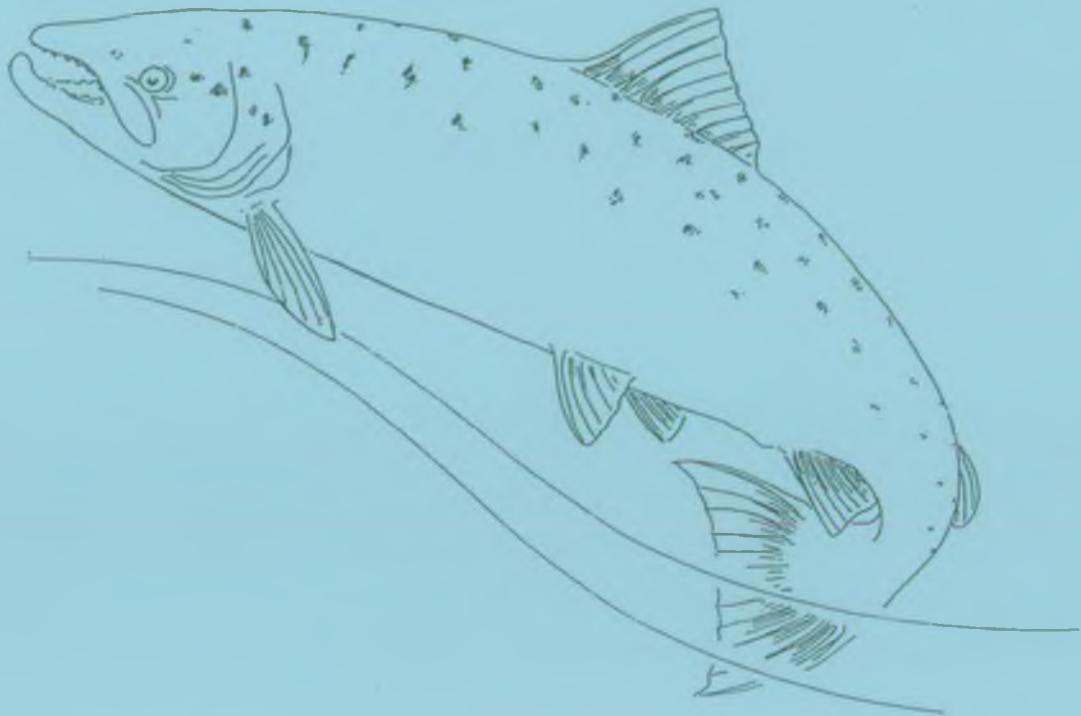




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HAMPSHIRE  
SALMON SEMINAR  
5TH OCTOBER  
1993

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Chairman's Introduction

ARTHUR HUMBERT

Chairman Fisheries Advisory Committee

## NATIONAL RIVERS AUTHORITY

### HAMPSHIRE SALMON SEMINAR - 5TH OCTOBER, 1993

#### **Chairman's Introduction:**

**Arthur Humbert, Chairman Fisheries Advisory Committee**

Well, good evening ladies and gentlemen, as your Chairman it's my pleasure to address you briefly, and then to hand over to speakers. It will seem there is a programme in this book and it tells you when the questions may be asked. Now there's an old saying that you shouldn't believe all that you read in the press and I've been reading and hearing gloomy things about that.....I see words like "extinction" and "disappearance". Well that is past history. There was a danger of that years ago but the NRA has tackled the problem and we are now in an improving situation. Things are getting better. We are not yet celebrating success but if we come back in five or ten years time I think we will be celebrating success. What we are celebrating at the moment is the turning of the cycle towards an upturn and enjoying an improvement. That is not just an opinion, it is there in the rod catch figures and if you take our two beloved rivers, the Itchen and the Test, the rod catch, which has not yet been confirmed but it's pretty certain, is almost exactly double on the two rivers in 1993 and now, to have an improvement by a multiple of two is, I think, a great achievement and that has come about, that achievement, by something that some of us have wanted to do for a great many years and has now been done on a scale for three or four years that has now shown this benefit. I refer, of course, to the Enhancement Programme, the rearing and releasing of large numbers of parr, or

juvenile salmon, and releasing them about mid summer onto the shallows where they've grown, they've become effectively wild fish, they have migrated to the sea, gone to their feeding grounds in the North Atlantic and returned to our rivers by this magical instinct. Now the salmon is a noble creature, it's silvery and it's sporting, but it has one actually terrible defect, it's good to eat, and every creature and every man wants to eat it so it suffers all down the line, right from the time when it emerges from the egg which it's mother laid in the gravel, when it'll be eaten by eels, by Millers Thumbs, even by the humble freshwater shrimp. It's attacked from the very first day and right through, in the juvenile stages when in the end of it's first summer and winter feeding on the shallows it's exposed to the heron problem, which is very prevalent in this county and many of what have been released have been eaten by herons I'm afraid and then as they migrate to the sea in the Spring of the following year, they are exposed to cormorants in the estuary. And then they go north to the high latitudes and then come down again and are caught by nylon nets, which are in themselves controversial. But then they return to our rivers and this year we have seen the first return possible, given the number of years we have been stocking, the first year in which one would expect to see a return was 1993 and it is therefore very interesting that the rod catch has doubled in the first year when an improvement could be looked for. Right, with that I think I would just give you a forewarning of what I am going to say at the end of the meeting, which is that if out there there are any benefactors please don't hide your light or your cheque book under the proverbial bushel. The NRA, like all grant in aid organisations, is facing a Treasury which is facing a 50 billion pound deficit. We are therefore passing the

hat around and if any of you want to sponsor anything to do with this enhancement programme we are very pleased to talk to you. Your name shall be applied to whatever enhancement is done and a lot needs to be done yet. But going back to the present, I would just like to remind you all that this enhancement, which is showing up for the first time in the figures of rod catches this year, has been possible due to a partnership between the NRA and what you might call the private sector. The private sector is, in fact, Mr. Alan Mann who is sitting in the second row of the stalls there, looking very serious but it is he who has made all this possible because he has kept the Hampshire strain of parent fish in his fish farm on the West coast of Scotland, he has taken the eggs from those fish, fertilised them and he has brought them up to what is called the eyed stage when they have been handed over to the NRA who hatched them and fed them for the first few months of their life before handing them over to Mick Lunn and his team of river keepers that distributed them up and down the river a few at a time on every shallow. So we are extremely grateful to Mr. Mann and this is the kind of thing that I mention. He has done a great deal to help us and without him this wouldn't have succeeded, and we thank you very much. I think we also thank the late John Potter for his contribution too.

\*\*\*\*\*

Introduction

**ROBIN CRAWSHAW**

**Hampshire Area Fisheries Manager  
NRA Southern Region**

**Introduction:**

**Robin Crawshaw, Hampshire Area Fisheries Manager, NRA Southern Region**

Good evening ladies and gentlemen and thank you Mr. Chairman. We've heard from Mr. Humbert, our Chairman, a brief summary of the life cycle of the salmon, about which I'll say little more. But we need to realise that the chalk streams, particularly of Hampshire - I beg your pardon for this - the chalk rivers in many respects are typical salmon rivers in that they have a generally very stable flow pattern, quite a stable temperature regime, very hard, very productive water and once spawned - and this slide illustrates a typical spawning reach on the River Itchen less than half a mile from where we are this evening - the young salmon will grow very rapidly, reaching the smolt stage in one year generally in our rivers. It's a notable characteristic of salmon that they return to the river of their birth each year, and this effectively isolates each river's stock of salmon genetically. The fact that we have an atypical type of river and a unique stock, an isolated genetic stock of salmon suggests that we have a specific strain of salmon specially adapted to our own habitat and just to illustrate the point we have got a young salmon and a young trout just to show the difference there. The rivers Test and Itchen have had an immensely long history of fisheries. They both have ancient rights of fishery granted by the monarchs pre Magna Carta, which of course historically were net and trap fisheries. The ancient right of fishery on the Itchen still remains to this day, but those on the river Test were bought out and ceased on the...around the time of the 1st World War. The rod fishing has a long history as well. We know, for example, that the Broadlands Estate commenced it's rod fishery in about the 1880s and the Nursling and Testwood fisheries were certainly active as rod



fisheries by the 1920s. The estates keep their own rod catch records. We unfortunately have no long historical record for commercial catchers but the NRA and its predecessors have kept records, collected our own records since the mid 1950s. Catch records, of course, have to be treated with a degree of caution, the record is only as good as those people actually recording catches, but I do sincerely believe that here in Hampshire we are very fortunate, most of the fisheries are based on private estates and the records are probably as good as any we can find anywhere in the country. Let's turn to some specifics now. Up here I showed the graph of the river Test annual catch from 1954 to 1992. The red line is the five year running average. It shows a fairly stable but quite wide swing year on year through to the mid 1970s and a steady decline since and, over the last five years, a very sharp drop, but this year's catch at about 300 shows a marked increase on the last two years. The river Itchen, however, has behaved in a slightly different manner. The graph here is complicated by the presence of the net fishery but again we have the annual rod fishery, the annual rod catch, the five year average and the total catch which includes the commercial net which operates at the bottom of the river. Now you might think looking at this graph that in the mid 1980s we had a vast number of fish available, this in fact isn't true. This high peak of catch here reaching nearly 900 fish actually represents a very high proportion of the available stock of fish in those years and was the result of a combination of an increased use of the net and the establishment of a new rod fishery over and above the traditional fisheries which gave the figure here. And again, in the last five years, a dramatic collapse of stock to a little over a hundred fish last year. This year,

again, we have a catch of about 200 fish which is fairly close to the long term average for the river. Looking....within the population as well we've not got just changes in numbers with a steady downhill decline on the Test and the more recent decline on the Itchen, but if we actually look at when the fish were caught - I illustrate this for the river Test but the river Itchen figures absolutely match this as well - what we have here is the percentage in each year of the catch taken before the 1st July. It approximates the multi sea winter fish here and grilse here and we can see that there has been a steady shift in the population from multi sea winter fish to an almost exclusive grilse catch and, not surprisingly, coupled with this is the deterioration in the average weight of salmon from between 10 and 12 lbs and even up to 13 lbs in the early 1950s down to about 6 lbs today and last year.....and this year will be of the same order. Interestingly enough thanks to my colleagues in the Western Region, formerly Wessex Region, I can just illustrate the comparison with the River Frome, again we have the rod catch and the five year average and it's very noticeable that in the last five years we've got an equally steep drop in catch there. And similarly on the Avon almost the same picture as the River Test which strongly suggests that there are things outside the river playing an important part in the fishery. These declining catches gave rise to the need for us to know a lot more about the stocks of fish available. As I say catches depend on the stock available, the amount of effort that's put into catching them, as well as how many are actually reported. In the early 1980s we established some fish counters which very rapidly in fact proved to be effective and Adrian Fewings will be telling us the more recent history of fish counting on the rivers. We have been, the NRA have

been taking a lot of action generally to help and support salmon. We spend a lot of time and money on law enforcement. Mr. Humbert mentioned the fish stocking programme, but there's not much point putting fish in if we can't monitor their performance. How well do they survive, where are they caught, who is actually catching them? And all of this culminated in the early/mid 1980s when coded wire micro-tagging became available as a technique of monitoring fish and the Ministry of Agriculture became involved at that time in an international programme and we'll be hearing from Ian Russell later on as to their involvement with us. Alisdair Scott from MAFF has been working on our rivers for several years now and has come up with some quite alarming conclusions as to the survivability and spawning success of young salmon and again we'll be hearing from him later on. Yes, we the NRA, have a duty to maintain, develop and improve fisheries and Lawrence Talks, our Hampshire Area Fisheries Officer, will be detailing a lot of the work and the cost of the work that we've been involved with. And, of course, as Mr. Humbert rightly says, we the NRA, cannot act alone and we certainly acknowledge all the help and co-operation we've had from all out on the rivers, the owners, the river keepers, the Test and Itchen Fishing Associations, and I too would like to thank Mr. Alan Mann and the Wester Ross Salmon Company for the work that they've done rearing and stocking the rivers. I'll now hand over to Mick Lunn who will tell us about his own involvement in the restocking programme.

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Introduction

MICK LUNN

Test & Itchen Association



**Introduction:**

**Mick Lunn, Test & Itchen Association**

Good evening ladies and gentlemen. You've heard a Chairman and a Fisheries Officer and now you're about to hear a restorer, a re-stocker. The primary objective, of course, of our restocking is with a view to maximising the juvenile recruitment in this river, to get as many smolts as we can into the sea. We know little about their marine life and I suppose we will need the scientists to sort that out for us, but meanwhile I think the Test and Itchen and the NRA have taken the initiative and seem to be doing something about it. We've heard about the decline throughout the range in the salmon stocks, we will hear later I am sure about the problems in the river and the ocean, you will hear I am sure of things like afforestation, changes in land use, pollution, abstraction, siltation, commercial netting and so on, all the actions of man, most of them, and those of us who remember the good salmon times in the River Test and also remember the UDN that appeared in 1967 and 1968 and took a large toll, especially the early Spring stocks. Now you only need to have one quick look at me to see I've been around a bit, that I go back a long way. Fifty years of taking care of the Houghton Club Fishery in and around Stockbridge has given me a great feel for the river and there will be others here I know in this audience who have had that same sort of feel for the river and who have a wealth of experience because of their work on it. I have stocked the river with trout from the Houghton Club hatchery, mostly from Whitchurch to the sea I'd say, I've electric fished over a great deal of it, and it's given me....made me very familiar really with the geography and all the access points on this river. Whilst electric fishing I've been able to notice where the salmon redds are, where the concentrations of

power are and all these sorts of things, just to be a good observer, and as you'd expect most of them were found in the shallow waters, in the strong running deeper water perhaps and certainly in the lively carriers and the side streams. Now our plan was agreed that we would stock these young fish north of Kimbridge. Kimbridge to Tufton was the sort of line. We did in fact stray from that a little and put a certain number down the little river at Nurseling because we felt that that was a part of the river that had never been stocked with trout. Salmon did spawn in it and, after all, it was an experiment anyway. But generally speaking Kimbridge up was the way of things and that included, of course, the river Anton and the Anton is an extraordinary river. I remember electric fishing that some years ago when it was really first electric fished, it was full of grayling and lots and lots of trout but it also had a fine showing of salmon parr. Now there can't be too many fish that get up the Anton but there's something about the water that really does well. It produces fish. Wild trout in greater numbers than the Test and it seemed the same with the salmon parr. I think we decided to go above Kimbridge working on the principle that the higher up a river you go the better the natural regeneration can be. So the spread was going to be a large one and the spread over each individual site was always going to be large, because I think your biggest probably number one enemy with these small fish would be the common or garden Dabchick, the Little Grebe. We've seen when we've come back off a trip where he's found a little patch of them and he's already digging into a fine meal. But you get over that problem if you make the spread big, and so this is what we intended to do, and this is what we did. As the Chairman said, this is the third year, third major year, or third year

