the panel to me? That is something that is attached to the net, is it? It is not something that happens when they are landed; it is actually attached to the net, is it?

Dr Horwood: Yes, it is part of the net. As they trawl along, the benthos, the whelks and the starfish fall through the bottom panel as opposed to going to the cod end. If they are in the cod end they are really quite rough, so the fish go to market and they have got bits of blood and scrazes on them and they will not attract such a high price as a fish that really looks quite good. There are top panels that we have that are used in the haddock fishery because the haddock do move up. Most of our mesh is a diamond shape mesh and as it contracts under pressure it will squeeze shut whereas these panels tend to be square mesh the other way so they actually stay open. Even though the diamond mesh is tightening these panels remain open more.

Q20 Baroness Sharp of Guildford: In your evidence to us you talked about the closed areas and their use in fisheries management. Could you tell us a little bit more about how the concept of closure has been used within the European Union and what advantages and disadvantages there have proved to be? The Scottish Government has been trialing real-time closures. Are these likely to work? What barriers are there to their application? Could you tell us a little bit more about the way in which they might work?

Dr Horwood: You might be interested to know that we have recently calculated that in our own England and Wales waters 30 per cent of the area is under some form of Common Fisheries Policy area-based control. If we consider other non-CFP ones then 40 per cent of our sea areas are regulated to fishing in some way. For many years now we have attempted to protect particularly the nursery grounds of fish. The flatfish in particular live on shallow sandy areas so are really more susceptible to being protected. It has been quite natural to protect these areas. It is investing in the future of the fishery. The fish themselves are of no value and they are quite tightly constrained. The other fish, such as the orange roughy, are very, very vulnerable deep water fish, very late maturing, they tend to congregate against oceanic sea mounds and the CFP has protected those from fishing. We have had some closures to protect spawning fish. We protect the herring spawning grounds because they lay their eggs sticking to the bottom and if you have trawling through them you destroy their spawn. For many years heron spawning grounds have been protected. In terms of the cod or any largely mobile fish, it becomes much more problematic that these areas are useful because if you protect the cod in one area the chances are you will be catching that same cod 50 miles away elsewhere. The cod has proved a problem. Certainly in the Irish Sea many years ago there would be a massive spawning fishery and the catch rates of cod on spawning ground would be over ten times higher than they would be elsewhere. So you can imagine if you stopped the fishermen fishing there and they were made to fish elsewhere they would only be

going to catch a tenth of the fish. That would be a sensible conservation measure, but now, unfortunately, the concentrations of cod and spawning are so small that if you force them to go elsewhere you may be pushing them on to juveniles which they may be catching in even greater number. You cannot really consider these closed areas as universally good. We have always said that they need to be considered on a case-by-case basis. In relation to the real-time closures for cod that have recently been introduced in Scotland and are now being rolled out in England with some support at least from Denmark, it has been following an initiative from the industry who believe they can avoid cod and in fact need to demonstrate that they can so do. As we have said, the measures so far off the west of Scotland and the Irish Sea have not proved fruitful. It is being rolled out this year now under a formal scheme that we can operate through the CFP, through the cod recovery whereby if we manage our effort scheme not as I previously described, on a vessel by vessel basis, but as a UK pot of so many kilowatt days we could be more efficient. Providing it has various conservation elements then we can give to our fishermen additional days at sea. So we are expecting a lot of fishermen to sign up to it. On the spawning area closures, the scheme involved is that if they are catching so many fish above a particular size they will close an area of about seven nautical miles square. There would be a maximum of nine of these at any one time. They would be closed for three weeks. You are talking about 500 square miles, which is about half a per cent of the North Sea. For juveniles it would be a slightly larger area but again a maximum of one per cent of the North Sea. We have yet to see whether these real-time closures can actually provide a significant mechanism. A key thing in this is the fishermen wanting to take the initiative themselves and at the very least it is not bad. If they feel this is positive, and we want to encourage them to take more measures like this, then it is something which should be supported.

Q21 Baroness Sharp of Guildford: Is there sufficient co-operation between fleets? Is there a problem? We may get the Scottish fishermen buying into this, but what about the Spanish and the French fishermen?

