

Environmental Audit Committee

Oral evidence: Sustainable Seas, HC 980

Tuesday 11 September 2018

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Members present: Mary Creagh (Chair); Colin Clark; Mr Philip Dunne; Zac Goldsmith; Mr Goodwill; James Gray; Caroline Lucas; Kerry McCarthy; John McNally; Dr Matthew Offord; Alex Sobel.

Questions 96 - 227

Witnesses

I: Rupert Howes, Marine Stewardship Council, Louise Heaps, WWF, Sönke Fischer, Accreditation Services International and Charles Redfern, Fish4Ever.

II: Guy Linley-Adams, Salmon and Trout Conservation Scotland, Dr Adam Hughes, Scottish Association for Marine Science and Ben Hadfield, Managing Director, Marine Harvest (representing the wider Scottish Salmon Producers' Organisation).

Written evidence from witnesses:

- [Marine Stewardship Council - written evidence](#) | [PDF version \(201 KB\)](#) 
- [WWF-UK - written evidence](#) | [PDF version \(152 KB\)](#) 
- [Accreditation Services International GmbH - written evidence](#) | [PDF version \(106 KB\)](#) 
- [Fish4Ever - written evidence](#) | [PDF version \(149 KB\)](#) 
- [Salmon and Trout Conservation Scotland - written evidence](#) | [PDF version \(186 KB\)](#) 
- [Scottish Salmon Producers' Organisation - written evidence](#) | [PDF version \(96 KB\)](#) 

Examination of witnesses

Witnesses: Rupert Howes, Louise Heaps, Sönke Fischer and Charles Redfern.

Q96 **Chair:** Good morning. I welcome witnesses and guests to the second session of our inquiry into sustainable seas. We will in this session be focusing on how our seafood is produced and how we can ensure its sustainability.

We are joined by four distinguished witnesses today. For the purposes of *Hansard*, can I ask you to introduce yourselves from my left, please, starting with Mr Redfern?

Charles Redfern: My name is Charles Redfern. I am the founder of a company called Organico Realfoods. We are 100% organic. Our bank and electricity are ethical. One of my brands is Fish4Ever, which was founded about the same time as MSC; I think about a year after.

Louise Heaps: My name is Louise Heaps. I am the head of blue economy for WWF UK.

Chair: Can you move slightly forward, please?

Louise Heaps: Sure.

Rupert Howes: Good morning. I am Rupert Howes, chief executive of the Marine Stewardship Council.

Sönke Fischer: Good morning. My name is Sönke Fischer. I am the strategy director at Accreditation Services International, the body overseeing the competence and conformance of certification bodies worldwide for the MSC and other sustainability standards.

Q97 **Chair:** Thank you very much. You are all very welcome here. Can I start with a question for you, Mr Redfern? Perhaps you could set out for us your case for reform of the MSC.

Charles Redfern: From my point of view, there are two very serious issues with the MSC. The first is that their system is not viable for the small-scale fishing industry. By their definition they favour large-scale industrial boats, and if you look at it from a global statistics point of view, small-scale fishing is far better in terms of bycatch, discard and environmental impact. It is far better in terms of social aspects: more employment, more democratic, more equity, more participation. I think it is very important that the small-scale fishing industry, which is also disadvantaged by economic factors and competitive factors, is not disadvantaged by a sustainability certification. The council will say sometimes that they do not meet the standard; that they are data deficient. Then maybe the standard should be in question and maybe there should be different standards for small-scale fishing.



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My second point is to do with the certifications that do pass, which are questionable themselves. There have been quite a few. I am knowledgeable about tuna. I think that fisheries are very complex and I do not like to talk about things that I do not know about. I do not know much about cod, plaice or haddock; I have no comments about that. I have seen some of the certifications that have been criticised in fish that I do not deal with, and they seem like quite serious criticisms that would not pass an ordinary definition of what sustainability is. Then that leads to other questions: who gets to define sustainability?

Q98 **Chair:** Clearly, with Fish4Ever you have your definition. Are your fisheries MSC certified?