of major stocking, and so what do we do when we set off? Well, we take the breast high waders, there's nothing like being able to slosh your way down through the middle of a shallow rather than doing it from the bank. We take the watering cans, buckets, a tank with oxygen and we select an area. Now the sort of area we might select, and I have just written one here would be Long Parish, running down into Middleton, Gabbie Acre, Butchers Mead, Gilbolton, Gilbolton Common. That sort of thing and looking to take according to size some 30 - 50,000 fry with us on that delivery, and sometimes we have to go twice, make two trips because we can't take them all in one. You've got to think of the welfare of the fish, don't stress them up, get them in in the best possible condition. Now the tag fish that have been produced through the years, we make a separate special journey with those and they're usually put into a location whereby it's easy for NRA to monitor them and one thinks immediately of Sheepwood Shallow at Houghton where you've got a big, long, wide expanse of shallow, coupled above with Radnor Shallow, somewhere where they can get in and fairly simply pick up some of these chaps we've introduced and see how they've done. I'm going to give some thanks now too and I'm going to start with somebody who hadn't been mentioned before, Alan Mann and his staff, well done Alan, and your staff at Lower Brook, and not forgetting Robin Bradley up in Wester Ross, and I want to thank the keepers on our river who gave their services very willingly and in particular those that have been there most times was Bernard Aldridge and his stout young number one, John, Guy Robinson from the Leckford Estate, Brian Parker from Bosington and of course the NRA staff. And, I think, thanks also to the owners on the river. We've walked about all their



property and all their lakes of fishing doing this job and thanks again for allowing us to do that. And last but by no means least my dear old friend John Potter. God I wished he was here to see the sort of results that we're beginning to get. He would have been overjoyed because it was his early enthusiasm and his drive and his efforts that really got this thing off the floor. So 1993, this was the year we expected to see the return of our labours. It was the first major stocking year, something like 700,000 approximately of these little chaps had to go into the river and I think we've done our job well because we've sent a goodly number of smolts to the river and if I can just read from MAFF's report on river test smolting, I've just picked a bit out of a paragraph here and it does say "it does inevitably suggest that hatchery fish probably comprise the vast majority of the river test salmon smolt run in 1992". So, you know, it's great to feel that we're getting somewhere. I'm always a little bit worried about this smolt trapping, it's the handling I worry about and I am sure those of us who know about fish worry about it too, but I guess it's one of those things we've got to go through with - but be careful boys, handle them carefully! I know all of us know, I think we must admit that our efforts have not been in vain. Through the Summer I've talked to the keepers of the lower river where they've been catching fish and seen for myself some of the fish caught and I have noticed that quite a few of them have been showing short gills and the odd little crumpled pectoral fin which of course is proof of early hatchery life. We've had good reports very recently from, after the rains we've been having, thank God, of fish being seen all the way up the river and I myself was at Bosington a couple of days ago and above John Fary's weir there we could see four salmon sitting quietly and quite nicely

in the river, and there have been others seen I know at Leckford. We have seen a few at Stockbridge so there seems to be a good spread, well above Romsey, which is good. Now I am not pretending that nothing happens in the wild, but we did know that natural spawning in those low water years didn't seem to be very good. I mean, the river was very clear, we could walk around and I was looking for salmon spawning wherever I knew they would spawn and trying to find a redd or two so we could have a look to core freeze the eggs and it was a very, very difficult job to find any redds. However, the signs are encouraging. High seas netting Faroes, two years off, Greenland came off August '93 and with a minimum of five years, and there is serious discussion as we've heard in Ireland, so if we pull together, get the funding from NRA and the major salmon fisheries and others in the private sector and I am sure, we have in the future, in due course, we shall restore a satisfactory salmon fishery. I must just finish by telling you about the lady in Wherwall. Bernard and I had been stocking the Millstream there and we'd left the Landrover with our watering cans and when I came up and Bernard had gone somewhere, she said to me "I know the river's low, but is what you two are doing going to make that much difference?". I said "I hope so". Thank you very much.

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Spawning Success

ALISDAIR SCOTT

Ministry of Agriculture, Fisheries and Food

### **Spawning Success:**

**Alisdair Scott, Ministry of Agriculture, Fisheries and Food**

I intend to tell you about some of the work that I have been doing for the last seven years, largely on the Itchen, but the implications run not only for the Itchen, but for the Test, Avon and other Southern English rivers. We've been working on the population dynamics of juvenile Atlantic salmon in the river, in the Itchen, and some of the most glaring results we obtained were on survival at the very earliest stages of their life history. Those in which the eggs or salmon elvens are within the gravel of the river, and this line illustrates results of the first few years' work, survival rates of Atlantic salmon in the river Itchen at two sites, Shawford and Winchester. These are two of the two major spawning sites for Atlantic salmon on the river. You can see that we have five years' worth of data. The obvious features are the extremely low values. If I said that the hatchery conditions, or ideal conditions in the wild you may be seeing survival rates of Atlantic salmon in excess of 90%. You can see that the figures on this are all extremely low, particularly the zero at the Winchester site in 1990. As I have listened to the speakers earlier on in the evening I have questioned some of the things they have said to some extent. I may without totally contradicting have put some little caveats on what's been said. As regards the success this year, it must be noted that in 1991 on the Itchen certainly the survival rates were much higher than in the previous years. The fish that emerged in 1991 are this year's returning grilse. There may be some evidence that natural survival in that year has contributed significantly towards the improvement this year. I would want some more years before you say "hooray, everything is O.K." The other noteworthy point on this slide is that the Shawford site has always had

better survival than the site at Winchester, except in 1993, where for some strange reason it was a bit low. I say strange reason, I'll clarify that as I go on in the talk because some of the later work has given a slightly disappointing result for me, has implications for that survival rate. Now to illustrate what the implications of this low survival are for salmon in the river I have produced a sort of worst case scenario for subsequent survival and numbers of returning adults. I have also done the best possible case. I'll illustrate with a slide that shows you the survival under what I have called the best conditions possible. I'm working on an average of 6,000 eggs per female spawner. Alan Mann may contradict me on the exact numbers but it's close enough. Survival rates I've got are spawning to emergence which are the data I just put up before. My best year was 18.7% average for the two sites. My other studies look at the survival from emergence to smoltification which is when the juveniles leave the river. We have a survival rate there from my study sites in the Winchester College grounds of about 5%, that would be very high on a national basis, but that's about what we have in this particular site on the river. Smolt to adult survival, this, we don't have this data in any great detail yet, although Ian Russell will describe some of our efforts in reaching this data for the Test and Itchen. This data is from an Irish study and on the river Bush and is probably the highest recorded figure for smolt to adult survival, pre exploitation, so that's the best you're going to get. Exploitation rate of adults, 60%, it's about what we feel the exploitation is, both on the river and in high seas fisheries. If you then worked down the column which is just your reduction in numbers as you go along, you will see this final boxed figure is seven, and that says for every female spawning, in fact

every pair of fish that spawn, you can under the best conditions possible produce seven fish, and that would be a very healthy population. You're saying not only have you made your exploitation but you have seven fish for two. That's the best it gets. If you start working to some more realistic figures through the life history then things start to change. If, for example, I put the smolt to adult survival at 10% which would be a sort of rule of thumb figure that some biologists may put on for that particular phase of their life history, and then keeping our exploitation rate, because after all we want to keep exploitation of salmon on the rivers, we want salmon fisheries to exist, we don't want to remove that. Just by changing the smolt to adult survival to 10% we are down to only having two fish. Well that's O.K. Two fish for every two fish that spawn. You still have a self-sustaining population, so giving my realistic value, we have a population that's just sustaining itself. Now you may think that's not a problem, it's a self-sustaining population. If, however, we go to the worst conditions in which the major changes to the data are the spawning to emergence success of only 4%, 4% being the average for the four of the five years of the study, excluding the best year, then if you follow through the same pattern and the best marine survival we can give them before exploitation we have less than two fish being generated for every two that spawn. Clearly that population won't self-sustain. If you put the smolt to adult survival figures at around 10%, which I say would probably be our ball park figure, then you're finding that you may have only one fish for every four parents. Under those circumstances that salmon population is going extinct. So, the implications of the study were and still are that that population is in danger of extinction. Now early on in that data

gathering we put forward the hypotheses that low under gravel survival rates were caused by excessive levels of fine sediment within the spawning gravels, there was a siltation problem in the gravel and that because we generally know the water quality is O.K. in the river we did not think that water quality was going to be a problem. In order to test these hypotheses we actually have employed two techniques which could be considered enhancement techniques on their own and these are cleaning gravels by means of water pumps and in order to test your water quality problems we put incubators alongside the stream in which we put perfect gravels, put the eggs in the perfect gravels and see whether there is a water quality problem causing mortality. So using streamside incubators and water pumps, two enhancement techniques that actually for me attest the hypotheses that the sediment finds are a problem. In order to assess whether our gravel cleaning work actually cleaned the gravels the Ministry got the Institute of Freshwater Ecology to do some gravel coring for us to look at the gravel composition. This graph, don't worry about the letters, they don't really mean much, this shows you that the sediment particle sizes along the bottom are large particles to small particles. The red line is the condition of the gravels before we did any cleaning, these two lines, the second line, the green line shows you the conditions in the gravel immediately after we did the cleaning using water pumps and the blue line shows you the conditions in the gravel at the end of the first spawning season. As you can see there is a reduction in the number of fine sediments, those with particle sizes below 2mm, that is exactly the effect we wanted to have using the water pumps to clean the gravels. So the gravel cleaning works in terms of removing sediment fines. You will see on the

next slide, which just shows rather more messy data, that there are two additional lines here, the grey and pink lines that basically show a slight movement of the gravels back towards their original condition. In other words there is some re-infiltration of fine material, but for the second season we still have relatively clean gravels. So the gravel cleaning appears to work at removing the fine sediment. The question is does it work in terms of increasing fish survival? So, survival in the cleaned areas. In 1992 in the cleaned areas we had an average survival in, A and B are two different sites, one downstream from the other, we had a mean survival rate of 61% in our cleaned areas, as opposed to a 7.5% survival rate in our controls which were simply the uncleaned areas adjacent to the cleaned areas. So on the first year's data you see a wonderful....the technique works beautifully, clearly we can rehabilitate gravels. In 1993 of course, you get a slight problem. You will notice on the data that the absolute level of survival has gone down, it's also noticeable that the cleaned site survival is almost three times the survival in the control. There is still a clear difference between them. I mentioned earlier on there was an anomaly in the survival rates at the site Shawford this year, that it had low survival relative to other areas of the river than in previous years. I believe, although I have no real evidence for it, that these are probably artificially low, and that when we continue to do some monitoring on these sites, providing they remain as clean as possible, these data will actually return some way towards the survival rates here. I believe that's an anomaly specific to that site. To put the gravel cleaning into perspective, the streamside incubators we put in which were placed one in the site at Shawford just below site A and the other one actually in the



Winchester College grounds, gave survival rates of 85% and 91% so if you put your eggs into ideal conditions, just as we've said under hatchery conditions, you've got somewhere around 90% survival. So although the clean gravel worked the first year and maybe not so good the second year, there is certainly scope for improving survival rates within the river. So I shall have a short spot on it and conclusions, but the lowering level of survival rates which we have seen in four of the last five years could result in the extinction of the Itchen salmon population. Our Chairman said he thought the danger of extinction had gone. I don't think the danger of extinction has gone unless something does....unless someone actually takes some action to prevent it. My work has shown that rehabilitation of spawning gravels is feasible but clearly because of the reduction in the survival rate between the two years we need to continue doing some research and that the streamside incubators may be actually a cost effective short term solution to the problem in that they are a relatively inexpensive system of running a salmon hatchery. When talking about salmon hatcheries, clearly we've heard a lot about the restocking programme. It could be that such restocking programmes are required to maintain populations like the river Itchen salmon population until something is done about the habitat, but I would suggest that it is most important to do something about rehabilitating the habitat and not rely on simply replacing fish from hatcheries practice over the long term. I'd like to stop there. Thank you.

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## Questions

Arthur Humbert:

Thank you very much, we have now time for some questions.

Q. Chris Pearson, I have a question for Alisdair. To what, to what do you attribute the reason for the good spawning success in 1991, the good hatching success?

A. It's difficult to say. We haven't done enough environmental monitoring to say with certainty what the differences between 1991 and the other years were, but from my observations on the river I would suggest that we'd had fairly stable flows during the egg incubation period and actually quite low flows in the river, but very stable, and I believe there was probably less redistribution of silt within the spawning sites than there would normally be in the river. It's largely speculation but it's all I can offer.

Q. Robin. Alisdair, in 1991 we took quite a few of the fry from Kielder and put them in the Itchen - do you remember? You took them across, where did you put them?

A.1 Yes. We distributed most..... we put about 30,000 fry into the river Itchen. They were distributed basically in the Eastleigh area, around Winchester and I don't think we actually placed any in the Shawford area but these fish wouldn't have shown in Alisdair's survival work.

A.2 My survival estimates are.....

Q. They might have shown in the run coming in this year?

A. Yes, that's quite true.

Q. David Browse. Are there any efforts being made to buy off the nets on the Itchen?

A. I'll field that one, David. We've made substantial efforts over recent years to buy out the Wood Mill net. Each time we've been very close to being able to do it and then the deal has fallen through at the very last moment. It's a subject which is very close to the top of my mind though and we will endeavour to do such.

Q. Ian Ashby, Lower Itchen Fishery. One thing I don't quite understand is that you said that when you clean the gravel you had a much improved state, and yet you did say that you didn't think that the river conditions warranted cleaning because you thought the water conditions and quantity were sufficient to keep them clean? That seemed contradictory.

A. No. Sorry I didn't say that the water quantity was adequate to keep the gravels clean. I said that the water quality in terms of parameters like oxygen would be considered adequate for salmonid survival. I wasn't suggesting that the river was flushing the gravels, quite the opposite. I would suggest that the river doesn't flush its gravels, which is why there's such a problem with sediment load within the gravel.

