

# Sea Change



## Sea Change, Episode 2 – Dr Richard Shelton

**Scottish Fisheries Museum:** Hello and welcome to Sea Change, a podcast series by the Scottish Fisheries Museum. This podcast asks a selection of the most knowledgeable people their thoughts on the current situations facing our seas, and what they think the future looks like.

**SFM:** Ok so it's a lovely December afternoon and I am here with Richard Shelton for one of our podcasts for Sea Change at the Scottish Fisheries Museum. So, just to kick us off Richard, it would be great if you could explain a little bit about yourself and your life's work and why we are here speaking today, I guess.

**Richard Shelton:** Well, I have had rather a varied career because I started at the Gatty Marine Laboratory in St Andrews and after that I got a job in England with the "Min of Ag and Fish" at their Lowestoft and Burnham laboratories, so that was two laboratories in England. Then I had the chance to return to Scotland and spend a period at the marine laboratory in Aberdeen and after that, I became Research Director of the, no I'm wrong there, I've missed a stage out: I spent nearly 20 years running Scotland's Freshwater Fishery Laboratory at Pitlochry. And after that, I became Research Director of the Atlantic Salmon Trust and nowadays I'm just a Research Fellow at the Scottish Fisheries Museum.

**SFM:** Well, that's, like you say a very varied career and lots to share with us I'm sure as a result of that. So, our first question today is about how you have interacted with the seas in your various roles and in your research?

**RS:** Well, there are two main bits of interaction really. One, and the one which taught me most, was going to sea with Scottish and English fishermen from all round Britain's coasts. And the furthest west I went was Rockall, the furthest north was Spitsbergen and the furthest south, where we ran into a force 11, was rounding Land's End, so I've really been all over the place. And they are of course known as cruises, but they of course bear no relation to what most people think of as a cruise. All we ever saw was lots of grey water which of course, I say which we always called "ogin".

**SFM:** Yeah, not quite as tropical as one might think, when one thinks of a cruise.

**RS:** It was very un-tropical.

**SFM:** Yes, absolutely. So you have also been all over as you say and it would be great to find out a little bit about how in your career you have engaged the public in your research and the findings of your work and that sort of thing.

**RS:** Well there were two bits to the public in my career. One was the real public, talking to people at meetings and things and giving little lectures, but of course the other sort of public that I came across were the Ministers, both Scottish and British ones. And in my experience, some were good at their job and some weren't, and it was totally unrelated to their political party.

**SFM:** There you go: an interesting insight for sure. And so, our next question is going to give you a bit of a chance to tell us what you think, you know, is the most important issue or issues facing our seas. It would be great to know how your work has broadened your understanding of the issues that our seas face.

**RS:** Well, I mean the earth is very much a blue planet. It seems to be the only one within easy reach that does have seas. And all the evidence is that life began in the sea, and latterly we have begun to realise that things called Grey Smokers, which are a sort of volcanism, or volcanoes under the sea, which have an incredible flora and fauna associated with them. When I say flora, I'm talking about bacteria which form the base of a curious food chain, and it looks as though that's where life started. And as for interacting with the public, well, I think we have come to the end of that.

**SFM:** Absolutely. So, you say that, yeah, life sort of began in our seas, I think that is absolutely a key thing that perhaps people won't know: that maybe alludes to a question that we might ask you later. What sort of issues have come up in your work and in your research that you think are the most, sort of, pertinent to our seas?

**RS:** There are several. Initially, I was involved in understanding the problem of marine pollution and that was extremely interesting because it followed on from the loss of the *Torrey Canyon*, and so I was involved with oil pollution and a variety of other sorts and that's come back to bite us in a way because, as you know, there is an enormous industry off the Scottish coast of rearing salmon in coastal waters and they generate as much pollution as at least 9 million people...

**SFM:** ...Wow!...

**RS:** ...in places very poorly adapted to disperse it. But the rest of my work was really involved with controlling the interaction between fishing boats and their crews and the populations of fish and shellfish they depend on. And that's a very interesting area because, there were fish and shellfish in the sea long before there were people and long before there were any fishing boats and a modern fishing vessel is a very, very powerful predator in an environment not adapted to cope with it. So, it's essential therefore that

governments regulate the activities of these large predators and we've really had very little success in doing it.