Charles Redfern: We were officially part of the MSC programme, then we started getting these worries. Some were commercial worries about having regular supplies. Some were this idea of changing our own fisheries that we find were very good but for some reason were not MSC certified. For example, our tuna has never been MSC certified. The Maldives has been, but we think that our source in the Azores is very good, probably the best in the world, so why change it? Why does one source get the sustainable definition and one does not?

Then I got increasingly concerned about these other fisheries, all the criticism that was happening. Even when we are MSC certified now, we do not put it on the can. We put it through another system, a traceability system that we have, so someone can go and find it.

I should have said earlier that not all MSC fisheries are bad. Obviously, not all industrial fisheries are bad, and in the industrial area I think that they have done a job of gathering the industry. I think everyone recognises that. I should have said that in favour of the MSC.

Q99 **Chair:** Some of your fisheries are still MSC certified?

Charles Redfern: Yes.

Q100 **Chair:** Do the fishing companies that fund On The Hook stand to gain commercially if the campaign is successful?

Charles Redfern: Speaking for myself, not really, because I am buying at such a high price already. I am buying the high-price pole and line stuff. For me, it is the competitors who now have this dubious sustainable tuna that is coming into the market. I think 10 times the volume of the pole and line from the Maldives is now certified. I know a couple of competitors—one that was advertising for 10 years, "Always with a line". Their whole page, their webpage, "We always fish with a line, never with a net". They have suddenly switched around completely to net-based fishing. All the comments on Ocado and Amazon are, "Oh, it is great that we found you. We really like the social content. We really like the pole and line. We like the fact that you are sustainable". Overnight they have switched. It is going to be a hell of a lot cheaper to buy this new tuna.



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It is the same in France where a competitor of mine had only done some pole and line skipjack because of the Greenpeace campaign that arrived very late in France. It arrived in England much earlier. It arrived in France two years ago. They have switched entirely to this new—I would call it dubious—certified PNA Western tuna.

It is indirectly that we suffer. I do not think I am going to gain that much personally. I do not know, but I cannot speak for other companies.

- Q101 **Chair:** On The Hook is calling for transparency from the MSC, but when we have asked it for a breakdown of its financial contributions—how it is funded, who it is funded by—it was reluctant to provide that to us. Have you any ideas why that would be so?

Charles Redfern: Who was reluctant?

Chair: On The Hook.

Charles Redfern: I am a member. I do not fund them. I do not pay them anything. I just turn up at a few meetings. I am not even a spokesperson, so I do not know why they are reluctant, no.

- Q102 **Chair:** Are you able to get that financial breakdown for us so we can see how the campaign is funded and who the members are?

Charles Redfern: The membership list is on the website, and there are two organisations. There is the Marine Stewardship Council and On The Hook. Am I able to get the finance? I have no idea.

Chair: Okay.

- Q103 **Caroline Lucas:** Can I push on that? I have also tried to get the breakdown of who funds On The Hook and I am just not getting anything back, which is a bit odd. I just wondered: wouldn't you want to know where the funding is coming from for an organisation that has your name on it?

Charles Redfern: It has not crossed my mind much, no. I think that the quality of the membership, the quality of the NGOs that are involved—there is, I think, a past Minister, current politicians. I do not think I have an—I think that you are a member.

- Q104 **Caroline Lucas:** I had to take my name off it for this very reason because I want to know where the money is coming from. On the issue of who is gaining from it, is it not the case that there is at least one person on that board who has direct commercial interests in the fishery that is of most controversy?

Charles Redfern: Yes, there is. Yes, probably.

- Q105 **Caroline Lucas:** It is the case that at least one member of the board would have financial interests, depending on the outcome of the—

Charles Redfern: Yes, but that fishery is accessible to a lot of other people. He does not have a monopoly on that fishery.



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Q106 **Caroline Lucas:** Sure, I am not denying that, but the question was simply whether or not anybody on the board of On The Hook would stand to gain commercially should the campaign be successful. I think that is useful to know.

Charles Redfern: Right, yes.

Q107 **Caroline Lucas:** You would acknowledge that at least one, World Wise, would stand to benefit?

Charles Redfern: I am sure they would stand to benefit, yes, but it is a much more competitive situation.

Q108 **Chair:** Do you fund the campaign?

Charles Redfern: No.

Chair: Okay. That is fine. Thank you very much. We are going to move on to some questions from Kerry.