Dr Horwood: This particular scheme is just a UK scheme. We know that some other countries have expressed an interest in either joining it or having a similar scheme of their own. Even before it was embodied by the EU in the Council regulation last year they were talking positively about wanting to do something with us on this, but it is very much a UK scheme.

Q22 Baroness Sharp of Guildford: Does that mean it is within the 12-mile limit that we have control over?

Dr Horwood: No. This will be in UK territorial waters and I think it might only be the North Sea that we are operating this in. I am not certain about this. I do know it is at least the North Sea, but it is our UK scheme.

Q23 Baroness Jones of Whitchurch: You have already talked a little bit about mesh sizes and so on, but are there any other innovations, technical or scientific, that are going on out there that are helping conservation? Is there anything that you would like to share with us that you think might help in this whole process?

Dr Horwood: There are major things now happening in Europe with the Marine Strategy Directive which is going to encourage us to develop the good ecological status of our seas or good environmental status. The marine environment side has really been a sleeping giant and is quite clearly waking up. I see the fisheries as eventually fitting in to a much more holistic management of the marine environment and marine ecosystems as a whole.

Q24 Baroness Jones of Whitchurch: That could be a horrible bureaucracy, could it not? It could be one bigger bureaucracy. What makes you so keen on it?

Dr Horwood: At present OSPAR, the Oslo and Paris Convention, have a particular remit to look after the environment. They increased their remit a few years ago to include the ecology of the seas, but there are no powers for them to do anything with fishing at all, fishing is quite independent. I can see, taking your point that this will not be without its bureaucracy, that there will have to be a more coherent link between fisheries and environmental management. We got the Darwin Mounds protected under the CFP. I believe it was a requirement through the Habitats Directive that protection was given, but the mechanisms to actually protect it from international fishing just are not there, so there are some big loopholes. The TACs and quota regulation this year protected some Irish areas from fishing, but it really is a bit ad hoc. There will clearly have to be a better integration of these two branches, the fisheries and the environmental protection.

Q25 Baroness Jones of Whitchurch: And the timetable for that merger, if it is going to be a merger?

Dr Horwood: I do not believe there is one explicitly.

Q26 Baroness Jones of Whitchurch: You mentioned in your evidence that we need more outcome orientated regulation. Do you think that this new regime you are talking about will be more outcome orientated?

Dr Horwood: I doubt it. There does not seem to be a culture to go along this particular line. The system that we have at present, particularly through technical regulation, knows that it wants to achieve particular objectives such as low discards, that they do not want you to use small mesh if you are targeting the large fish and so they have constructed a massive rule book of things that fishermen must not do in order to achieve this outcome. You really

believe it would be better if there was some way that you could say what is it you want to achieve and let us see if fishermen can do that and you can monitor it and leave it much more up to them to decide how they are going to achieve such measures.

Q27 Lord Palmer: I think everybody seems to agree that the policy of discards is really an absolute international scandal and indeed perhaps it was what made us embark on yet another inquiry into the Common Fisheries Policy. To what extent do you consider a discard ban would help to address the problem of discards and how might such a ban function in reality?

Dr Horwood: I think the proposal for a discard ban is extremely helpful in that it will scare people into deciding they really must do something about the issue. There are some negative issues associated with the discard ban. I really do not feel to date that it has been taken particularly seriously and I rather suspect this is where the Commission is coming from as well. The response by the Regional Advisory Councils also suggested this was the Commission putting a shot across the bows of the industry. One of the disadvantages is a safety issue in that you will be forcing vessels to carry back to shore large amounts of unwanted material. Having got the material to shore, then instead of having what is effectively a contaminant of some sort spread across the sea floor, you are bringing it back and presumably it will be disposed of at a point source and so it is likely to prove more of a problem. I personally would not want to see markets developed for small fish. So if people are bringing back small fish and sales develop for them, do we want to encourage people to market fish like that? There are some negative elements associated with a discard ban, but I am hoping that this will be a prompt to take a much more significant step to get fishermen cutting down on their discards in the future.

Q28 Lord Palmer: Could you see a discard ban in reality actually coming into force in the next five years in your opinion?