Q. This is the main root of the problem would you say?

A. Well, we don't know....I don't know enough about the dynamics of sediment in streams to say that it's the lack of water that causes it. Certainly once you start getting sedimentation into spawning beds then the process is self-accelerating so it may get to a stage where even if you increase the flow down the river dramatically you would no longer be able

to clean the riverbed and I suggest that is the case in the, certainly in the Itchen at the moment, that unless some mechanical means is found to remove some of the fine sediments then you will not flush them out naturally.

Q. Bernard Aldridge, Broadlands. Like Mick, I've been about a bit, between myself and my predecessor we're looking at something like ninety years on the Broadlands section of the Test which, up until about the seventies, was primarily salmon fishing. We never, ever had to clean gravel. Can I ask what is so new and the source of this very fine talcum powder like sediment? Because we used to rear all our own trout in river water, we can no longer do that because the eggs get smothered. If this is happening to the salmon in nature there's very little hope for them.

A. I cannot answer anything on sediment sources within the river. I have a few pet theories as to probably the likely timescale over which it's happened. I suspect there's been a significant change since the last war, purely because of the increase in agriculture in the valleys, but again it's speculation. We've done no work on sediment sources. We have actually considered the possibility of carrying out sediment sourcing work on the catchment but it is at a very early stage.

Q. Alisdair, just one thing - Michael Didley, Head Keeper Fishing Club. I've worked alongside Alisdair Scott with this salmon business, of raking, gravel raking, with various things and for those of you here this evening who've never actually seen it or watched it I can assure you it's very, very successful. The business with using a machine on my particular

patch has worked very, very well indeed and I would like to also add at this moment in time the NRA are trying their very best to do what they can for us and I think Alisdair Scott, especially, is working very hard to try and establish something amongst ourselves and I think we'd all do very well to listen to him because he certainly knows what he's talking about. Thank you.

Q. David Stewart. It seems to me that a simple solution if it could be found would be to decrease sediment input. Can that be done in any way?

A. Certainly it would be interesting to see what sediment supply is prevalent. There have been talks about looking at the sediment dynamics of the river as a whole. One of the problems on the sites I have looked at on the Itchen, now it's difficult to say how representative they are to whole Itchen, is that the sediment that's there is already a problem. Any more coming in, clearly, is going to exacerbate the problem but we need to do something about the material that is there, as well as actually identifying potential sources of more.

Chairman: We have one of England's experts sitting in the front row, Mike Beard will probably be able to answer that question.

A. Well, you're very kind, Chairman, I think...

Chairman: I'm truthful as well!

A. I don't want to preclude what's going to be said later on. We have done an enormous amount of work on attempting to find out the source of sediment, particularly in the Test catchment, and actually looking at it's nature to try and pick up where it comes from. It isn't very easy. It does

look as if the great majority of it is probably from agricultural land use changes over the of years. The one thing that did surprise us was that there were no coal ridge fractions in the river which we thought were the reason for the colouring in the river and would have possibly promoted the very small fines which are causing the problem, but as we go on we shall eventually eliminate all loose sediment from the river. Already we have begun to introduce consents for the cress farms which put in a small amount, but of very fine gravels. Those consents will be in operation almost immediately and there will be a reduction in sediment coming in from the side streams certainly. There is no doubt that that alone won't do the job. It's probably changing agriculture and buffer strips in the long term that will probably do the job, but there 's a lot of R & D being done at the moment and I won't say any more because I believe that Mr. Talks is going to go on about it.

- Q. My name is Alf Skilbert, thank you. Robin Crawshaw showed us a chart that showed us that 90% of the fish population in the 1950s was caught for July, and that is now down to about 5%. There has been a lot of talk in the Trout & Salmon magazine and various other sources suggesting that the Spring, Springers, are a different genetic strain of fish to those that come in in the Summer. The question I want to ask is are you monitoring, or sorry, to what extent are the eggs that are going up to Wester Ross coming from Spring fish, as opposed to, let's say, late Summer fish?

Chairman: That is a very reasonable and very good question. Who's going to.....

- A. I think that's directed at me. Regrettably comparatively few of those

eggs have been from multi-sea, winter fish. Obviously we are taking the eggs from fish from the river initially, to overcome the bottlenecks, or try and overcome the bottleneck that Alisdair's described and of course it depends very much on the fish that we can actually catch. How much of, how much of the multi-sea winter versus grilse is actually genetically determined and how much is environmental, we're really not terribly sure. I have discussed this at some length with Alan Mann who's got a great deal of experience from within the salmon farming industry and it does seem to be a bit of both, some of it is genetic, some of it is environmental.

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What is the NRA doing?

LAWRENCE TALKS

Hampshire Area Fisheries Officer  
NRA Southern Region



**What is the NRA doing?**

**Lawrence Talks, Hampshire Area Fisheries Officer, NRA Southern Region**

The title of my part of this Seminar is "What is the NRA doing?" The NRA is committed to the cause of preserving and enhancing the future of salmon in the Hampshire chalk streams. In practical terms this commitment can be illustrated under a number of headings. Following on from Alisdair's work the NRA has been heavily involved in salmon habitat improvement which, in recent years, has been focused on gravel cleaning. From MAFF's research at Shawford on the river Itchen the NRA has, too, developed a gravel cleaning programme to improve the salmon spawning conditions on both the rivers Test and Itchen. Last year five methods of gravel cleaning were trialled. This is the more traditional technique of the horse and harrow being used at Yavington on the Upper Itchen. On Mick Didlick's water on the Lower Itchen we used the less traditional method, which as Mick has already said, has improved the spawning considerably. The third technique we chose is the back breaking fork. It is quite a killer to do....a considerable amount of cleaning with a fork, but it was a simple method which keepers might already use themselves. This is an example of the gravel we are coming up against. This is a lump of gravel from Shawford on the Itchen. The fourth technique we used was using the Landrover with a winch and harrow. The people standing in the river are weighting the harrow down so that the tines of the harrow really rip through the gravel and flush out the sediment. This was done from the bank and also within the river. You'll be pleased to hear that we actually managed to get that Landrover out of the river at the end of the day! Our fifth technique was the use of water jets. We trialled three types of pumps, a Honda 2" pump, a larger 3" Cellwood pump and a high pressure pump. Of the

five methods of gravel cleaning water jetting is the preferred method. This year two new water pumps have been bought which are now available for keepers and clubs to undertake their own water jetting. Here's the keeper at Marterworthy, Ron Holloway, using our Honda 2" pump, so if anybody would like to experiment with these pumps could they contact me after this Seminar. We've had a few takers already but we are very keen to spread the use of water jets on both the rivers Test and Itchen. Since 1989 £23,000 has been spent by the NRA on salmon habitat improvement work. Following on from tackling the gravels we have built some fish passes to promote the migration of salmon sea trout up river. Since the formation of the NRA in 1989 ten fish passes have been built, two fish passes have been built on the river Meon. This is, sort of, well not quite bird's eye, but looking down one of the fish passes, the fish pass at Gaters Mill. This year the NRA are planning to build a new fish pass at Allbrook on the Itchen navigation which, at present, presents a very drastic obstacle to the migration of salmon up river. This single fish pass cost £20,000, which limits the number of fish passes we can build in any one year. Salmon rearing and stocking, as has been referred to by Mick Lunn, and Alisdair and Robin, the NRA has been heavily involved in the stocking of juvenile salmon in the Test and the Itchen. Since 1989 a total of 1.5 million juvenile salmon have been stocked into the rivers. This has been at a cost....it has cost the NRA £100,000. This is the NRA fish transporter used for stocking juvenile salmon into both the Test and the Itchen. From stocking and rearing salmon we move on to salmon and sea trout anti-poaching. Protection of salmon and sea trout stocks is an important element of the NRA's activities. Off the Hampshire coast and in the river estuaries covert boat patrols keep a

check on illegal salmon netting. Up river a tip off might prompt an operation to stake out an area in anticipation of a poacher trying to snatch or foul hook a salmon. For your news, for your interest, we caught two snatchers on the Itchen yesterday, so they are about and do have quite an impact on the salmon stocks returning. We seized a bicycle which we were quite pleased about! To aid us in our anti-poaching operations we use sophisticated image intensifiers which give us night vision for night time surveillance. This is what somebody might appear as through an image intensifier, it's blurred, but it's enough for evidence gathering when it comes to trying to prosecute a poacher. In a new initiative to try to reduce the market for illegally caught salmon and sea trout this year, "buyer beware" leaflets have been distributed to fishmongers, pubs and hotels, warning them of the legal implications of buying illegally caught salmon or sea trout. At the conference room, at the conference entrance there are "buyer beware" leaflets, which some of you may already have picked up, which illustrate what we are trying to do. Since 1989 the NRA has spent £330,000 on anti-poaching operations. Planning and development control. Many here will be aware of the rivers Test and Itchen catchment management plans. These are important planning documents in which the enhancement of the salmon population is a major concern. In the previous three years Hampshire, like much of the South of England, has suffered from a lack of rainfall, although you wouldn't have guessed it in the last week. The pressure on our limited water resource has been, and is acute. The NRA Fisheries Section reviews all applications for further water abstractions. The NRA Fisheries Section also reviews all applications for water quality discharge consent. It comments on

planning applications and oversees fish movements and the use of instruments other than a rod and line. This Fisheries input ensures that Fisheries has an input into the planning process, maintaining and improving the quality of the Hampshire salmon rivers. Since 1989 Hampshire Fisheries have contributed £40,000 to planning and development control. Salmon scientific investigations. Since 1989 the NRA has initiated some important pieces of scientific research. The Hampshire Salmon Investigation, which will be discussed later, has significantly increased our knowledge of the passage of salmon up the rivers Test and Itchen. You will hear about that later, this has cost the NRA £200,000. Another part of scientific research has been an extensive series of population studies, fish population studies on the Hampshire rivers. These have provided valuable information on fisheries ecology, vital for the decision making process. This process, this programme has cost the NRA since 1989 £100,000. Here's the NRA Fisheries Survey team, surveying the Anton, a tributary of the river Test. Since 1991 an in depth study has been carried out on sediment transport in the river Test, as referred to by Mike Beard. This is one of the sediment samplers used in that programme, as a direct result of this research the NRA can now recommend to riparian owners the ideal channel characteristics which will enable their stretch of the river to become self-cleansing of sediment. This project has cost the NRA £30,000. The NRA, since 1989, has invested over £800,000 into the salmon of the rivers Test and Itchen. Clearly, ladies and gentlemen, the NRA are working hard to promote the future of salmon in the Hampshire chalk streams.

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## Questions

- Q. I have nothing but praise for the efforts of the NRA to improve the salmon stocks on the Itchen and the Test, and in particular the Itchen. There has been great improvement this year, in fact my percentage increased higher than double, but to get on to my point, Dr. Owen mentioned buying out nets on the Itchen which I found most interesting because it occurs to me that the Rivers Authority are spending a great deal of money to improve the stocks of the river, and the stocks of the river being destroyed at Wood Mill. Now, if you look at the last slide on the screen just now, the amount of money it's spent is a great deal and I wonder just how much it would save if the fish that were taken out of the Itchen try and get up to spawn at Wood Mill, if that was got rid of, just what would be the saving? Referring to the chart earlier on it appeared that about 12 to 1 salmon were netted at Wood Mill as to the rod catch and I think, obviously, you are seeking into this, but I think it could be looked at more seriously if the improvements this year are going to continue.

Chairman: Thank you. Dr. Owen, would you.....

- A. Yes, several points raised there, obviously the figures, particularly the graph put up by Robin Crawshaw, with the net component of the catch on the Itchen and the total catch of over 50%, every fish that runs up the Itchen taken with rod and at net is of great concern to us. As I say, we have made repeated attempts to buy out the Wood Mill net, but it is a commercial fishery as such, and the historical side of the Wood Mill net

is that it pre-dates Magna Carta, the legal side of it is very detailed and very complicated and we have spent enormous efforts trying to do it, but there is two sides to this. The owner of the Wood Mill is a businessman and obviously he is not liable to sell unless he feels that the market is right. We will endeavour to try and purchase the net but it involves money.

Q. Would you have the legal powers to restrict the number of salmon that are netted?

A. Yes, we do have legal powers, yes.

Q. You can't allow anybody to destroy the stock?

A. No. There's something....again, I'm playing myself in, being a new boy to the County, but it is something I'm acutely aware of, but it's a legally, technically, very difficult subject.

Q. Chairman: Dr. Owen, would you like to comment on the possibility, as the owner is a commercial person, you say, of buying the fish live from him, which would be quite reasonable, within the kind of money scale we've been looking at just now, and releasing them upstream of the netting station. That would seem to solve all sorts of problems.

Audience (general response): excellent idea, thought they did that already....

Q. Are they doing it already?

A.1 We actually.....if Robin would like to field that one, he'll give you more detail.

A.2 Yes, in fact, in the last.....as we'll hear from Adrian Fewings fairly soon, over the last three years where we've been.....with part of our radio

tracking programme, we have been purchasing, initially three years ago we purchased live fish from the net, in the last two years no fish have been killed at Wood Mill by the net. I can categorically state that. We have actually purchased the netting right on an annual basis, but purely for scientific purposes. It is on a year on year agreement at this stage though. But in the last two years no fish have been killed.

Q. Dr. Potter, the Test. Is it correct that the Test with it's bigger catchment, bigger number of fish. Have we had a proportionate input into the gravel raking or is this, as the pictures show, mainly attributed to the Itchen and is this something to do with the increased survival that Dr. Scott has shown in his graph of 1991? Any tie up at all?

A. The gravel cleaning programme, last year, was aimed at looking at different techniques of gravel cleaning, because before we had used a Himack, MAFF had used a water jet, but there hadn't really been much look at different techniques, so last year was more of a study, rather than a broad scale effort at cleaning extensive areas of gravel. Now this is what we want to try to begin with this year, and in future years. Now we feel that as an honorary section with only four bailiffs, it's very difficult to cover the whole Test and Itchen, which you'll appreciate. So we're trying to develop, as I illustrated, our more of a self help idea, with us actually purchasing the capital equipment, the water pumps, having already gained the experience, and then loaning that out to interested parties, be it keepers, river owners and so on, so this year we're open to requests from both rivers and we'll try to do as much as we can.

Q. Yes, sir. Of the £330,000 actually spent on anti-poaching, how many successful prosecutions did you manage to occur, or take? On your chart there, you spent £330,000 on anti-poaching patrols.