Q109 **Kerry McCarthy:** Can I ask MSC to start with? I should state that I have been involved in the On The Hook campaign. I think that I am listed on the website. I have not been in recent contact with them in connection with this inquiry, though. We need to be impartial. We have obviously had meetings with yourself in the past as well.

Can I ask about the whole issue of compartmentalised fisheries and particularly how tuna fishing vessels are able to categorise part of their catch as sustainable when they are using these fish aggregating devices on the same trip? Could you explain your thinking as to why? There is obviously a lot of concern that if a vessel is using sustainable and unsustainable fishing methods, possibly on the same trip, they may not deserve a blue tick.

Rupert Howes: This is an incredibly complex area to do with the unit of assessment for the MSC certification. MSC operates a certification labelling programme for wild capture fisheries. It is a voluntary programme. We are trying to drive change and reward good practice to complement public policy in terms of oceans management. Our programme allows the fishery partner or client who voluntarily comes forward to define the unit of assessment, typically the gear type, the species, the geography and the vessels. All market-based programmes—Fairtrade, organic—operate like this with units of assessment where we try to give advantage to those units that are operating sustainably. For example, the Soil Association; their 2018 guidelines talk about the production of organic produce, even the same crop next to, alongside, non-organic and the need for definitions of those units and full segregation.

MSC has used this approach very effectively for 20 years. When MSC started there was no sustainable seafood movement. There was no concept of what constituted a credible programme. We now have 400 fisheries in the programme landing 14% of global landings. The Scottish



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industry, for example, came in initially with their saithe fishery. They then brought their haddock fishery in, different units, and last year they achieved certification—a fantastic moment for North Sea cod. This incremental approach has worked very well to build trust and add value.

To answer your specific point on the PNA fishery, which is the subject of this campaign, they have a tight—

Q110 Kerry McCarthy: We are not here specifically to talk about the On The Hook campaign. We are talking about your certification across the board of where it is mixed; sustainable and unsustainable fishing methods.

Rupert Howes: The critical area there is segregation. With the PNA fishery, and this is small island developing nations—

Q111 James Gray: What is PNA?

Rupert Howes: Sorry, it is the Parties to the Nauru Agreement, made up of 13 small island states: Kiribati, Tuvalu, Federated States of Micronesia. They have brought their fishery into the MSC programme and that means that independent certifiers go in, look at the evidence, look at the management, and look at the performance of that fishery in a very inclusive, stakeholder-engaged way. Any evidence used to score the fishery has to be publicly available, and that fishery has been deemed to pass and meet the MSC standard. I have been out there and seen this on the boats. They have trained on-board observers to make sure that their sets on the free schools are completely segregated from the sets on the fishing aggregation devices.

It is important to state that those FADs, we do not say whether they are sustainable or unsustainable. They are not assessed. MSC is trying to recognise and reward good practice and over time, just like the Scots, we have seen more units come in and improve.

Q112 Kerry McCarthy: I know you have this theory of change that means if you reward good practice then the fisheries will feel inclined to move more and more in that direction. I am not entirely convinced that that does work. I think that it can sometimes mean that they feel that they have their blue tick for the products that they want to market under the blue tick, but it allows them to continue to fish unsustainably when it suits their purpose in other respects. I think that you should perhaps require more when it came to certification and be more judgmental about whether they are fishing sustainably across the board—I appreciate the blue tick goes on a product, but in terms of their overall practices it seems to me that companies are getting away with declaring themselves to be sustainable where there is an awful lot of unsustainable fishing going on, too. Can you persuade me? I have seen some figures on that in the past, but I am not persuaded that it particularly acts as a driver for them to stop fishing unsustainably as well.



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Rupert Howes: MSC is 20 years old. It was founded by WWF and Unilever and the whole focus is on ecological sustainability, trying to reverse the decline in global fish stocks.

Q113 **Kerry McCarthy:** Could you just explain what Unilever's involvement in that was?

Rupert Howes: Unilever at the time was the biggest purchaser of frozen white fish. They owned Birds Eye, Igloo, Gorton's in America. You had this wonderful commercial and biggest conservation organisation coming together to create a market-based programme to complement public policy.