Dr Horwood: I would have hoped that the consequence of the Commission's proposal for a discard ban will have some end point in less than five years. We have had lots of things which seem to have stuck in the Commission. Five years is not an outrageously long time for the Commission to act, but certainly Commissioner Borg has expressed his disgust with the level of discarding that is going on. You can see that there is a personal commitment to do something. It would not have to end up as a discard ban; there are other things that can be done. In Iceland and New Zealand if they catch marketable fish they are not allowed to discard those ---

Q29 Chairman: That is the key issue. It is not just a discard ban; it is a discard ban of market or marketable fish.

Dr Horwood: That would be a different issue. At present it is a discard ban of all biogenic material. There are lots of loose ends which would have to be sorted out. One assumes you do not want to bring back loads of shellfish. Equally, you do not want to be bringing back 100,000 tonnes of baby haddock in Peterhead. If it is marketable fish then that becomes a rather different matter. It is possible as well to set targets of some sort for discarding and leaving it to the fishermen. They might use different nets, fish at different times and different places. It would be very difficult to monitor and observe them, but this is the sort of outcome orientated process or legislation that I was suggesting might be more fruitful.

Q30 Chairman: You could reasonably tell that they are discarding. You cannot tell what they are discarding, can you?

Dr Horwood: If it is at night you do not know what they are doing.

Q31 Chairman: In Scotland it is night quite a lot of the time during winter!

Dr Horwood: Monitoring this itself will be quite difficult. You do feel an awful lot of these issues would go away if there was a commitment by the fishermen to do something and the trust by others that the fishermen would actually do it. If you have not got that you end up having a massive rule book that you ask people to follow.

Q32 Viscount Ullswater: When we are talking about bycatches and discards and when measuring the amount of discards, are we talking about bycatches of controlled fish that are subject to the CFP or are we talking about just fish biomass as a bycatch?

Dr Horwood: Most of the fish discards in the south-west for instance, where we have done a big study, are of low value, non-commercial fish, gurnards, pout whiting -- Somewhere in this pile I have a list of the species. The component which is discarded through being out-of-kilter with the quota is a relatively modest part of that. It is currently a bit of a concern because the cod quota in the North Sea has been set out of line with the size of the stock and there will be a significant discard of marketable cod in the North Sea, but in general it is of small, under-sized fish and of unmarketable fish or fish for which there are not currently markets.

Q33 Viscount Ullswater: When they talk about this figure of anything between half a million and 800,000 tonnes of discards, is that basically a lot of unmarketable fish or is that only the marketable fish which is being discarded that you would want to measure for some reason?

Dr Horwood: I know the figure that you are talking about but I do not know precisely where it comes from. Our figures that would add up to what you are talking about would be mainly under-sized fish; they would be the 100,000 tonne of under-sized haddock for instance in one year.

Q34 Viscount Ullswater: But it is not the sort of gurnards and things that you were talking about, is it?

Dr Horwood: Yes.

Q35 Viscount Ullswater: That would be discarded on top of that, would it?

Dr Horwood: No, that would be included. The large percentage of that figure would not be marketable cod, haddock and whiting.

Q36 Viscount Ullswater: How does anybody come to measure the size of that particular thing? I know it is a big range that I have given you. How do we even have an idea of the tonnage?

Dr Horwood: We have observers on the vessels. I think we have about six guys or we spend about six man-years on the boats of the vessels. So we actually record all that is caught and landed and discarded. Over the years we have a very good record of what is being caught and discarded. Scotland has had a major programme for their whitefish fishery for a very long time. The EU has something called the Data Collection Regulation and it obliges countries to collect such information. As for our sampling levels, probably only about half a per cent of the trips are sampled. It is just too expensive to contemplate otherwise. Over the years you end up with a very robust database which can tell you what is going on.

Q37 Baroness Sharp of Guildford: You state that climate change is likely to affect both the abundance of fish and the mix of species and this seems to be borne out also by other long-term surveys of plankton. What implications is this likely to have upon the procedures for the management of stocks? How are we monitoring the developments as a result of climate change and how should we be monitoring it?