A. That was since 1989.

Q. Yes, well, could you tell me how many successful prosecutions we've had, if any, because it's a great deal of money when Mr. Mann's restocking programme is only costing £100,00 and we're spending over £300,000 on catching poachers, and probably not very successfully because they....every time I walk up and down either the river Itchen or the Test I can always see a poacher. I have never yet fished on the river and not seen a poacher, so it's obvious we're not stopping the poaching, but if we spent the money instead on the stocking maybe we'd have more fish to fish for.

A.1 Now, in terms of numbers, I couldn't.....I can't pluck out a figure since 1989, the total number, but what I can say is that if we don't have a presence on the bank, numbers of poachers catching salmon would be vastly increased. This year we are looking at further techniques to improve our efficiency, one of which is remote video cameras for both night time and day time surveillance. I mean half the problem, as I am sure many of the keepers are aware, that poachers can be there 24 hours a day, many of them unemployed, we can't..... We do deter them and we do catch poachers, as illustrated yesterday, but poaching won't go away but we're trying to clamp down on it.

A.2 I can add a little bit to that. Since 1989 we've had nine successful



prosecutions. These range from estuary netting to snatching. But I was very interested to hear your comments about always seeing poachers when you go fishing. It is important that we can all help ourselves here, particularly by reporting any incidents as they occur. We do rely...we must rely inevitably on intelligence and anyone here can help us by passing information on.

- A.3 Chairman, before we leave here, may I with your indulgence just point out that that, of course, does not include the number of prosecutions that we have for licence evasion, which is a very much larger number. I don't personally know because I've only just come here but I'm sure Robin can give you a feel for that number.

Chairman: Yes, I think the question was poaching convictions.

Audience (general comment):

Indeed but it's a form of poaching. The licence will go up to £75 so the number of prosecutions is going to increase because people will not necessarily pay the £75. I was fishing somewhere the other day and some welsh boy said there was no way they'll pay £75 to anybody for a fishing licence, so they'll fish in threes and throw the river keeper over the bank and then the other two will fish. I mean that, if the cost goes up to a point at which fishermen don't pay, you're going to get more prosecutions.....

Chairman: I sympathise with you entirely, sir, about paying for a rod licence, we're not here to discuss that tonight.

Migrating to Sea

IAN RUSSELL

Ministry of Agriculture, Fisheries and Food

## **Migrating to Sea**

**Ian Russell, Ministry of Agriculture, Fisheries and Food**

Thank you very much Mr. Chairman, ladies and gentlemen. I'd like to talk to you tonight about migrating to sea. Now basically I want to split that talk into three, looking firstly and very briefly at a review of the results that have been derived from a national micro-tagging programme and clearly with the emphasis very much on the Test and Itchen. I then want to look at some of the problems that we have had in running that programme over the last seven or eight years, and will then deal specifically with how we've addressed some of those problems over the last two or three years, and finally I'd to give some very provisional results that have been derived from the micro-tagging programme with reference to the stocking programme that you've heard so much about already this evening. Now I'm sure most of you will be familiar with micro-tagging, in case there's anyone out there who hasn't yet seen one, these are microtags on the head of a match, they are extremely small, they are stainless steel, binary coded tags, measuring....the one we commonly use is the one in the middle, about 1mm long, and we have also used this half length tag, the very small one here on some of the very small fish that have been introduced in recent years. The tags are implanted into the nose.....in the cartilage into the nose of the salmon, it's a very quick and efficient process and has really revolutionised the way that we've been able to approach quantitative stock assessment of salmon in recent years. At the same time that the fish are tagged we remove the outer post fin to make them visibly detectable later on. Right, the objectives of the programme, now this is very much a national objective that we sort of came up with about, well in the early eighties really, when there were very grave concerns about the

impact that high seas fisheries might be having on stocks throughout England and Wales. The primary objective at the time was to identify the stocks around England and Wales that were being exploited at the Faroes and West Greenland, and as other North Atlantic salmon producing countries were adopting micro-tagging programmes at about the same time it clearly gave the opportunity to assess the impact that other intercepting fisheries might be having as well, and in that we include Ireland and Northern Ireland and so on. The other objectives at the time were that it was going to enable us to estimate relative levels of exploitation, how many, you know, tagged fish that we get back from a variety of fisheries and how they would relate to one another and we'd also hope be able to describe some of the temporal and spacial patterns of exploitation on stocks from different regions. We started micro-tagging down here in 1985, the first releases, or the first smolts that went out bearing microtags were in 1986 on the river Itchen, we've increased in recent years through the late eighties and into the early nineties between ten and twenty thousand or thereabouts, in most years these were all hatchery fish. More recently we have made some more concerted efforts to get some more fish out into both systems with some wild tagging, which I will tell you a little bit more about later on, but also to try to monitor the big introductions that have gone on in recent years. A quick look at the results. Now these are the pooled results for the period up to 1982, tag recoveries up to 1982. I should just put in a very quick word here, to say that not only do we look at the tag recoveries but by using detailed scanning programmes at each of the fisheries in which we are interested, we are able to derive what we call raising factors which enables us

to scale up the numbers of tags we've got to the overall catch taken in those countries and the figures that I give here, and the numbers of tags and the different fisheries represent scaled up tag recoveries in the various fisheries. Now you can see very quickly, and we are talking over the period here about 83,000 fish, tagged fish, have gone out. If you look at the bottom line first overall only ten recoveries from multi sea winter fish. This is scaled up recoveries too. For grilse we see a much larger number of tags, particularly from the Irish fisheries here, and also from home waters, and with broadly similar numbers in those too. What will be apparent as well is that virtually no tags have been recovered from the high seas fisheries in Ireland and West Greenland...sorry, in Faroes and West Greenland. We've also been able to look quickly at some of the temporal variations that occurred year on year, these are the recapture rates per thousand fish tag, per thousand fish tagged for batches that have been released in the Test and Itchen since 1986, and you can see that early on we got some relatively high recapture rates. These have decreased though through the period '88, '89 and '90, possible improvement in 1991. Now I think there are possibly a number of reasons for the reduction in these years here, partly obviously we're looking at different batches of fish, so clearly there can be differences there, there can be year effects, but there are a couple of other things, other factors which are obviously important as well in that we've had a number of low catch years on the Test and Itchen associated with low flows and fish derived from the year classes '89, '90 and '91, so clearly we wouldn't have expected so many tags back in home waters in those years. In addition, throughout the North Atlantic, there have been concerns expressed

about the marine survival of smolts from the 1989 and 1990 year classes, so a number of factors have probably contributed to these figures, slightly disappointing figures in the more recent years. Very quickly then, if we look at the initial conclusions that....I mean, this is really the position we were at just over two years ago when some of you may have heard the talk I gave then, this is really where we were then, so this is really bringing you up to date on where we were possibly a couple of years ago. The tag catches are predominantly from grilse, the Faroes and West Greenland fisheries are having negligible impact, not least because they are exploiting predominantly multi sea winter fish. We are getting substantial numbers of recaptures in home waters, sorry in Irish fisheries, similar to home waters and we've got this high temporal variability from year to year with strong year effects for reasons I've already, sort of, expanded on. Now there are a number of limitations with those initial conclusions and I've separated them into three, and I want to sort of give you some more details about how we've addressed each of those limitations and expand on what we've done over the last two or three years to try and improve upon these problems that we've perceived. The first limitation, I said that we were only getting relative levels of exploitation, how do we scale up the numbers of tags that we've got to the size of the stocks overall, and in order to move on from the relative levels of exploitation that we were getting to get absolute levels of exploitation you need to measure some other things, some other pieces of the jigsaw required and you need information on the stock size and the proportion of the stock that is tagged. Now a lot of that information can be derived from counters and I won't waste any more time because clearly that is something that

Adrian will be telling you about later on. But also catch scanning by anglers and riparian interests, and everybody else involved in management is important as well. I will talk later on about the fact that recapture rates have been disappointing in most years for the hatchery fish that were put in and how we've tried to address that by getting some smolt traps out and to tag some wild fish as well, and also we've got this....or have had this problem.... we've actually, deriving raising factors for the home water fisheries and being sure that we're getting accurate tag recovery data for all the home water rod fisheries. So those are the three main areas that I'd now like to expand on a little bit more.

To deal firstly, then, with how do we get absolute levels of exploitation, and before I go any further, in case there's anybody again who isn't quite clear what we're talking about here, we're talking about the extant exploitation rate. Now to expand on that what we're talking about here is actually the proportion of fish from any particular stock which are caught in a fishery relative to the actual size of that stock in the sea at the time that the fishery is operating. Now we need to measure this thing called the total extant stock, now that is really quite a difficult thing to measure and this is where we had to resort to modelling. Now I don't propose to go into a great deal of detail on the modelling, it's something which the North Atlantic salmon....high seas North Atlantic Salmon Working Group have gone into great details on in recent years and if there's anybody who wants to pursue the matter in greater detail over coffee later on my colleague, Ted Potter, is here, he's a member of the working group, I'm sure he would be happy to provide you with a few additional details later on. However, I will give you a sort of simplistic, sort of bash at trying to describe

what is going on. Now what we've got here is a sort of simulated model of a stock of Atlantic salmon. The width of the arrows is designed to give a feel for the numbers of fish that we are talking about, and it's going from the smolt stage up here when the fish leave the rivers and go into the sea, down to returns down here in home waters. Now what we're interested in is the distant water fisheries here, or it could be the central fisheries in Ireland that are exploiting various components of the stock and we need to try and get an estimate of how many fish are in the sea at that time. Now this is clearly very difficult and there are really two ways of having a stab at this, one way is to get an estimate of the number of smolts that are leaving the river which is quite a big if to begin with, and then to extrapolate down here to get an idea of the number that are surviving in the fishery areas at the time the fisheries are operating. Now that's quite difficult and requires estimating the mortality component in this area which is known to be highly variable from year to year and a very difficult sort of area to get into altogether. The other drawback with going forward from the numbers of smolts leaving the river is that we have an unknown proportion of the stock which returns at this point here, the one sea winter fish that come back to home waters, that are making their move back to home waters before these distant water fisheries are operating and so you also need to estimate the proportion here of the stock that is deciding to return as one sea winter fish as well. So you've got a number of....well two principle problems in estimating the abundance of fish in the fishery areas using this sort of forward running method. The alternative technique that the working group have moved towards is what's called a run reconstruction model which goes from these values here, estimates



of the numbers of spawning fish returning to the rivers, and working back from these, back up the life cycle if you like, to get estimates in the....of the abundance in the distant water fishery areas. Now this still involves making some assumptions about the mortality at sea, but the mortality at sea over this period is believed to be fairly constant, fairly stable, and we feel we can make a reasonable stab at estimating that. So this, as I say, is a very simplistic description of how we have tried to model Atlantic salmon stocks throughout the North Atlantic over recent years, throughout the last couple of years, and I would say that while there are probably six or seven major indicator rivers throughout the North Atlantic, we don't as yet have any in England and Wales, but we are probably closest to achieving that objective on the river Test, with the counter developments and the tagging programme and other things. If I just move on, I'll give you some....a sort of feel for the sort of results that we can get. Now I think 1993 will probably be the first year that we actually derive the information, when all the tag recaptures are back, when the catch information is in, when the counter information is in, when we can actually start to run this model for the first time for test stocks. If we make some assumptions, however, we can have a sort of tentative stab at deriving absolute levels of exploitation for Test and Itchen salmon, based on the tag recapture data that we've got so far. Now I've high-lighted one area here, and these are assumed rod exploitation rates, so instead of using known numbers of spawners returning which would normally be the piece of the jigsaw that we'd need to run the model, we've used the proportion....I'm sorry, the exploitation rate within the river to drive the model. Now I won't go into any more detail than that, suffice it to say that

these figures are the ones that we've put in, which are the assumed values, the rest of the figures are the ones that have come out. Now what stands out clearly is that we have this exploitation in Ireland that, on the figures that we've got to date, is probably between 20% - 25% of the available fish in the sea, 20% or 25%, that's high, that is based on two fish. It is a very small number of tag recaptures and clearly, with only ten tags altogether, the confidence limit on the whole two sea winter bit are very wide and tenuous so I wouldn't hold too much weight on that and clearly, with the faroes fishery not there any more anyway, it was not a problem. Two other things of interest, though, which have emerged or which are derived from the model, one, we have this estimate of the proportion of one sea winter salmon maturing to return, which for testing year stocks appears to be over 90% and we've also got an estimate here of the survival from tagging to one sea winter in the sea which comes out at 1%, relatively low, it's been a little bit disappointing. Right, just moving on then, that's given us very much just a feel for the sort of data that we hope now to be able to generate on an annual basis, a year by year basis. I mentioned that we've had some problems with fairly low recapture rates for batches of hatchery origin fish and over the last couple of years we have made some efforts to try and address this by getting some smolt traps in the river, and many of you will have seen them. One of the ones we've put in is on the Test, that is adjacent to Romsey Trout Farm, we've taken out this upstream fish pass here, an elite, for a couple of months, April and May, or sort of March, April and May, and we've put in a trap here just on the weir. I've also got a couple of slides, just to show how this thing operates. It's an inclined slatted screen on the weir, effectively

just the water goes through the slats and the fish don't, they slide down the bottom into a tank, and just to show you that we do sometimes get our hands dirty here, and this is a shot of the actual looking downstream of the trap in operation. This has been a fairly successful trap but it only takes a relatively small proportion of the flow on that particular carrier and we've been able to take probably about a thousand fish there over the two years that we've been operating it so far. We've also put in another trap, this is Nursling Mill, I am sure this is familiar to most of you, you'll be familiar with the sluices down at Nursling Mill, and we have modified eel racks to enable us to catch smolts by putting in some shallow plywood troughs at this end and replacing the area where the eels are normally caught with some similar hardwood slats that, again, enable us just to sieve the water and catch smolts, and this has been the more effective of the traps. Clearly there is a much bigger flow of water going through here, we tagged over two thousand, about two thousand two hundred in 1992 and a rather smaller number, with problems of high flows, in 1993. This, we hope, is going to give us a lot more fish into the river and help with estimates of exploitation rates that I've talked about. The third sort of slight uncertainty that I mentioned was the problem of getting reliable tag recovery information for the home water rod fisheries and this is just by way of saying that we have made efforts and made you aware that we have been in contact to get reliable catch records and to ensure that we are getting good reporting of tags, scale sampling, in order to be able to run the model for both grilse and multi sea winter salmon and so this is just a plea, reiterating what other people have said earlier on, we're all on the same side. We need your co-operation on this issue