Here on the Forth, a long time ago, the oyster fisheries were depleted to the point of collapse; the same happened with the herring; the same has happened with fish of the cod family and that has had one beneficial effect in that predation by fish, particularly of cod themselves, on young lobsters is much less than it was. So, we now have more young lobsters but less of everything else. And the fisheries of the Forth are now largely dependant on fishing for prawns with relatively small low-tech vessels and that's a great sadness really.

The same story you can see all over, and the proof that sensible control of fishing is beneficial is, of course, the effect of the two World Wars, where following both the First and Second World Wars there was a great increase in fish populations around Britain and for a time they supported quite virulent and bonanza-like fisheries, but sadly that success has been wasted, and one of the most difficult situations nowadays, is the practice of quota management, which involves fishermen having to discard large numbers of fish at sea.

They sink to the bottom of the sea, most of them, some of them are eaten by birds, but most sink to the bottom of the sea where potentially they are prey for Atlantic grey seals whose numbers are now at record levels where they are also, of course, preying on the remaining living fishes. So, it's not a particularly good picture. Now, the hope is that after we leave the EU, that more of the fishing resource will be available to Scotland. Just how well that will turn out only time will tell. The EU for all its faults, has actually been quite effective in some ways in controlling fishing mortality. Whether a domestic government, sensitive to the immediate wishes of skippers will do the same thing, only time will tell.

**SFM:** Yeah, absolutely, it's a time of uncertainty in many ways isn't it? I am really interested in the concept of the fishing vessel as predator and how that impacts on our seas, could you maybe expand on that a little bit? That would be excellent.

**RS:** At the end of the day the marine eco system is highly complex. And when you start to disturb it in fairly drastic ways as fishing does, the results can be very difficult to predict and that's what lies behind, in many ways, our relative lack of success in regulating the fisheries. It's a difficult thing and you have to always bear in mind that fishing is a business. Fishermen don't fish for fish they fish for money and often the unit value of fish increases when their numbers are depleted, because there are fewer of them. That means fishermen are able still to make money even if the resource they are fishing on is seriously depleted.

**SFM:** Absolutely, that makes complete sense. It is a business and it wouldn't exist otherwise, I guess, on the scale that it does. Also, on the grey seal population, that's very interesting. How long have we been facing that issue?

**RS:** Well, we have really been facing it since the, I would say, the 1960's but of course they're at this record level now. They are perfectly beautiful animals and we all like to see them, but you can have too much of a good thing and large populations of grey seals and powerful fishing boats, are both of them knocking a few spots off the marine eco system.

**SFM:** That makes sense, what sort of measures would you suggest might help us control this grey seal population?

**RS:** Well, for a start not discarding large numbers of dead and dying fish at sea. That would have to be the first thing.

**SFM:** Sure.

**RS:** But it's difficult because fish are controlled by regulation species by species. So, you can be in a situation where you still have an open opportunity, an open quota say, to land whiting or haddock

but not cod or another species so what fishermen do of course, is chuck the ones for which they don't have a quota over the side. So that immediately causes worries, as far as the seals are concerned.

**SFM:** Absolutely, so they are getting a free dinner really, aren't they?

**RS:** So the fishermen would say, well some people say, well look, Hugh Fearnley Whittingstall would say bring all the fish back and don't discard any and that's of course a counsel of perfection because, the number of fish that are marketable is really often quite a small proportion of the total catch. So, if you had to land everything, you would need a different sort of fishing boat with lots of storage capacity and the question would then arise, what would you do with the fish when you've got them? One option would be to go in for the eastern European approach of having factory trawlers where you process the unmarketable fish into meal but that's never been a British tradition, it would be anathema I think, to our fishermen.

**SFM:** Absolutely, that's very interesting. One of the things that in previous conversations with yourself I have found so interesting to hear, is the sort of increasing awareness of what fish feel. I wondered if you might be able to say a few words about that.