To answer your question, though, I look at Iceland, Norway, our own country here in the UK, where segments, units of fisheries, have come in and we now have over 50% of the landings of Iceland, Norway and the UK. Iceland has just announced that they have 90% of their landings either certified or under assessment.

I think that in the 40-odd submissions that I have read to this inquiry there is lots of evidence of real change being delivered. BirdLife International in South Africa talk about the South African hake fishery. This fishery is entered into assessment. There was a lot of controversy from many NGOs at the time, and indeed through the assessment process they established there were two stocks of hake, not one. One was overfished. They were killing over 10,000 seabirds every year, the majority Wandering Albatross. By using the MSC as a tool, WWF South Africa, and BirdLife International, working closely with the Government, improved that fishery to the point that there has been a 99% reduction in albatross deaths. The industry has said MSC has helped win export markets and protected predominantly female production jobs—12,000 onshore.

Q114 **Kerry McCarthy:** How many fisheries around the world are still compartmentalised?

Rupert Howes: I think to a degree all of them. That is the way that market-based programmes complement public policy. They define the unit. However—

Q115 **Kerry McCarthy:** So that means they have sustainable and unsustainable fishing going on?

Rupert Howes: We would say sustainable and unassessed and over time they bring those other units in.

Q116 **Kerry McCarthy:** Unassessed means they are sustainable but you just have not got around to it; is that what you are trying to imply?

Rupert Howes: Again, it is very important to stress that MSC is a standard holder through a multi-stakeholder process involving 300 entities, Governments, NGOs and seafood businesses around the world. Our standard for environmentally responsible fishing was developed



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based on the United Nations Code of Conduct for Responsible Fisheries. We are essentially trying to operationalise the code of conduct.

Fisheries come forward and they are assessed against that standard and we try to recognise those who have achieved certification awarded by an independent certifier. MSC has no influence on the outcome of that process. It is entirely based on transparency, stakeholder engagement and evidence. Sorry for a verbose response.

Q117 Kerry McCarthy: My point is you are saying if something presents as sustainable you will assess and certify and they will benefit from that, but you do not have, as I understand it, any policy objective or any ambition to phase out the compartmentalisation of fisheries. What is your approach to unsustainable fishing other than this theory of change principle that means people will come forward because they want to get their badge and will change their ways? How proactive are you?

Rupert Howes: It is very important to recognise that MSC is a voluntary market-based programme. We see the organisation as part of a broader sustainable seafood movement that is trying to help move the markets and production on to a sustainable footing to complement public policy reform. That is our role. Sorry, the question again was?

Q118 Kerry McCarthy: This is a marketing exercise. It is rewarding sustainable fishing, but do you go beyond that? You said you were set up by WWF, which would suggest that you had an ambition to promote more sustainable fisheries, but to me, apart from this concept of theory of change, which means that other people will see that you benefit from a blue tick and follow suit, you do not have a proactive agenda for trying to phase out compartmentalised fisheries or unsustainable fishing. That is not your business. Is that right?

Rupert Howes: No, absolutely not. Our oceans are in trouble. We absolutely welcome this inquiry. It is incredibly timely. When I look at "Blue Planet", growing political interest, the Sustainable Development Framework, this is the time to fix the problems in the oceans. MSC is singularly ambitious. We want to see global fisheries fish sustainably. It does not mean they have to be MSC certified. Yes, we do have concerns on policy, but we are not a policy organisation or an advocacy or a campaigning organisation. It sounds a bit boring, but we are a crusty old standard setter trying to use certification, labelling and science to influence behaviour. That is our contribution to shifting the entire sector.

I was privileged to speak at the UN's inaugural conference in New York in June last year, and in my three minutes I made a point of stressing MSC's ambitions to work with our partners to engage 20% of fisheries by 2020 and a third of landings by 2030 as our contribution to delivering the SDG framework. I used 180 seconds to say, "We cannot do that alone. We need public policy reform, the implementation of harvest control rules and effective harvesting to enable more fisheries to achieve certification ultimately and high performance".



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Q119 **Kerry McCarthy:** Do you not think your acceptance of compartmentalised fisheries mitigates against that, makes it more difficult to achieve that?