Dr Horwood: We have been monitoring our fisheries now for a very long time, the commercial and the non-commercial species and it has been a wonderful database to follow and to note the changes that we have been seeing. We have certainly seen some changes and they are being attributed to climate change. We have a natural oscillation in the North Atlantic which causes ten to 20-year oscillations which are likely to be much greater than a slow trend of climate change. So probably what we are seeing is a climate change signal and the effects of the North Atlantic oscillation affecting our fisheries as well. They are all indicating that we should expect changes to occur. The predictability of those changes does seem to be quite low. You can make some general statements such as maybe the warmer water species will increase and the cold water species decrease, but it is really the entire ecology that will determine whether the fish larvae survive. We really do not know how the ecology of the seas is going to change. Also, if the seas get a bit warmer, with the North Sea sole, you might think that they would expand their range further north, but they do need these particular nursery grounds. Even if the larvae food is there and the temperature is right, if they have not got coastal sandy nursery ground, which you do not see around Norway, then there would not be an expansion of the sole stock. We have got to expect change, but we cannot rely on a lot of predictability. Future management measures and tools need to be climate change proofed against such unpredictability.

Q38 Chairman: I would like to turn to Regional Advisory Councils. Your evidence is pretty positive toward RACs. Is there anything that we can point to and say that has really been delivered, an advance has been made in that area because of Regional Advisory Councils? If their importance grows what sort of help could basically the science give them? What could you feed in to enhance their competence?

Dr Horwood: The RACs publish the advice they provide to the Commission on their website and they really are worth reading. They are extremely considered pieces of advice. I think

they are very polished works and quite clearly should be taken seriously by the Commission. At the Commission level, you can see from discussions that the views that the Regional Advisory Councils are a part of the natural language of the Commissioner. He does listen to them. That does not mean that their advice is taken, but it is quite clear that they are taken quite seriously. It is difficult to point to very particular successes because it is quite a grey process in Brussels sometimes to see how exactly any one decision is made. The North Sea RAC were really very scathing about the Commission's approach to the introduction of protected areas and quite rightly. I think to some degree that had a significant part in the Commission stopping their own initiatives to impose closed areas on the system. They have also been developing their own views on management plans. In many ways they are part of a group of different players that are feeding into this system. In many ways you can see they are a partner round the table in the development of plans as opposed to just responding to it. It is a bit difficult to say yes, this is a real success, but there are lots of bits of evidence which say this is clearly going the right way and their views are being sought. In terms of the scientific and technical base to help them, we would very much like to feel that there is a common science and technical base that supports the Government, the RACs and any stakeholder that actually has a part in making a decision. The EU DG FISH has said it will help the RACs feed particular questions through to ICES if ICES is the appropriate source of information for it. This is because the DG FISH provides ICES with some monies to answer some questions, but it is also aware that there is a very small finite fisheries science community which has demands on it from the EU and then, via ICES and the EU, other technical committees, the governments and if the RACs come in as well and say we want this, there does need to be a prioritisation of some sort. That is one of the things that is happening institutionally. The Government has given a high priority to empowering the RACs as a significant voice and both ourselves as scientists and our policy colleagues are really giving

them as much help as we possibly can. We support their meetings. Defra funds a series of specific projects which the RACs feel they need to help them do their business. We are doing quite a lot to make them as successful as possible. This is a major new bit of work and business that is put on a relatively small group of people. They have done an excellent job with quite meager support.

Q39 Baroness Sharp of Guildford: How many RACs are there?

Dr Horwood: I should know the answer to that but I do not because some of them are Mediterranean RACs ---

Q40 Baroness Sharp of Guildford: We have got one for the North Sea. Is there an Irish Sea one?

Dr Horwood: There is the North Sea one, there is a western one which covers all our western waters of interest and then there is another one that goes down to Iberia, and there is a deep sea RAC and there is a pelagic RAC. The pelagic RAC would affect the North Sea pelagic fisheries because they are really quite a separate different industry.

Q41 Lord Plumb: Do they meet together in Brussels occasionally?

Dr Horwood: I do not know the answer to that. They certainly meet under ICES because there is an annual ICES/RAC meeting where all the RACs meet with ICES in one place.