as well, getting reliable data back. It is essential. Right, the final bit of my talk is evaluation of stocking programmes. It's one of the major advantages of coded wire micro-tagging, apart from what I've said about it being revolutionary tool in terms of our ability to do stock assessment programmes, it's also an extremely valuable tool in evaluation of stocking programmes, and I've just got some very tentative data which I'd like to give you for some of the first recaptures back from the big introductions that we've heard about already. Now this, I hope, is a simplification of what went on with regard to the 1992 smolt run, you probably saw the arrows and whatever else. There are a number of contributions made to that 1992 smolt run here, we had an unknown number of wild parr clearly, natural production in the river, very difficult to get your hands on that - we don't know what it was. We have heard about, already, this very large introduction that was made, I believe, in three consignments of around about 730,000 small nought plus parr that went in in June and July of 1991. We tagged, then, a proportion of these.....I should stress at this point that these were the largest of the nought plus parr that went in, so we've probably done.....actually done rather better than these and they were also tagged a month too late so they've benefitted from an additional bit of feeding in the hatchery. We tagged a proportion of these with the half length tags that I showed you at the beginning, and these were released in August of 1991. We also tagged the following February another 18,000 one plus parr derived from the same overall consignment, but these, by now had come up to approaching smolt size, they were reasonably.....quite big fish. Now, so all these things, sort of, contributed to the 1992 smolt run. I've described that we built these traps in 1992 and we

also ran those in 1992 for the first time, and when we ran those traps this.....these two batches here together..... excuse me, were caught in the smolt traps, and at that time comprised about 9% of the fish that we were catching in the trap and on the basis of that I deduced that, probably not unreasonably I thought, that these nought plus parr were probably making a very big contribution to the smolt run overall and Mick Lunn has already read out a few words that I wrote when I made a report to the NRA, suggesting that, indeed, a large proportion of the run was probably derived from hatchery fish. The final tag batch that went out in 1992 were some fish that we tagged at Nursling and at Romsey and around about 2,200 smolts were tagged. Now clearly these would have been a mixture of probably wild and hatchery fish. Now I'm moving on to the results stage and I hate be the bearer of potentially, sort of, bad news but I would have to say that the results that we have done - these are very, very tentative, provisional results, we've haven't had all of the tag recoveries back, and we've only had very small numbers so far - but these are the numbers of tags that have been decoded from those three batches which I showed you a moment ago. From the 18,000 nought plus parr so far, in the Test and Itchen, we've had one tag. From the 18,000 one plus parr we've so far had one tag. From the 2,200 smolts, we've had 12. Now, if you adjust the figures here to take account of the numbers that have been tagged, this gives us recapture rate figures here, which are very low for these..... for these parr, and round about a hundred times higher for the smolts. Now that might not be surprising if you think that these little nought plus parr were very small, but clearly it does represent a very disappointing result for these one plus parr which were close to being smolts

themselves, and, you know, I say these are very much provisional results and I should also stress that these only represent the grilse recaptures, but they give us, I think, some food for thought and I think they do lead us to the, perhaps unpopular conclusion in my mind so far anyway, the tentative conclusion, that we shall see very few recaptures. I mean there is.....there is that caveat, but I would have to conclude that on the evidence, the limited evidence that we've got so far that the contribution of stock fish to the 1993 catch has been fairly small. So to wind up, I've sort of itemised the programme for, sort of, the next two years really, if the thought that we might be having another, you know, sort of, another session like this in two years time, we clearly can't make a hard nose decision, you know, hard and fast decisions based on the tag recovery information we've had thus far. We do need to look at the two sea winter recaptures next year, perhaps all those hatchery fish are out there waiting to come back as multi sea winter salmon and we'd all be very delighted about that if that was the case. Clearly it's important that we continue monitoring, it's essential with any stocking programme in my mind that we evaluate it fully and properly and therefore we must continue with the micro-tagging programme and obviously as we get more tag recoveries our confidence in the very tentative observations and conclusions I've made so far will increase. And finally, I think we would all need to sit round and, in the light of what we find, review what the stocking strategy should be in the light of the results that we get in future years.

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## Questions

Q. I don't think the fish like your tags!

A. Well, that's your opinion. We certainly have tagged fish all over the country. In many instances they've been held in hatcheries for many months after tagging, with no detrimental effects. It's a standard technique which is used for evaluating and monitoring and managing salmon in the Pacific, countless millions are tagged there every year and I would have to say that these results are very different to what we've seen elsewhere. With micro-tagging we have seen tag recapture rates as high as 15%. That's actually tags back from batches of fish tagged with micro-tags. It's....it's a worldwide proven technique and, I mean, there may be evidence, you know, that you can provide me with proof that the micro-tagged fish didn't survive very well, I don't know. You sort them out, but I would have to say that all the evidence that we have is that micro-tagging is the best available technique for the evaluation of fish...so, can't say more than that really.

Q. These figures are very worrying - is that what you're trying to tell us amongst all that? That we're not getting the numbers back that we should, or they've been taken somewhere else, or what?

A. Well. Well I would say that they give food for thought, certainly. I mean, I would very much want to re-emphasise the fact that it's provisional information. I mean, we had fourteen tags back, I wouldn't want to hang my shirt on the results, and sort of, you know, give you any hard and fast recommendations on the strength of that. But, clearly, it's food for

thought and, I mean, it's in everybody's interests that the large sums of money which are being invested in stocking programmes are wisely spent and clearly give the sorts of results that you're after. Now, the provisional results, I say, don't really suggest at the moment, that you know, well, it's for other people perhaps to make the cost benefit analysis, but at the moment I would say that the costs are down here and the benefits are up here. Now it may change, but clearly we need to keep an eye on it and review it as time goes on.

Q. Bob Forsythe. Is it by according to your graphs, it seems better to tag smolts rather to tag parr, surely it would be better to keep that one going rather than to play with parr and then lose your percentages of tagged fish?

A. A sort of qualified yes. I mean, I would have expected....I showed you there two batches of roughly equal size of approaching smolt and nought plus smolt and there was no difference in the return rate, so on that limited evidence smolts were no better, but I would have to say that as a general rule, I mean, clearly, with any population you get a steep decline in numbers, you know, everybody heard about this from Alisdair, very steep decline and then it very gradually levels out and so, clearly, as you come down that curve, if you can get fish in later on, in theory they should give you better returns. Now we have been stocking in the past mostly, mostly approaching pre-smolt fish and on the early slides I showed was that they hadn't been particularly special in terms of survival and recapture rates either so I'm not sure it's necessarily the answer.



Certainly. I'll use "wild" in inverted commas, smolts that we tagged did get a much better recapture rate. Now there will be a contribution of hatchery fish in those, what I would say is that the wild fish that were, you know, clearly adapted to the wild, were better suited and obviously survived very much better and, to fly a kite - one possibility for the future might be the rearing channels that are used for rearing smolts, sort of, semi naturally in the wild, has been employed with some success in the States. Now, I'm not going to suggest that the NRA should jump out and do that straight away but it's clearly something that we should...it might be cost effective to look at that in the long term to look at that sort of option, if indeed stocking is decided that that's the way ahead. And again, that's not a decision really that's for me to make.

Q. Chairman: Mr. Russell, may there not also be a human factor? How certain are you that anglers declare what they catch to you?

A. Well, I mean, that's clearly one of the points I was making, that it's vital.....that we do get that co-operation, that we do get that information back. Now, I believe we've got very good relations through the NRA with the major fisheries on the Test, and that's where the bulk of our recaptures have been made this year and I think we've got very reliable data. I mean better, again, I would stress we've got much better co-operation, better data for the Test and Itchen than we have for probably anywhere else in the country, so without being disparaging to anglers anywhere else in the country.....so, but I think it's....that can be ruled out I think for the moment. I mean, we're still....it's still hard gone that it

is provisional. We do not want to draw too many hard conclusions but it gives food for thought.

Chairman: Thankyou.

Q. Thank you Mr. Chairman, Jeremy Reade, the Atlantic Salmon Trust. You say that the Faroes and Greenland fisheries have negligible impact, are your tag recaptures on which your basing that, mainly on hatchery reared fish? From what I saw a very large proportion, if not the major proportion were?

A. Yes, for the Test and Itchen, that's certainly the case. I mean, virtually all the tagging that, until the last two years, has been based on hatchery fish.

Q. I was going to say, Dr. David Solomon, suggests that the evidence is that hatchery reared fish, tend to grilse, rather than to develop into multi sea winter fish so you wouldn't actually expect to get many multi sea winter fish back; and I notice that of the ten you did get back, two did come from the Faroes. The other evidence I think needs to be taken into consideration is that the decline, very marked decline in multi sea winter fish which we saw in the graph which Robin Crawshaw showed right at the beginning of the Seminar, coincides very clearly with the time at which the high seas fisheries were taking very large numbers of fish and therefore I would suggest hitting the breeding stock fairly heavily. So I wonder if it is a fair assumption, just to dismiss the high seas fisheries as having an impact.

A. I clearly wouldn't want to do that. We do have other data for other

regions of England and Wales. Now on the basis of those other data, far bigger batches of fish, hatchery and wild, I can say that.....the feel we've had for the Faroes fishery was that probably exploitation on all regions of England and Wales is low in that fishery. England and Wales stocks don't appear to go to the Faroes fishery. I mean, I would say that it's under 1% on all stocks, on stocks throughout England and Wales. Now the Greenland fishery, we have found that exploitation on multi sea winter stocks can be higher, and the only real data we've got for that is that is particularly for the North East where a significant component of the multi sea winter exploitation appears to take place in Greenland. Now it's quite possible that if the Test and Itchen were producing large numbers of multi sea winter fish, that exploitation in Greenland...you know, we can say there have been no tags there, we can start getting some tags there and a measurable exploitation rate there. So I'm not trying to dismiss it, but at the moment with a grilse dominated stock here, it was very difficult to get the sort of, any information on the multi sea winter component because there's just so few of them. You know, the likelihood of getting tags back is small. I'm not trying to dismiss it, but at the moment it doesn't appear to be a problem, particularly.

Q. But you actually said that the, of course, the Faroes aren't fishing and therefore it isn't a problem.

A.1 Well, yes, yes quite.

A.2 I hope, perhaps in the Open Forum I might be able to say a word or so

about how we will try to make sure that the Faroes don't fish any more, and that Greenland having stopped, don't fish any more. But if I could perhaps come back later on.

Q. Sid Geoffreys. Following up on those things that are being discussed at the moment, the figure of 23% I think for the Irish nets, I would like to know how that figure is arrived at and if it does bear any resemblance to the number that probably are actually taken?

A. Well, I've given you some information on how it's arrived at in terms of the modelling approach, and I mean, clearly, it would be best discussed perhaps with my colleague, Ted Potter in a few moments if you want to go into more detail on the modelling. As far as the actual reliability of the data goes from Ireland, now we believe it's pretty good. The Irish themselves run an extremely big tagging programme and they have a very detailed scanning programme throughout all their fisheries, and as far as I am aware I don't think they ask too many questions about where the fish come from, i.e. whether they are from licensed netmen, or not. Otherwise I think they get a pretty good coverage of the catch that comes in and they have no indication from the outer post clip whether it's an English fish, an Irish fish or whatever, so all the outer post clip fish are sampled as best..... or not all....but certainly a significant component are sampled and are then independently dealt with by the scientists in Ireland so I don't think there's any danger of the data being tampered with. So, we believe we are getting very reliable data for the Irish fishery in terms of the tag recaptures. I hope, does that answer the question?

Q. Thank you Mr. Chairman. Guy Hall. May I ask you - you avoided the question - but could you give us a feel for the order of magnitude for the cost per returning fish? For let's say, your best performing micro-tagged fish, with the smolts. Are we talking £10 per returning adult, £100? £1,000?

A. It would be very difficult to give a figure. I mean, you saw there, we've had one tag back from that batch of 17,000. If you scale that up, assuming that the other 700,000 performed the same, you're talking around about 40 salmon possibly caught....no I think that's probably, would be a top figure, and clearly then you've got to multiply that up by the exploitation rates in the test which...I mean Adrian would probably....we're probably talking about 40%, so the best possible figure, I would guess, is that maybe a hundred of the fish in 1993 were derived from that stocking and I think that's really tops. I don't know what the costs were, I've forgotten but, you know, you can do a calculation on that and I wouldn't like to go any further than that really, I'm not quite sure. I mean clearly it's a significant component and would obviously need to be taken into any review and further discussions on where the stockings should go. It's an important point.

Q. Mr. Chairman, Gerry Swanton from the Avon. Very impressed tonight with the NRA on this side of the valley, so to speak. But I do find one thing a little confusing, and please correct if I'm wrong in my figures. As I understand it, in 1991 you stocked the Test with 700,000 fish, small fish

and you tagged 20,000 of those fish. Now you're telling me, as I understand it, that very few of those fish came back this year. Now that means you've recovered very few numbers from the 20,000 you tagged, but that still leaves 680,000 that you know nothing about. So is, what I'm saying basically, is your stocking programme may be better than you think?

A. It could be. There's no way of answering that. I mean, it's possible but I mean I would have to say that those 20,000 were a little bit bigger than the other fish, and I think it's not unreasonable...they've come from the same source and everything else and were reared in the same way, but you can extrapolate from those 20,000, you're never going to be able to tag all the fish that go in on a massive stocking programme like that. All you can do is tag a sample and extrapolate from that. There will always be uncertainties, there always are in....you know, in fisheries work as many people will tell you. So I can't give you a hard and fast answer, but I would have to say that my initial, my tentative conclusions are on standby at the moment with the caveat that obviously the picture's incomplete yet.

Q. And how accurate are these fish counters that you have? In form of accuracy I mean.

A. I think I'll leave that one to Adrian. Adrian Fewings will be talking about counters about the break and if you would like to come back on that one then I think that would be more pertinent at that point.

Chairman: Thank you very much, thank you.

Q. Michael Baron. Not for the first time, I'm worried about the Irish state.

It seems to me we're getting just about as many fish caught off Ireland, perhaps, as have been caught in Hampshire rivers. Can you give us any idea where these fish are being caught, for instance are they being caught off the nets off the South Coast of Ireland, off Cork, somewhere like that?