Rupert Howes: No, because when I look at the evidence that has been submitted, I look at our 20-year track record. We produce annual global impact reports that have documented over 1,200 improvements delivered by small-scale and large-scale fisheries in the developing world and the developed world, including reduced bycatch of birds, voluntary closures and introduction of MPAs. We have had peer-reviewed literature that has shown that MSC-certified fisheries tend to have more stable biomass than non-certified stocks. I think incrementally we are driving change.

If you required such a holistic approach right from the beginning, the Scottish industry probably would not have entered the programme. It has taken them a decade to build that trust and understanding, and again that is reflected in their submission to this inquiry.

Q120 **Zac Goldsmith:** I am going to put my question first of all to the MSC, to Mr Howes.

Chair: Zac, declaration.

Zac Goldsmith: My declaration, absolutely right. Apologies, Chair. Like Kerry, I am also a supporter of On The Hook. There is no financial relationship, but I have been following and supporting the campaign and communicating with you as part of that campaign, as you know.

Can you just explain for a non-expert like myself, and I guess most of the people around the table, the rationale behind certifying the PNA again this year despite the recorded incidents of 429 silky sharks having been finned by that same fishery? It just does not make any sense at all, it seems to me, for an organisation that is the hallmark in terms of sustainable fishery to provide that hallmark to an organisation engaging in something that everyone regards to be worse than bad practice, and which I believe is even banned by the nations that sign up to the PNA.

Rupert Howes: Absolutely, shark finning is abhorrent. Nobody wants to see shark finning. The MSC board banned shark finning from the programme. We have dealt with that not through a scope issue in terms of fisheries coming forward but from a scoring perspective. The independent scientists go in and assess the fishery, look at the evidence and have to make sure that if any shark finning is detected it is not systemic throughout the fishery.

The Governments of the Parties to the Nauru Agreement fisheries also banned shark finning in 2013. Although you are quite right that 429 examples of shark finning were recorded, that is over four years and the trend since the PNA brought in this ban, and with the incentive of MSC saying it is banned, is downward. In the last reported year there were 14 instances, which is still too many, but by being engaged in the MSC programme they have the incentive to reduce that further.



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Q121 **Zac Goldsmith:** The figure I cited, the 429 sharks, that is up to 2015, and I think that it covers the four years before that. Those are the most recent figures I believe that are publicly available. I do not doubt the figures you just provided, but could you make those figures available to the Committee, figures you have from 2015 up until now, that demonstrate that downward trend that you have just described? Are you happy to do that?

Rupert Howes: Can I quickly clarify? Obviously, MSC is the standard setter. We do not certify the fishery. The figures you are quoting and I am quoting are the publicly reported figures in the assessment reports. The trend data, you are quite correct, was over four years. The most recently reported data was 2015. We are waiting, the certifiers are waiting, on the latest data, but we have to remember again that these are small island developing nations, with multiple languages. A lot of them are paper-based systems. They are having to collate all of the information from a number of observers with different vessels. It takes time. When that is reported to the management agency, the certifiers will get it and they will definitely be looking at it as part of the annual surveillance audit. When we get them we will make them available.

Q122 **Zac Goldsmith:** Is that not worrying, then, that you have recertified the PNA this year despite the fact that—I think this is what you have said—you do not have any evidence of what has happened over the last three years? The last known evidence suggested a very significant number of a rare endangered shark had been finned—429 of them. Silky sharks are categorised as vulnerable under the IUCN. I believe it is also the case, but I am willing to be corrected on this, that shark mortality in the PNA has more than doubled since it was first certified by the MSC, so the overall trend is upwards—the wrong direction—rather than downwards. There is this three-year blackspot about which we know nothing, yet at the end of that blackspot you have provided your certification.

I want to contextualise, if you do not mind the question, because I am a believer in the MSC, partly because it is a monopoly. It is the only game in town, pretty much, and I believe in sustainable seas and sustainable fishing. It is absolutely in my interest and that of anyone who cares about the future of the oceans that people have confidence in the MSC. This example that I am scrutinising with you now, I am afraid, does not give me any confidence that that blue tick is as meaningful as it should be. I will ask you again: how can we have confidence in your decision this year to recertify the PNA, given how little we know about the last three years and how much bad stuff we know from the previous years?