**RS:** Yes, well, fish are fellow vertebrates, we ourselves are vertebrates, and our fish's swim bladder is a modified lung, our ear openings are modified ear openings and our lower jaws are of course modified gill arches, so we are all fish really under the skin. There's increasing evidence, particularly well summarised in a book by Jonathan Balcombe, it's a book called *What a Fish Knows*, and you realise that actually fish are capable of doing a lot of remarkable things. They are quite capable of learning, some of them are quite capable, apparently, of solving problems. And all of them appear to be aware of unpleasant stimuli and almost certainly can feel pain. So these are disturbing things to know really, and I

would be the first to say that fish and fishing are very important to Britain and particularly to Scotland and I would hate fishing not any longer to be on the menu, but we have to be aware that fish are sentient beings.

**SFM:** Absolutely, I think that's key and the book that you mentioned is a very interesting read, I have read it myself. One of the things you had spoken about previously was the impact of sea lice on salmon and I wonder if you can tell me a little bit about that.

**RS:** Sea lice occur naturally in the Atlantic and they don't do any particular harm in the open sea, until recently, and nowadays there is an enormous industry both in Norway and in Scotland rearing salmon in cages. And they are fed large quantities of fish meal-based diet and when the fish are confined in this way, sea lice numbers build up to an enormous extent and the first fish to suffer were the wild sea trout and salmon that go anywhere near the fish farms, from the clouds of sea lice larvae that come away from them. But now, the sea lice problem is so serious that they're actually killing the fish in the cages, which are also liable to a range of unpleasant viral and bacterial diseases. So, it's an industry that people thought was going to be the answer to a maiden's prayer and has turned out to be a nightmare.

We also have to worry about the fact that marine survival of salmon, wild salmon, is at a record low level and we don't entirely know why that is. Quite a lot of salmon escape from fish farms, carrying with them the diseases and the parasites they had in the cages and they mix with wild salmon in the Norwegian Sea and along the shelf edge current. So, whether or not fish farming activity has been responsible for much of the enhanced marine mortality of wild salmon we don't know. It's not the only factor, I mean marine climate has changed as well but my suspicions are based on what I've seen of salmon in and out of cages.

**SFM:** That's very, very interesting and clearly an issue that isn't easy to resolve either, none of these are, are they?

**RS:** No, I mean the industry is in such a bad way of course, and it may collapse anyway, we just don't know. What we can be sure of is that the governments of Norway and Scotland have fallen down on the job in regulating them. Norway has had a better record than we have, but in Scotland it's been shocking .

**SFM:** Yeah, very interesting, and obviously you've got a lot of experience in salmon research and that comes across in how knowledgably you speak about it, and that the issue of sea lice is a very, very interesting one and I guess that it ties into this idea of fish sentience and all that.

**RS:** Yes, you only have to look at film of fish in the cages, with their skin terribly scarred and stripped off, to see these poor creatures suffering, it is really heart-breaking to see.

**SFM:** Absolutely, it's an interesting one to see how that will resolve itself. Are there any other issues that you feel we haven't covered that are particularly pertinent facing our seas at the moment or in the last 50 years or so? Or ones you can see bubbling under the surface that might...

**RS:** I think we've covered pretty well all that my experience can come up with. One thing we've learned I think, is how difficult it is to predict the effect of fishery changes. The marine eco system is highly complex and it's affected not just by what we do but what the other species do and above all what the climate does. So, in thinking about the next few decades, it's pretty much a blank sheet and though I've put down a few thoughts of my own about what might happen, I think we have to take it all with a bit of a pinch of salt, that's about it I think.



**SFM:** Absolutely, yeah, I mean I think you have covered a lot of ground there, so that is more than sufficient. One of our next questions, which I would love for you to answer is, if you could tell someone something that they might not know about the sea, what might it be?

**RS:** Well I think we have already talked about that. The earth is the way it is and the way it has got living organisms in it at all is because of the sea around us. For a long time people thought the origin of life was possibly in fresh water or maybe even deep in the earth but nowadays the best guess is that it's associated particularly with volcanic activity in the deep ocean and everything else that followed has taken place later, and the most remarkable thing for me is A. that life began B. that some of these living creatures eventually came on to land and were able to think. And I think even about the origin of the universe and at the end of the day we are all just glorified fish anyway so it's pretty extraordinary.