Q42 Lord Palmer: Aquaculture also comes under your responsibility. To what extent do you see developments such as cod farming alleviating the pressure on sea fisheries? In light of some of the work that you have undertaken, what risks might these developments entail? Do you see a relatively rosy future for aquaculture in the long term or are you yourself a bit sceptical about it?

Dr Horwood: I am less of an expert on aquaculture. To me it seems a priority is to get our North Sea cod stocks back up to 150,000 tonnes, which is where they should be and the bulk of our fish be taken from places like that. It is a bit difficult to see that these huge volumes of fish can be generated through aquaculture although, conceptually, they can. It takes between two and five times the weight of a fish developed in aquaculture to produce it. Of our typical whitefish, to produce a kilogram of farmed cod will take five kilograms of food, which has got to come from somewhere and that somewhere is typically our industrial fisheries, so from the North Sea sandeel fishery or the Peruvian anchovy fishery. To some degree it is affected by your philosophy as to how bona fide those fisheries are. Global fish production does seem to have peaked and stabilised. In general we are not going to produce a huge amount more fish from the sea. The aquaculture side has continued to rise, but it does have to be fed. I understand they are developing non-fish food for aquaculture. There are a few vital amino acids that seem to be absent from vegetable feeds, but they seem to be solving those problems. It is possible that some of the environmental issues might be solved. It does seem that we should be producing the bulk of our fish food from our natural fisheries.

Q43 Chairman: Just imagine, if you can, a sort of fantasyland where the Secretary of State comes to you one day and says, “I am feeling particularly brave and farsighted and I really do want your advice on one or two policy initiatives I can take to really set us on the road towards a sustainable fisheries policy.” What would you say to him or her?

Dr Horwood: I guess two things after saying that clearly the Secretary of State’s view is a lot wiser than mine on these matters. A key thing is to get the capacity in line with the resource and if that happen a lot of the temporal pressures disappear from the system; people’s livelihoods are much more secure. I guess the other one is to develop a greater understanding of the role of the local inshore fisheries to the local community, how that interaction is working and do we need to support it and sustain it. This is quite different from our big

commercial offshore systems. There are lots of areas where you feel that small fishing is integral to the wellbeing of the community and does one secure a future for that and, if so, how.

Q44 Viscount Ullswater: Does that mean you are going to reduce the amount of over ten-metre boats? Is that the sort of area where the biggest modernity comes from, the ten-metre boats plus?

Dr Horwood: Yes, it does.

Q45 Lord Palmer: It is not the under ten-metre boats that are causing the environmental or the fish stock problems?

Dr Horwood: The vast bulk of the catch is by the offshore over ten-metre vessels. One can say that 95 per cent of the fishing is by these larger vessels, so that is where the big capacity issues arise. The inshore fisheries are a hugely complex network of different things. They have problems of safety, they cannot move very far and if there is some vulnerable species there they cannot necessarily avoid them. It may be a target species, for example, some species of ray which are being caught throughout the North Sea and we want to stop people fishing them if we can. This may be a massive problem for a small local less than ten-metre vessel where for two months of the year that is what they catch. They will still be catching a minute amount compared with the other vessels. They do have a different character to them.

Q46 Chairman: There is a bit of all that that is pretty depressing. The last time I was at all involved in fisheries policy was ten years ago and even then they were saying things like the TAC-driven system is inadequate, there is a need to reduce fishing effort, there was the hope that technical innovation would ride to the rescue, there was the horror of discards and there was a gap between the scientists and the fishermen. They all seem to be still there!

Dr Horwood: One of the things that I have found really since Net Benefits is that there has been much, much greater co-operation between the fishermen and the scientists. That does not mean at all that you have to agree on all occasions, but I have to say that the dialogue itself is much, much healthier than it was five or ten years ago. It is possible to disagree in a much more normal way. This is quite difficult because it is their livelihoods. We are saying you should cut back by 50 per cent and they are saying, “This is my mortgage you are talking about.” That element has improved. We are really working at that; it is really quite a significant priority. Unfortunately so much has been dominated by cod recovery and the issues associated with that that it colours our perception of just about everything else.

Chairman: Thank you very much indeed. I think we are going to have to refer continually to what you have said as we proceed with this inquiry, but it has been enormously helpful. Thank you.