Rupert Howes: Again, just to reiterate, MSC does not grant certificates. The certificates are awarded by the independent certifiers. Not only is the fishery certified for a five-year period and has to go through a full recertification five years later but every year those auditors go back in on what is called an annual surveillance audit and look at the latest evidence.



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That trend has gone down. MSC is premised on evidence and what is available, but we are dependent on the management agency to provide that evidence. Everybody is watching, but to put it in context, 14 instances in the last reported year is an incidence rate of 0.14% from the observed sets. You have non-certified fisheries reporting instances of shark finning in the tens of thousands, so I would argue that the PNA is doing the right thing. The stocks are healthy. This is adding value to small island developing nations, helping them win export markets and giving them the incentive for continual improvement, but as soon as we get the data we will share it.

- Q123 **Zac Goldsmith:** Just a couple more questions. Is it the case that the 429 that have been reported represents only the shark-finning incidents occurring in the MSC-certified part of the fishery?

Rupert Howes: Correct.

- Q124 **Zac Goldsmith:** There could still be many thousands happening outside of that certified compartment?

Rupert Howes: That is correct because that is what the auditors have looked at.

- Q125 **Zac Goldsmith:** Can I ask you then, if you could—

Chair: Sorry, before we move on, Mr Howes, you said that it was 14 in the last recorded year. Do you have the data for the previous years?

Rupert Howes: Yes. The assessment report provides the downward trend over four years.

- Q126 **Chair:** What are the numbers for 2016 and 2017?

Rupert Howes: I do not have it exactly to hand, but from memory I think it started off at a couple of hundred and it has been on a dramatic decline, but, again, we will provide that afterwards.

- Q127 **Zac Goldsmith:** If you could provide that information, that would be very useful, and if you could also provide any kind of evidence of sanctions that have been taken against vessels that break the rules, that would also be useful. I do not think that exists publicly, but it would be very useful to have that if it does exist publicly.

Then the last point I want to make is that I know that WWF was involved in the formation of this organisation 20 years ago, and we know all about WWF and their priorities and why they exist. Just to broaden the context a bit, WWF International has been critical of the MSC for precisely the reasons that are implied in my questions and questions before by Kerry and, in fact, by On The Hook. They put out a statement in March this year, "There is still much more to do if the MSC is to evolve as scientific knowledge and practical experience continue to grow". They go on to criticise the compartmentalisation approach.

My final question to you is a general one. What attempts are you making



given that not just On The Hook but a very large number of conservation organisations, eminent international ocean scientists and marine biologists are increasingly critical of the approach? What are you doing to examine your own practices with a view to reassuring people, and the experts and the conservation organisations, that that blue tick is something in which we can have confidence?

Rupert Howes: MSC is premised on a high degree of transparency and stakeholder engagement. We welcome constructive criticism because that is how the programme improves and how we scale and drive change in the oceans, not directly but through the leadership of our partners. The strength of the programme is our governance. I report to an international board of trustees, two from science, two from the market, two from NGOs, including the ex-Director General of WWF, and the rest are made up of independent experts. We have a stakeholder advisory council, again made up of scientists, NGOs and seafood businesses. In fact, Louise Heaps sits on our stakeholder council. Importantly, we have a technical advisory board made up of some of the leading fishery scientists and supply chain experts in the world.

We have processes to engage stakeholders and we are committed to continuous improvement. Every five years we review the standard for sustainable fishing in a very inclusive way. The specific criticisms raised by WWF, On The Hook and others are taken into these processes and reviewed in a multi-stakeholder transparent way. For example, in the next standards review endangered, threatened and protected species is a core issue for many NGOs and they have asked MSC to look at that and how we can strengthen our standard in that respect. We will do that. We will review our objections process. In the same way, at the last standards review, again WWF raised a lot of concerns about vulnerable marine ecosystems and the standard was strengthened to increase the requirements on fisheries to report on their benthic bottom impacts on vulnerable marine ecosystems.

Again, I think that it illustrates how the programme delivers continuous change because fisheries in Iceland and Norway that had no conditions to their assessment under our old standard are now getting new conditions to conform to these new requirements. That is how we bring it in and bring improvements.