**SFM:** Absolutely, what a thought. I am sure most people have not considered themselves to be fish-like, so that's a very astute comment. So, our next question sort of beginning to wrap up our discussion is, if our listeners are listening in to this podcast thinking "what can I do to play my part in shaping the future of our seas?", what would you recommend that they do?

**RS:** Well first of all, to be very careful about the fish you buy. Don't buy farmed salmon and don't buy fish that are endangered in any way, including tropical ones. One of the things that happens, we were talking earlier of course, about fish as a business and some fish and haddock are a good example, the size of brood years can vary by tens, in the case of haddock, by a factor of a hundred. So what can sometimes happen is that when you're fishing you suddenly come across vast numbers of these young fish which still can be landed even with the most modern nets and at the end of the day there is no market for very small fish, so they have to go over the side. Now, the snag with that is that they are the seedcorn for the

future, fish that could have maintained a fishery for them when they were bigger over many years, so that is the one of the bad aspects of fish as a business. But it is a business and there's no escaping that's what it is and always will be.

**SFM:** Absolutely, yeah that absolutely is the case I'm sure. And for our final question. It is a big one. We would like to know where you think the seas will be in 50 years' time.

**RS:** It will depend on whether we have any wars or not. If we have major wars, then the fish will recover after each one of them. But all the evidence is that modern war is relatively short on any kind of large scale and the fish need at least 5, 6 or 7 years to recover from over-exploitation. So assuming that there are no wars, I think knowing the poor quality of fishery regulation, in recent history, I don't hold out a great deal of hope. It all depends on the resolution of governments and government's a short term 5 year things and they would rather dodge issues than actually confront them and so I think we will be bumping along the bottom for rather a long time.

**SFM:** Absolutely, it seems as though it's an issue that needs to be dealt with, you know, from the very highest authority isn't it?

**RS:** Yes, it doesn't go well with ordinary democracy, I mean, the best sort of regulation would be some form of dictatorship and God preserve us from that!

**SFM:** Absolutely, sometimes you have got to find a middle ground, perhaps. Absolutely, that is a thought, it is a strange one to have to try and guess where something will be in 50 years' time. Do you think we will be catching the same sorts of fish?

**RS:** Well, it'll... climate plays a big part in the species composition of our seas, at the moment we are going through a warming phase

and we don't know how long that will last, but for instance, there are a lot more bass around our coast than there used to be. There are red mullet in the Channel, there are oarfish in the North Sea, there are a lot more hake than there were, there are a lot fewer cod and haddock and whiting. And mackerel at the moment are doing very, very well but that probably won't last and the same will probably apply to herring. But it is very difficult to predict because of the complexity of the marine eco-system.

**SFM:** Absolutely, and do you think the massive changes in the way that fishing vessels are constructed? Or do you think...

**RS:** Well, there's always a steady process of sophistication in vessel construction and gear construction. The highest tech vessels nowadays are the pelagic ones. These are the ones that fish for things like mackerel, herring and blue whiting, and with their modern equipment they are able to locate and enclose shoals quickly and efficiently and can go on fishing at stock levels, which are dangerous to the long term future of the fisheries. Those are the ones that, there aren't many of them, but the ones that there are, are incredibly powerful. The demersal fishing vessels that are the ones that scrape their trawls along the bottom, also are quite high tech but still not in the same league as the pelagic ones and the least high tech at the moment are the in-shore shellfish vessels, but even they are using things like side scan sonar to localise the places where they put their creels.

**SFM:** Absolutely, yeah, it will be very interesting to see where things head in the next few years and, yeah, I would like to thank you so much for sharing your thoughts and research and life's work with us today Richard. I hope that it has brought some clarity to our listeners and they have learned something new about our seas and that there is plenty of food for thought there so thanks for speaking with me today.

**RS:** It has been my great privilege Eilidh.

**SFM:** Thank you.

**SFM:** Thanks for listening to Sea Change, The Scottish Fisheries Museum podcast series that accompanies our exhibition of the same name, running from the 24<sup>th</sup> of January to the 21<sup>st</sup> of June 2020. Join us next time when we will be speaking to Rob Kynoch.