A. I mean, right round the Irish coast is the answer. Most of the recaptures seem to come from the area in the North West, West of Malin Head and round, but I mean they have been taken right round the South and West coasts of Ireland, and yes, it is a significant component....it does seem to be equivalent to what's being taken in home waters, as best we can see.

Q. It's contributory, is it?

A. I think it's about 85%...Ted may correct me...I think it's about 85% or plus of the catches made by drift nets and there are other methods as well. But it's that sort of order, I think.

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**Returning from the Sea and Movement up River**

**ADRIAN FEWINGS**

**Fisheries Scientist  
NRA Southern Region**





### **Returning from the Sea and Movement up River.**

**Adrian Fewings, Fisheries Scientist, NRA Southern Region**

I'm sure many of you are aware there has been a programme of salmon counting and radio tracking for many years on the rivers Itchen and Test. The primary purpose of this work is to identify the conditions required for normal migration of salmon and sea trout throughout these rivers. We are able to monitor the migration of salmonids by counting them past fixed structures in the lower reaches of the river and also by catching the fish and radio tagging them. Automatic fish counting has the advantage of sampling almost every fish descending the river, with minimal impediment to their passage, but can only describe what's happening at each fish counter location. Radio tracking samples fewer fish but they can be tracked right through to spawning and sometimes even back to the sea after spawning, thus giving a much more detailed information on the fish sampled. I propose now, to illustrate the usefulness of this type of monitoring, especially when it forms part of a larger investigation covering the complete life cycle of a genetically unique stock such as that found in the chalk streams of Southern England. First, the automatic fish counting. We have three operational fish counting sites.....the counting sites on the river Test are located round about here, which roughly equates the bi-focation of the little river Test and the main river Test at Nursling and on the river Itchen at Gaters Mill, just here. All of these sites are continuously validated using the latest computer techniques and during clear water conditions, the fish passage events are confirmed with either video still prints, time lapse video tape or 35mm still photos. Here are some examples of these visual checks of fish counter performance. This is a video still print taken as the salmon swims through the

fish pass at Gaters Mill on the river Itchen. The lines on the bottom are the electrodes through which the fish sensor detects the fish. The fish sensor detects changes in electrical resistance of the water above the electrodes. By storing and analysing these resistance changed wave forms it be determined if the disturbance was caused by a fish or not. If it was fish then the direction of travel, the approximate size and, in most cases, the species of fish can be deduced. Species other than salmon have been recorded in this way but computer analysis of the fish wave forms has enabled discrimination of eels, and in most cases, sea trout from the salmon events. This is a salmon ascending the fish counting weir, it's actually two salmon ascending the fish counting weir at Nursling Mill on the river Test. These images were captured using video still prints. Computer information is shown at the bottom of the picture, including the fish wave form....here, the fish wave form, and here on this event. Next I'd like to show some video footage of a salmon ascending the fish pass and fish counter at Gaters Mill on the river Itchen. This is a time lapse video recording showing a reasonably large salmon ascending the river, the water is flowing from right to left as you see it. At the bottom is a scope trace which shows the fish wave form as it happens. Now you will see that same event slowed down. The line at the left of the picture is a laser line which also appears on the fish in the next frame. These two lines enable us to scale the fish by determining the distance away that the fish appears on the picture. At the bottom of the picture you see the fish resistance wave form progressing. Next is some footage ascending the little river at Nursling. I think you could clearly see there that there was an outer post pin present. As already mentioned, fish passing through

the counting zone cause changes in the electrical resistance of the counting zone, which are recorded as a wave form. A fish wave form would look like this, in fact this is a real fish wave form recorded in July of this year at Nursling. Time is along the bottom axis, the extent of excursion on this event gives an indication of the size of the fish. The crosses you see on these lines and circles are decision points that are transcribed onto the trace by the computer algorithm that interrogates this information. The order of the upward and downward peaks indicates the direction of the fish's travel, the shape of the wave form can give further indications as to the type of fish causing the disturbance. The Hampshire Salmon Investigation has developed computer techniques that analyse these recorded fish wave forms and can discriminate between salmon and other species. Furthermore the method allows reappraisal of the recorded data if better discrimination methods become available in the future. In fact, during the year the visual checks served to calibrate the discrimination techniques to maintain optimum performance of the counting system. Operation of these systems gives the following benefits that are difficult to achieve with any other method. First the timing of fish movement. Here is the column chart of fish movement showing both for the rivers Test and Itchen. To explain on the Y axis here, we have the number of salmon counts per day, the X axis along the bottom is the day and the month - this is for the month of July in 1993. As you can see, there were significant increases in the numbers of fish moving per day at these two major times during the month of July on the river Test. These were not quite so significant on the river Itchen and were followed by two other peaks. Further to this data we can extend to estimate returning stock sizes. Here is a

table of estimates for returning stocks for the river Itchen for the years 1989 through to 1992. I will shortly be showing the data for the river Test. Other data that can be determined from use of the fish counters are the in river exploitation rates since we know the rod catch and the total number of fish and, in conjunction with the MAFF micro-tagging project we can also make estimates of open sea survival. Here is the data I promised for the river Test. The other major work that's carried out in this investigation is that of radio-tagging and tracking. By observing individual fish over the entire length of a season a more complete picture of salmon behaviour can be formed. The primary benefits of this method include identification of the static and active phases of in-river migration, location of in-river physical and behavioural barriers, location of spawning sites, estimation of straying rate between rivers, the seaward migrating kelt rate and the estimation of survival after capture with different methods. The method of capture, sorry, the method includes the capture of salmon using nets, of which I have a rather old slide here, of rod fishing, here we show a fish being released on the river Test early on in the year, and electro-fishing. To track the fish a small radio transmitter is inserted into the salmon's stomach via the mouth. Here a slide depicting the relative size of a prawn and the radio tag that routinely use. Since salmon don't feed in fresh water the stomach becomes inactive and retains the tag until feeding resumes and the tag is regurgitated....here is an x-ray of a grilse with the same size tag inserted into the stomach. The type of tag used enables the individual identification of up to 100 individual fish. Once tagged these fish can then be monitored using mobile tracking via foot, mountain bike, or car. There we are. And even in some

circumstances, where required, the use of a light helicopter. Aerial tracking is carried out on the middle reaches of the river Test during the Autumn when fish are migrating very quickly. It's the most cost effective way of locating fish in this part of river, since the main river can be completely checked in an hour for less than the cost of checking on the ground by car. In addition to active tracking, we place automatic recording stations at strategic locations on the rivers. These record the time, radio frequency, and sound of the tags that come into the range of the stations. Collation of this data over the past few years has provided essential data regarding the timing of migration, dormancy and the location of physical and behavioural barriers, in addition to the spawning areas during unusual drought conditions. It has formed the basis for provision of grant to improve fish passage at problem sites and has shown that high survival rates of rod caught and released fish can be achieved. This may provide an opportunity to reduce the high in-river exploitation rates, without restricting the revenues of fisheries. In summary, the combination of data from fish counting and radio tracking will allow detailed analysis of salmon behaviour with respect to resource use of these two chalk fed rivers. This analysis will be essential for strategic policy formation in the NRA. Additional benefits of this work are the provision of stock assessment data more accurately, and at lower cost, than available from any other method and the development of fish counting techniques for high accuracy, routine use. And finally, the identification of passage problem areas by radio tracking leading to quick management solutions.

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Summary

DR TONY OWEN

Regional Fisheries Manager  
NRA Southern Region

Summary. Dr. Tony Owen, Regional Fisheries Manager, NRA Southern Region

Unlike Alan Mann and Mick Lunn, who've got a combined 90 plus years' of experience in the South East on the Test and Itchen, I've only been in the region for nine months and as a lead to my presentation I'd like to say I'm absolutely overwhelmed with the positive feeling that's come through in my short time here and also through tonight. This is a situation that has obviously captured the imagination of a lot of people, not just fishermen, but people on the outside, I think that is reflected in some of the press coverage we've had over the last day or so. What are they all asking - well, this is what I'm here to try and pull together in my review of tonight's proceedings. I attended the Institute of Fisheries Management Conference two weeks ago in Cardiff, and one of the key note speakers at that conference suggested that a common weakness of fisheries managers was that they didn't clearly frame their objectives and define them. I suppose, in this situation, two overall objectives are these, to conserve what we know from previous speakers, that the absolutely unique strain of chalk stream salmon, but also I believe an objective we should strive for is to really revisit the situation we had not so long ago, where we had a thriving and active self-sustaining population of salmon which provided a very high value fishery. We also need more specific objectives. How do we do this? Well I put up an example. For the Test, I believe, looking at the figures that have been presented, and the long term averages....we've got pretty good data going back even to the 1920s, particularly from the Nursling Fishery, that an overall run of between 3,500 and 4,000 fish for the Test is not an unreasonable objective to strive for. This would yield a rod catch, assuming an averaging factor for fishing



effort of about 900 fish per annum which is the long term average rod catch for the Test. On the Itchen, applying similar logic we would be looking at an overall run of some 1,500 to 2,000 salmon with a rod catch of between 250 to 300 fish. What of the average size of fish? Obviously the graph that was presented by Robin Crawshaw showed a dramatic decrease in the average size of fish. His graph didn't go back quite as long as records show and going back to the turn of the century, the average size of fish at Nursling was nearer 20 lbs., than 12 or 13 lbs. This is a trend clearly that is very disturbing, but one that is mirrored nationally, both in England, Wales and in Scotland. So what are the strategy, assuming that these objectives are clear enough? I believe that any good strategy has, in this case, these essential elements. We must understand the processes involved, I think you've seen a wide range of presentations, particularly on the scientific side and, to my mind sitting here tonight, as I say being relatively new to this matter in Hampshire is there was more questions came out of the presentations than we actually have answers to at the moment, and I believe the role and the work of fisheries scientists really is absolutely vital over the next five years, particularly on the issue of stocking which....I would hate to think that there are two camps developing here because I think we're united in our common goal, which is to conserve the salmon on these two rivers, and the Avon as well, but I think we do need to have a better understanding of the processes involved which are regulating the stocks and also the value of stocking. So a high degree of scientific monitoring of all our stocking efforts is absolutely vital. Clearly, our understanding of what's happening at sea is an essential part of that work as well and obviously has a knock-on from the micro-tagging work.

The figures presented by Ian Russell were disturbing to me, but I have to say in the context of the recent buy-out initiatives I think they are one of the most positive things that have happened in recent years. We await with interest to see what happens on the Irish fishery. Secondly, and it really goes without saying, this point, the mutual co-operation and collaboration between interested parties.....I think the turnout tonight and very great interest that's been shown is testimony to that. I think that energy has been harnessed and I think we are pulling out of the trough, but I think it's essential that we don't become complacent, I think we have the answers, I think now's the time to show our resolve even more by talking and communicating with each other and having healthy debate on controversial issues is absolutely vital to picking out the best way forward - I welcome that, in fact. Investment, being the policy and strategy man, I couldn't come here tonight and not talk about money. The NRA spends approximately £200,000 a year on it's salmon work in Hampshire. Now the income from rod licences is relatively small from the salmon fisheries of the Test and Itchen. There's a great deal of hidden expenditure from those fishery owners and interests and I would single out Alan Mann again for this, that in actual fact the figures we have are not a precise reflection of the actual investment in these salmon fisheries, that is considerably more than the amount the NRA puts in, but £200,000 a year is a very large figure. With the current funding situation for fisheries very much in the magnifying glass at the moment I have to basically come here with the message: we are facing a reduction in direct grant from the Government for our fisheries work, it's inevitable. In fact, browsing through the Salmon Seminar notes of two years ago I notice that my

colleague, John Chandler, basically made a very similar presentation to that Seminar, and I'm here making it again. I don't think John could have envisaged at that time that our funding situation would be quite as serious as it is today. Clearly with the NRA expenditure of £200,000 a year on fisheries alone in Hampshire, on the Test and Itchen, against the amount of money we raise from the rods, someone has to pay, and that person, or those persons are the general public in grant and aid. I have to ask myself some very serious questions, I have to look at every single element of our expenditure and ask the question: who pays, who benefits, who does the work and who causes the work to be done? That's my job. We won't know the position in terms of direct grant from the Government, which currently makes up about 50% of the total fisheries budget, until November. But with a 50 billion deficit we can anticipate a very severe public spending round. I didn't mention investment in time. This is one of the great unquantifiables. Clearly there are very many people here, and people who can't attend tonight who have spent a vast amount of time and energy, and nervous energy in their inputs to the situation and, obviously, all that is appreciated and welcomed. The last point I'd like to make on those four key elements is that the development of this strategy really depends on learning and, if you like, that means learning from mistakes, so be it, but a fluid and dynamic approach is absolutely essential. Communicating with each other and making the best use of the information that's coming in day by day. I'd like to focus on one or two key issues again. What's happening off shore? Well, clearly this is my very schematic representation and unfortunately commercial exploitation is at the bottom of that, but there are other factors that we simply don't know enough

about. Predation and disease are clearly very important ones. And what's happening in the river? Well, I think our climatic situation has been well and truly pointed out and the knock-on effects that the relative flow rates in our rivers have on things like gravel siltation. Poaching is another area I would pick out. The cost of enforcement work is high, most of that cost is in manpower, staff time, it's 24 hour cover, if an event occurs we are able to respond to that. That has a price to it. Yes, we are worried about the number of offenders we actually bring to book, we're also worried about the level of fines that are executed in the Courts. Clearly recovering our costs should reflect the amount of effort that we put into catching the poachers, a situation which I have to say does not exist at the moment. Another area I'd like to pick out is angling and if this is a controversial point, well so be it, but recently in two publications, "The Trout and Salmon", and "The Salmon and Trout" magazines, both featured articles on catch and release. At the moment the situation is that we take something like between 25 - 30% of the salmon that run these two rivers. One in three is angled and taken. With the situation as it is as such, I believe that every single fish that runs those rivers should have an opportunity to spawn. Catch and release is certainly an issue that needs further debate. It may involve culture change, it certainly has in the States, in Canada and Alaska, but it's been welcomed there as a very positive contribution to salmon stock conservation. Particularly the targeting of vulnerable fish and I would suggest in this case, the multi sea winter fish that we've heard so much about tonight. I am a policy and strategy man, as I've already said, and I've been looking very clearly at the development of strategy to actually roll on what's already been developed, but