Q128 **Chair:** Before we move on to Alex's question, I just want to hear from Dr Heaps; I like to hear a lady speak. I would like to hear about what your current criticisms are and what your response is. You are sitting in between the two points of view there. What is your considered view?

Louise Heaps: WWF does obviously acknowledge the important contribution that the MSC has made in terms of sustainability of fisheries. They have been a game changer globally over the last 20 years. What we are seeing is that the external environment has changed significantly over those 20 years. We are seeing a lot more expectations in terms of



governance from consumers and from ourselves in terms of other aspects of the ecosystem, not just on the target species.

We have also seen that a number of fisheries more recently—and this is not all the fisheries out there that are certified—we would say were higher risk and we have questioned why they have become certified. This has thrown up a number of gaps in the process and in some of the standards. We have been able to articulate quite clearly where we see that there is a need to strengthen the system and also strengthen the standard.

This is around building stronger checks and balances in the decision-making process. We have been in discussion with the MSC and with the MSC board on all of these issues as well. I just wanted to highlight that. We want stronger checks and balances. We have concerns that some of the decision making is in the hands of the certifier alone, so there could be other mechanisms to strengthen that and to make sure that there is independence in the system.

On top of that, there are a number of standards that we feel need to have stronger measures in there. In particular, our concerns are around the endangered, threatened and protected species and around habitats and making sure of compliance with the objectives of marine-protected areas, for example.

I think we have outlined our concerns very clearly. We have taken this to the highest levels of our organisation and to the highest levels of the MSC. We are optimistic that the MSC is taking these seriously, and our expectations are to see some important reforms happening very quickly. Certainly, in terms of the checks and balances side of things, that can happen outside of the standard review so we are hoping that that will happen immediately.

Chair: Thank you. That is very helpful. We are going to move on.

Q129 **Alex Sobel:** I want to return to the role of the ASI. So Sönke, in terms of the accreditation process some of the things that were underlined from these discussions were whether there was a commercial interest at play when the CABs were hired and appointed by the fisheries, because the fisheries obviously have an interest in being certified.

Sönke Fischer: It is a very interesting question. Looking around in our environment, any private process we see is normally coming from a third-party certification process following this model, which has an independent certification body in a market-based economy appointed by a client. Conformity is then verified against a set standard. It is important to have checks and balances in place to mitigate any risks arising. The certification body itself is an institution set up to have these checks and balances so there are reviews if any interest dominates or puts pressure on the audit process. There is a whole set of checks and balances inside this certification body, plus MSC and other leading sustainability



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standards have put in place significantly more checks and balances. There is this complete transparency; everybody can scrutinise an assessment process. Everybody can attend an audit and be interviewed by the assessment team and make written submissions. All written submissions have to be responded to. There is complete transparency for stakeholders.

Then there is also an independent peer review by two senior scientists. These are appointed independently of the certification body and the certification body has to respond in writing to all the points made by the peer reviewers. Then, even if these systems fail, there are independent dispute resolution mechanisms. Most importantly, probably, there is also ASI as a specialist accreditation body watching over this whole process. We regularly audit certification bodies with an expert team globally—fisheries, scientists, marine ecologists—and we follow audits and verify competence and conformity. If there are some failures or some deviations from the process, we issue non-conformities to the certification bodies. These are areas they have to correct within a given timeline; they also have to explain the root cause of the problem and how to prevent recurrence. If this is not addressed, then we have the means to suspend certification bodies and basically stop them from operating. I think that in essence it is a very common system in a market-based economy, but voluntary standards like MSC have put many more safeguards in place on top of this mechanism.

Q130 Alex Sobel: How often do you get challenged in terms of the accreditation process of the ASI?

Sönke Fischer: Challenge from whom?

Q131 Alex Sobel: From people who say that the process has not been undertaken correctly, or has not been properly independent.

Sönke Fischer: I think we seek input actively and then we have the means on our website for whistleblowing, for highlighting information. We work very closely with stakeholders and seek input on aspects where people perceive that something went wrong, and we appraise all this information and then target our activities based on this information. It is a continuous process for us to get this information as part of our daily life; to get this input.

Q132 Alex Sobel: Have CABs ever been removed from undertaking the assessment process?