also looking far more into the future. Meeting the Icelandic businessman, Ori Vikversson, recently, I was very impressed by his vision, his long term version. He wasn't thinking on a five to ten year scale, he was thinking on a hundred to one hundred and fifty year scale and, if you like, I've been thinking along the same lines. In the short term I believe that maximising our scientific understanding of processes is a key part of the strategy and that is going well at the moment, I think we're getting there, but clearly there's a bit more time to run on the stocking issue and the micro-tagging work and the offshore exploitation. Stocking is clearly an issue that's come up through the night and we're obviously committed to that, but also to maximising our understanding of the process. Juvenile enhancement in or near river is something that particularly catches my eye and the use of egg incubators in-river to simulate as far as possible a natural condition for the eggs and the hatching larvae is of great interest, as is channels for rearing on. Controlling exploitation I've covered, habitat rehabilitation I believe is something that is working at the moment and also we should put significantly more effort into and investment. I think habitat rehabilitation really should form part of the medium and long term strategy and be a key part of that, not just actually getting the gravels right for fish spawning off, but looking at the whole business of land use, set aside, buffer zones and how the silt is getting into the rivers. Reduce pollution - I have to say, having come from the North East where I was used to fairly polluted rivers, and experiencing very briefly the chalk streams, they are an absolute dream and we get relatively few pollution cases. Obviously continued vigilance in this area is important. Reduce poaching - I'd like to think from our intelligence efforts and also Robin's

team that although there are occasional individuals poaching out there, which are very difficult to track down and bring to Court, gang poaching really isn't the problem down here that it is in the North East. We are dealing with a diffuse poaching problem and it's very difficult to take prosecutions when you're dealing with that. And then the final point of the short term strategy obviously is to develop the long term strategy, and obviously ownership is the key point here, that we, all of us here, scientists and professionals, fishermen, fishery owners and fishery keepers are putting our oar in and putting our knowledge into the development of a long term strategy is a key thing to develop, and I see this forum, really, as a way of doing that. To conclude, many years following the England Cricket team enabled me to practice my ability at praying for rain. I had no idea that I'd be as successful as Peter Midgeley who seems to have the monopoly of that, he only has to appear in Hampshire and it rains, but anyway rain is on our side, the climatic situation seems to be reversing, and I for one....now when I see it raining, don't get depressed about it all. I just feel the enormous environmental benefit that it's having. I'm sure it's been a key factor in events of the last five years. Two comments to finish with, the first really is that the recovery appears to have started but we can't afford to be complacent and the last comment really, is that all the work that has been done costs, somebody picks up the bill at the end of the day. From the NRA's point of view I have to sit down wading through yards of computer printout, analysing where we're spending the money and yes, to use a cliché, see if we're getting value for money. In conservation terms that is actually very difficult to do, but we have to do it. For all those who are investing outside the NRA, then

obviously increased investment is welcome. This is not a question of coming out with a begging bowl, this is just saying our financial situation is as it is, we are expecting a decrease in funding over the next few years, there are some critical issues still on the boil at the moment in terms of funding fisheries, but any investment in specific schemes is obviously welcomed. The last point, and just before I got up to speak, our PR Manager pressed a number into my hand and said "if you see any poaching we've got a hotline now" and that is a free number 0800 807060, it's manned 24 hours a day, if you see anything going on, ring that number.

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OPEN FORUM



## Open Forum

Q. We've heard about the past, could Adrian give us any data of today's count and does the little riverside photographic record add any help to Ian Russell on proportions of adipose clipped fins to date, we saw one in his examples?

A. Thank you Nigel. I do have some figures which I've concocted today...sorry. This is the number of fish past the counters and including the fish removed below the counters up until this morning. For river Test that includes both the little river Test and the main river Test and I have a total of 706 salmon estimated. A small proportion of that is unvalidated as yet, that represents the months of September and a few days of October. For the river Itchen a similar figure is 506 for the same period. Your second question about the contribution of the video on the little river, yes I think it will be able to help Ian. Today the pictures weren't particularly good because the water was quite cloudy but I do expect that between now and the end of the year we should have a reasonable sample of fish through there on which we'll be able to determine the proportion of adipose clipped and non-clipped adult salmon. Does that answer your question?

Q. .... from July?

A. No. That sort of data is on video and will be evaluated at the end of the year.

Q. Would you like to take away the rod catches from these?

A. For the counts themselves, you would take away the rod catches. The

figures I have given represent the rod catches plus the counts, so that's the returning stock estimate up until today.

Q. Keith Elliott, The Independent. Dr. Owen, you hinted very clearly that you'd like to see catch and return. Can you talk a little bit about what time scale do you think this might work under and perhaps how it might work in a limited way?

A. Yes, in a way, it's already started happening. Dave Stewart's article in the "Trout and Salmon" magazine high-lighted that.....I think Dave is here this evening. It's a very controversial area and I know it's not popular with a lot of people. The concept of actually returning such a noble fish and treating it as a plaything was one comment I read recently in one of the journals, is a view that I don't actually agree with. I think that given the critical situation we're in at the moment and also our concern for the larger fish particularly, then catch and release is very clearly something which is now in the forum for debate. I wouldn't like to go into detail with it. I personally have had little experience of it but my warning bells start ringing when we see a fishery....there's no other fishery in the country that has an angler exploitation rate quite the same as the Test and the Itchen. 30% is very, very high. This would obviously be a short term issue and, hopefully, we could return to the days of not so long ago where we didn't have to consider such options, but I do think it's in the forum for debate now.

Q. I just wonder whether Dr. Owen would like to touch on the question of fish boxes? Because I think these are very important because I am

convinced that if anglers knew their fish was actually going into a fish box to be then taken on elsewhere, it might actually encourage more people to contribute.

- A. Thank you, David, that's obviously a point and we are very much singing from the same hymn book here. If it was a question of the fish either being used for putting stock back into the river or being returned to the river, or being killed then there's no question in my mind where we should go. The issue of fish boxes is one, they're relatively cheap and cheerful, we've also looked at fish stockings which are a sort of elongated keep net that can be used to hold fish in the river for a short time until someone can get out with a transporter and actually either move the fish on, tag it and use it for that purpose or take it to the fish tank, which is actually proving....touch wood here...proving quite successful at the moment at retaining some of the brood fish caught earlier in the year. If it's a question between killing the fish or letting it live then there's no competition in my mind.

Chairman: I think, Tony Owen, that brings us back to fishing methods, now catch and release may be alright for the fly, but if anglers fish the prawn, or dare I say it in this room, the worm, the chances of a successful release are reduced, but I do believe the catch and release has a place and I think, particularly so, in a case like the Hampshire rivers where we are nursing the fish along and we hope for better things in the future. To me the object of going fishing is pleasure and I don't think that a chunk of fish meat at the end of the day is necessarily part of that pleasure - I would like to see more fish returned and indeed, on my own

fishery, it has been against the rules to kill a salmon for six years. I am not a salmon fishery, I am a mixed fishery, but any fish that are caught by accident have to be returned.

A. Absolutely. Clearly the fishing method, I am not aware of much research that's been done on that, but barbless hooks are obviously the order of the day if you're intending to release fish. A large barbed hook can cause significant damage.

Q. I'd like to ask Adrian.....Adrian, we saw the helicopter aloft. I wonder if you could tell everybody how many radio-tagged fish you found on that trip up the day before yesterday?

A. Right. Just to put the helicopter tracking into perspective, we only use this sort of tracking above Romsey and up to Stockbridge and throughout the tributaries. This earliest of the aerial tracking trips this year has been just from Romsey to Stockbridge and we found, I think it was nine radio-tagged fish above Romsey, the highest of which was just below Alan Mann's house on the river Test.

Q. James Ferguson. Could I, before returning to the point if I may on exploitation, just at the outset, Chairman, you said we shouldn't believe everything we read in the press, and two or three times during the course of this debate there's been reference to the "Trout and Salmon" magazine and as someone who used to write in it for about eight years regularly I can confirm, most authoritatively, that you should not believe everything that you read in the press!.....

..... but the point about angling exploitation, and you have touched on one on the catch and release and that is that if fishing is allowed with feed-inducing baits then it's very, very difficult to return the fish undamaged. But of course there are other methods which should be considered for reducing angling exploitation. Our catch limits were very successfully introduced on the Torridge which was suffering a similarly serious decline in stock, it was resisted very much by some anglers, but after three or four years it has proved to be very successful and one of the ingredients in the better results that are being achieved on that river. And the other, the catch limits, and of course the limitation of angling methods should be considered in addition to catch and release. Catch and release was very much favoured in America at one stage and is now much less in favour for all sorts of reasons.

Chairman: Thank you for that contribution. I can't think the questions are drying up after such a stimulating evening. Any observations if there are no questions?

Q. Dr. Owen, you told us at times in your speech that the NRA has spent £200,000 this year and I am sure that we're all extremely grateful for the vast amount of time, effort and money that the NRA are spending. Can you tell us how much you've received in licence fees from salmon fishermen?.....

A. From the Test and Itchen?

Q..... Well you said, the £200,000 you said was it for the southern region?

A. That's for those two rivers, for the salmon and sea trout, where it covers

some of the estuarine work, I can give you a figure for that. And it's hot off the press, it's approximately £5,000 from rods.

Q. What percentage of salmon fishermen, then, do you think you have reached?

A. The total number of salmon fishermen on those two rivers is relatively low, but that's true pre-national licence for the data that we had. We had something like 25,000 salmon fishermen nationally, against a total of just short of a million anglers. On the Test and Itchen we have something like 170 regular salmon anglers, the majority of those on the Test, and a difficult to quantify number of visitors but it's believed to be an equal amount.

Q. Just to follow on that question, Dr. Owen, the licence duty for the Wood Mill net, you say that's not operating now but put in perspective that's another source of income. What is the licence duty for the Wood Mill net?

A.1 I'll tactfully move this one to my colleague, Robin.

A.2 Right. The licence duty on the Wood Mill net has been calculated historically on a rather complex formula relating to the number of salmon caught in the previous...on the five year running average of salmon and sea trout. To put that into pounds, the last time we issued the licence, it worked out at around £80.

A.3 I would add to that point, it's a situation that clearly has existed for some years now. The whole Wood Mill story.....that.....our files on it, I don't know quite how big the Magna Carta was but I think our files on the Wood

Mill net actually is about ten times bigger than my mental image of pictures of the Magna Carta, so you'll have to bear with me that I haven't actually been able to either plough through it all, let alone assimilate it all but you can rest assured it's an issue which is very high up on my agenda.

Q. It was my understanding....Alastair Stoddart.....It was my understanding that you are spending something in the order of £200,000 per annum on the salmon programme, would it be legitimate to ask this evening, within the Test and Itchen how much you're spending on Brown Trout?

A. That's a very difficult figure to quantify and I'm afraid I couldn't actually give you that this evening.

Q. More or less?

A.1 It's less than that. The total fisheries budget for Hampshire is somewhere in the order of £250 - 300,000.

A.2 If I may add a little bit to Tony Owen on that, although all the work we've described on habitat improvements, gravel raking, etc., has been lead by the decline in salmon, there's little doubt in anyone's mind that this will, in fact, benefit spawning brown trout every bit as much as salmon. Certainly, the monitoring we did last year of the raked areas which, to come back to an earlier point of Dr. Potter, we did do a lot a work throughout the Test, as well the Itchen and monitored sites on both rivers and there were roughly equal numbers of trout and salmon using those spawned areas, those improved areas.

**Chairman:** Sir, Officers will give you figures in due course, I am sure, but in general principle the still waters and the rivers of Hampshire are maintained by the owners or lessees at the owners' and lessees' expense. There's work for coarse fisheries and there's a huge amount for salmon fisheries, not a great deal of expenditure for trout fisheries. I'm not going to go into figures, but that's the

broad basis of the thing, that fisheries are maintained at private expense for private benefit, be they lakes or rivers.

**Q.** Therefore shouldn't the NRA put it's own house in order before asking the rest of us to put our hands in our pockets? They're getting quite laden already by shelling out for the fishing licences.

**Chairman:** Yes, I'm.....I think though, Section 142 and the Angling Rod Licence are in the closed season tonight.

**Q.** Michael Baron. Whilst I share our general encouragement about this year's good run of salmon, I remain very concerned about the poor run last year, in view of the, presumably, poor recruitment that will follow, and therefore the very bad runs that we're going to get maybe next year and the year after. I therefore feel it's extremely urgent that we lower the level of rod exploitation during the next two or three years.

**Chairman:** Personally, I agree with you, but let's hear from the experts.

**A.** I'm not sure....I mean, clearly we're looking at a, well, an ownership thing, a message has come through to me loud and clear before we actually came this evening, one or two of my colleagues said "don't mention catch and release, they won't like it". But in actual fact I think the message,



you know, is loud and clear, and I do gauge from the comments that have come from the floor, that there's actually quite a deal of support for that concept. In terms of actually legislating for reduction in effort, I mean, I would say that every angler who fishes these rivers, I think the question that should go through their mind as they land the fish is "well, should I kill it. Would it be more use either to the tracking programme, to the tank programme, or what should it's destiny be, other than my freezer?". I think if there's anything I want to get through, it's that message.

Chairman: Yes sir, we're ready for you now.

Q. Thank you Mr. Chairman. I'm afraid this is back to money again and also self help. At the beginning of the Seminar Mr. Lunn, and in his summary Dr. Owen, both mentioned the positive effect of the high seas buy-outs and also the inspirational nature of Ori Vigfusson who's their author, but unfortunately a buy-out implies money to do the buying and so far the Faroes Fishery has been out of action now for two years, and the Greenland has closed this year, and U.K. hasn't yet contributed anything at all. Other countries bordering the North Atlantic have. We're now trying to remedy this situation and there is a U.K. committee of the North Atlantic Salmon Fund, Alan Mann sitting here is a member of that committee and we are about to start trying to raise some cash to pay the U.K. share so that we can keep these fisheries closed. This is going to start with an appeal in Scotland, which of course is where most of the money is expected to be raised and this will go to District Fishery Boards

at the end of this month. But we hope to progress that appeal to both riparian owners and salmon fishermen in England and Wales at end of this year and into the New Year. So I know that there are a lot of calls on peoples' pockets and I am afraid this is going to be another one and I would ask all owners and fishermen who are interested, particularly, in improving the stocks of the multi sea winter fish that have declined so drastically to watch the press for the announcements and to be prepared to contribute.

**Chairman:** Were you implying a possible Government contribution?

**A.** I would love to see a possible Government contribution.

**Chairman:** I know that my own Member of Parliament, Sir David Mitchell, was on the invitation list. I can't see him against the light, Sir David, are you here? No, there's no run from the Parliamentary.

**Q.** Dr. Owen mentioned a colleague whose long term strategy for river conservation was about 100 - 150 years. You didn't put a time scale on your short term strategy for the Test and Itchen. Would you like to provide a figure please?

**A.** It's already been the subject of some very lively debate between myself and the Chairman earlier on today. I wouldn't like to start sticking time limits to it, what I would say, is our short term strategy really is the next five to ten years. I would like to see us pulling ourselves out of the trough, which I think we are doing so, increasing our vigilance, but really aiming to a position where we can hit those objectives that I put up in my introduction, really in ten to 15 years. I don't see that that's an

unsurmountable challenge.

**Chairman:** The Chairman's side of that debate earlier this morning, hadn't a time scale attached to it, but it had a physical condition attached to it. I hope that we shall continue our enhancement programme and when the numbers of fish returning to our rivers has built up, and there is successful natural spawning and everything is running as it used to run in about 1905, say, then we might consider easing back on the enhancement programme, but not until that state has happened. What I visualise is that the returns shall be much greater than they are at the moment, that the escapement of fish is much greater than it is at the moment and therefore the natural spawning of possibly hand reared fish is much greater than it is at the moment, and I think that is the point at which we need to review policy. But that, I'm afraid, is lying off a few years yet.

We haven't heard from David Jordan who is the boss of fisheries at Head Office, David, would you like to spring to your feet and make an announcement, if not a question?

**David Jordan:** Like Tony, I've been in my current post for nine months and it's been something of a learning curve for me as well, as indeed tonight has. What we've seen is an increase in the run fish in these two rivers, in 1993 perhaps double what it was in 1992. Two of my friends in this room went fishing on the river Usk three weeks ago and in three and a half hours they caught ten salmon. Last year there was no prospect of that whatsoever. I think we have to be very cautious indeed about jumping to conclusions about the success of the stocking work that's being done in this river, in these two rivers, but it is one of the key areas of interest and I've taken a close interest in this project at a national

level, because I think that the lessons that we can learn from this might have implications nationally and I that emphasises the importance of being very careful and making sure that the judgements that we make are the correct judgements and, having made those judgements, that the decisions that we make are absolutely clear. What I'm saying is this, that if a re-stocking programme is shown to enhance the run of fish, then we have to make a decision about whether that should be supported, because what we're actually doing is ranching fish. And we have be very clear about what the objectives are and I think Tony Owen has set out a very commendable strategy for the short and medium term, I think the long term strategy must look at solving some of the fundamental problems which I think the NRA and MAFF, together, have quite clearly identified. I think that the gravel enhancement work, the gravel raking, or the water jet work that Lawrence Talks has shown to be so effective, must be extended.....this is the message that we must get across. The NRA can't do all the work, I think it's demonstrated clearly what the best practices are and those practices must be transferred and picked up by the Fishery Managers, the River Keepers, who do so much vital work on the rivers. That is tackling a symptom, what we also have to do is tackle the cause. Mike Beard suggested that changes in agricultural practice since the War might well have lead to an increase in silt input to the river, or to the two rivers. If that is the case, then we have to make sure that that cause is actually tackled, and again Mike referred to the possibility of riparian buffer strips. For those of you don't know what riparian buffer strips are, they're effectively areas of land adjacent to the river which are very carefully managed and not agriculturally exploited, so they...you keep

the problems away from the river and you don't get silt input into the river. So I think by habitat management, dealing with the issues that we really can deal with, is a fundamental part of the long term strategy and it has yet to be proved, in my personal view, that restocking plays a significant part long term role in that strategy. One other factor that we have to bear in mind, I believe, and that is the.....what is actually happening at sea. The decline in the Spring fish is, as Tony Owen has said, mirrored right across England and Wales and it's quite possible that that is due to climatic factors which are changing at sea. Now we mustn't necessarily accept that as an excuse, we have to be very realistic, if we can do something about it we should do something about it, but we shouldn't be diverted by assuming that we can reinstate the Spring run of salmon. So I think that the messages that have come across tonight are very important. They clearly demonstrate close co-operative working between the NRA and MAFF and all the fishery interests on the rivers, and I've been enormously encouraged by the very strong, positive messages which have come across from this particular forum. One of my concerns was that there might be some sort of establishment of two camps as again, Tony raised the possibility. Quite clearly that is not the case and I regard that as being very welcome indeed. I'm Head of Fisheries for England and Wales which means I have to take a national perspective of all the aspects. I've taken a very close interest in the Test and Itchen and I will continue to do so and I will continue to look at what the national implications are of the work which is being carried out on these two rivers. It would be wrong for me, having been thrown into this opportunity by tonight's Chairman, not to emphasise the financial difficulties which the NRA is facing. The question of the

buy-out of the Wood Mill Fishery reared it's head on a number of occasions this evening. The NRA has managed to buy the fish which have been caught and either use them for monitoring or in fact simply for....I think it is exclusively for the monitoring programme. We can't guarantee to continue to do this. If there is an opportunity to buy out the Wood Mill Fishery which would definitely benefit that particular river, then I think perhaps the riparian owners might want to consider the role that they might play in that particular buy-out. And again, the NRA would be very happy to enter into dialogue with anybody who wants to pursue that particular option. Thank you for the opportunity, if that was the opportunity, to make my view clear. Thank you Chairman.

**Chairman:** David thank you very much. I wonder whether you would pass the microphone up to Christopher Rothwell, four rows up.

**Christopher Rothwell:** Thank you Chairman. Just a brief word because you've caught my eye. First of all Arthur to thank you and the whole team here for inviting us from Wessex to come along. We've come with a strong team, we've sat here, we've listened, we've made copious notes. As I am sure you know, on both the rivers Avon and the Frome, we've got our problems. We are starting to address them. Some of things we've learned tonight which are, I think, splendid ideas that we might develop on, we actually have started on the gravel work. The question of lending the pump to riparian owners strikes us as being a splendid idea. The thing also that has impressed me, and I think it has impressed the others from Wessex who are here with me, has been the co-operation between owners, fishermen and the NRA to address this problem and

get together because a thing that I've always stressed in Wessex is only by working together.....(end of tape 2).

(Start of tape 3 - speaker unknown).

.....back to the powers that be at NRA and indeed, Government, that in fact the fishery service should not be the poor relation because of what the fishery service and what healthy rivers and fish living in them do for the whole of the NRA, and so I am very concerned that we don't give in, as it were, on this question of Government cuts before they've even started. And I think it's a question of looking at the case, looking at the statutory duties that we're required to undertake and I think it's epitomised, in fact, in this Hampshire work that's gone on with this salmon investigation and the good that's come out of it, and the lessons that have been learned and I think a very strong case should be made, in fact, for the continuation of this work as you said at the beginning, Sir, but it should be made with some teeth, I think, and really that's what I'd like to say.

Chairman: Well thank you for that contribution and you and I have often talked on the basis of whether statutory fisheries work should be funded by Government, leaving just the marginal items for being funded from the rod licence or else how. I do feel that the Government...sorry my Member of Parliament's not here after all....I do feel that the Government should be funding the statutory policing and installation of fish passes and matters and matters of those kind. Thank you. Dr. Potter again, down here please.

Q. Dr. Potter: Perhaps could we have some guess, with the increased water in 1993, whether the smolt run was equally as good this year as last? My

opinion would be that with the difficulties of trapping perhaps we even sent more smolts to sea this year than last year. So perhaps we might not be staring disaster in the face next year with a smaller spawning stocks.

A.1 Ian Russell: I think there are probably,...I'll probably ask Alisdair to come in on this one as well with his survival data. You're right, we did have problems with the trapping programme in 1993 because of the high flows, we weren't able to keep the traps in as long, we didn't tag as many fish. I think it was around about 1,700 in total compared with 2,200 the year previously. With the two traps we are able to a sort of crude mark recapture estimate based on the numbers of fish that we tag at Romsey which are recaptured subsequently downstream and that recapture estimate was also lower, but clearly that's only for the time that we actually operate the traps and large numbers of smolts, you're right, would be going on the high flows. As ever, it's one of these intangible things you can't quite get a grip, a grasp on. But I wouldn't say there's a strong indication it's going to be a substantially better and I think Alisdair might have something to add on the survival from the data.

A.2 Alisdair Scott: Certainly from the Itchen the egg survival data we gathered there would suggest that since 1991 we've had back to poor survival, so making the assumption that I have all through that the two sites I study are representative of the river, I suggest that the smolt runs for the last two years have been relatively poor, compared with the one that's producing all returning adults now. So I would be less than



optimistic about maintaining runs at high levels for the next two years at least.

Floor: Just a brief fact for Dr. Owen who has a weak stomach for killing fish, it would appear, first of all, the numbers that are returned to him are actually rod catches, not necessarily rod kills. I happen to know, certainly where I fish, that certainly quite a large percentage of the fish have been returned to the water without being killed and that's up to the individual fishermen. The other thing I'd say is also that in the statistics I think something like.... we don't know what the wild rearing was but of the fish that were stocked, something like 5% were tagged. Of the fish that were caught where I fish 10% of the fish caught this year were tagged. So maybe that's a useful statistic.

A. Dr. Owen: Well, I'd like to thank the comment from the floor there and I am extremely encouraged that the catch and release policy that's beginning to develop there is actually gathering momentum. As for having a weak stomach for killing fish, I can't resist this one, my background is as a Fish Pathologist and I think I've probably accounted for more fish kills than anyone in this room, so...I just thought you must know that!

Q. Would it be a good thing, as Alisdair Scott said, to put eggs into baskets in the river? Surely it would be better if the eggs from Alan Mann were to be brought down, be put into boxes the length and breadth of the river, so they naturally rear in their own water, rather than be transported once they've eyed over?

A. I guess someone's going to have to field this on Alan's behalf I think. I really don't think there's a great deal of difference in performance of the fish were they to be, I mean, to transport them from Scotland where the brood stock's being held, they would need to be Alevins or eggs at that time, he would be transporting any fish that he intends to rear in Hampshire down at that stage anyway. The relative benefits then of stocking the fish out as fed fry or unfed fry is a subject to that's very much open to debate and existing literature would suggest that were he to stock his fish out as unfed fry, as soon as they were ready to feed, that would probably be the most cost effective method of doing it. That's what existing literature would suggest. Alan prefers to nurture his fish a little bit before releasing them and certainly in my own experiences of stock of fish in the Itchen suggests that fish that are nurtured for six weeks in the hatchery will actually exist in higher densities than unfed fry. So there are arguments both ways. I suspect that the relative merits of either technique will balance themselves out. You're talking about two equally useful techniques.

Chairman: Mr. Lunn.

Floor: Yes, I was going back to the 700,000 or so of the fry that we got from up North and from the Welsh hatchery in those two years of '91....was it '90 and '91....they were a pretty motley lot in my estimation of looking at small fry, and there would be a lot of those fish which really, I felt, didn't come up to scratch. I mean, if you compared them with the 200,000 we took out of Lower Brook this year, I mean, there really wasn't any

comparison, you know. I felt that, I mean I suppose, you know, the best had been done but there were a lot of little tiny things which I think it would probably have been an absolute waste to put them in the river. And with the first lot, of course there were quite a lot of mortalities in the transport, so maybe, you know, I guess everybody had done their best, but it was a pretty poor best lot that came down from those two places in the first two stockings. Whereas this year, although the numbers weren't so great, the quality was so much different, you know. I'd just like to say that, because it was certainly one thing I noticed.

- A. I think one thing that isn't widely appreciated is, I've actually touched on this earlier on, is that if you're going to stock very small fry into any system, under natural conditions you're going to get an extremely small percentage of those smolt. The major benefit of running a stocking programme with very small fish is the very low cost it entails relative to holding onto those fish until they're extremely large and most studies that have been done on stocking suggest that the best cost benefit is to get rid of the fish from the hatchery as soon as possible. You're always going to have very high losses from those small fish so, although it looks like a huge number of fish going out, in terms of the number of smolts that may be yielded from the river, it could be much lower than probably a significant proportion of this audience would think. You know, a typical result may be 7,000 smolts from 700,000 group parr of this size. That's again, it's a number from under the thumb, but it's probably closer to the mark than 70,000.

**Chairman:** I think the one thing is quite certain, that is that the scientific work that's being done has confirmed what Mr. Lunn's family and others have known for some generations, that the act of natural spawning is not a biologically productive purpose and perhaps for that reason the female salmon lays so many thousand eggs in order to go get some through the very heavy losses. Now logically, you can jump those early stage losses by putting out your parr at mid-summer, when they are established little fish and the chances of survival are rather better than they are at the egg stage, buried in the gravel, so I think we are helping nature by jumping the early stages where so many of the losses are occurring. Would anyone like to comment on that?

A. Ian Russell: There are, obviously, I mean I would take that point, yes, you will certainly, as you go down the road of producing bigger fish, the survival and everything, ought to be better but then there obviously are some conflicts of interests, I mean there will be, you know, heavy predation pressure on those small fish going out from trout and from other things as well, so I mean you will lose quite a number of those fish, and I mean, clearly, I mean, I think the fallback on the fact that there weren't terribly encouraging results initially but there's scope there for, you know, identifying and investigating different times of stocking, different sizes of stocking, also, you know, a variety of branches, you know, if stocking is decided to be the, you know, the best line to go down.

**Chairman:** Yes, I think we mustn't be impatient, this is the first possible year, and I think we'll know a lot more in four or five years' time. I can't believe that we've come to an end but we appear to. Right, well I forewarned you what I was

going to say, there is a lot more to be done and if there are any benefactors out there or commercial organisations who wish to sponsor some particular aspect of our work, we're quite willing to listen to you, I mean we're more than quite willing, we're dying to hear from you and your company's name or whatever shall be attached to the good work, so we are looking for sponsors and if anybody knows of a sponsor would they please make contact with Dr. Owen. Thank you very much. I've enjoyed this evening, it's been a pleasure to chair, you've been an attentive audience and I think we have made progress. I just hope that, unlike the little eggs and alevins in the gravel, we all survive and we meet again in four or five years' time when our current feeling of optimism will be translated into fact, because that is what I shall do and continue to strive for, I think we've got to keep going at all this. There's a lot of work to be done yet, we can't stop at the half way stage and my closing words are to thank again Mr. Mann for having made all this possible. Without your help and without the blend of the private sector with the NRA we would not be in the good position we are today. Thank you, Alan, very much indeed.

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