Sönke Fischer: We allow only 10 certification bodies to do fishery certification worldwide. In the last five years, five of them were suspended for, in one case, up to one year, in the other cases up to six months. The suspension meant they could not take on board any other business, so it is quite a significant public measure and it is also transparent on our website, all this information.

Q133 Chair: Where were those fisheries? Where were those bodies operating?



Sönke Fischer: Where?

Chair: Yes. What fisheries were those suspended bodies certifying?

Sönke Fischer: Some of the certification bodies were among the largest in the programme; that was in 2012 or 2013. I will have to look up the precise data. Other certification bodies were smaller certification bodies focusing on one or two countries, but it is significant certification bodies. It was a significant body, one of the largest.

Q134 **Alex Sobel:** We can find that on your website?

Sönke Fischer: Yes, and I can also provide an overview afterwards and details to make it easier.

Q135 **Alex Sobel:** Turning to Louise, do you think greater safeguards are needed to ensure that the CABs do not have a commercial interest in approving certification? Does WWF have any wider views about looking at the way the process is run?

Louise Heaps: Very much so, yes. That is one of the key concerns and issues that we have raised with the MSC. We are not saying that all certifiers are a problem. That is not the case. Many fisheries out there are certified well and are acting well and we are happy with them, but we have experienced cases where we have felt that there was not full independence with regard to the certifier. Even if that is not the case, the system is such that it comes under question, and this has been going on for many years. We are suggesting that the system should be tightened to make sure that the certifier is not the only body finalising and making decisions and that the best scientific evidence that is out there is leading the decisions and making them robust.

Q136 **Chair:** Are there any particular conformity assessment bodies that you were concerned about?

Louise Heaps: I do not have a specific one and I think the ASI are the people who would identify those.

Q137 **Caroline Lucas:** The first question is for Mr Redfern. In your evidence you say that the MSC process is inherently skewed in favour of large-scale industrial fishing, and I wondered if you could explain why you say that.

Charles Redfern: Can I come back on the organic example that Rupert Howes just gave about segregation first, justifying that you segregate territory and organic? A company can be doing farming in one field organically and in another field non-organically. It is something that is fundamentally different between the MSC and all other symbols. All the others are property-based so you know that every rule that is applied in organic is applied on that piece of land and you know that it fits that standard—the same with Fairtrade or another certification. They are property and land-based.



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The MSC is in quite a different territory where you are certifying a common stock, this idea of a compartmentalised fishery being completely different when the stock is completely the same. FADs have doubled in this fishery. There are apparently 70,000 floating FADs and they—

Q138 **Chair:** Can you explain what FAD is?

Charles Redfern: One of you mentioned it earlier, but I was told not to overcomplicate it. It is the bad method of fishing with purse seines and the better method of fishing with purse seines is FAD free. The compartmentalised fishery is fishing with both and that is the issue. This idea that, "Oh, it is just like organic" is not true. It is not just like organic. There is a complete difference with the MSC. The stock is in the commons and then that brings another difference. Organic is also a regulation. It is an EU regulation and it is a UK regulation. In the US it is a regulation. In Japan it is a regulation. This is a standard from the private sector with a lot of stakeholders, but the stakeholders divide and there is a pro and against camp right across the NGO world, the corporate world and the fishing world. The pro one is invested in this theory of change idea, and this answers your question more directly.

The theory of change is the idea that if we can impact the large scale it is better to do a small movement on the large scale than just to reward what is already good. If you look at tuna as an example, historically it is the purse seine fishers that have come in and destroyed the stock. It used to be pole and line. Longlines were very bad, but they were not fishing a lot. In any sea, it is the purse seiners that are over fishing. Suddenly they come along and they get rewarded with this gold standard of sustainability and, in fact, they are not the gold standard. They are just a little bit better than worst. We are trying to do a theory of change. We are trying to have an impact. We are trying to do that without upsetting the distribution system that exists—the retail industrial distribution system.

I want two truths. I am not going to say, "Let us go back to the middle ages with just artisan boats". We are talking about collateral damage with the artisan boats because when you say, "This purse seine system is now gold standard", we are talking about collateral damage. We are talking about taking the gold standard away from what I deem to be the real gold standard.

I do have figures that I can let you have later about the global bycatch and all of that, but just for this, relevant to the Western PNA, I picked this up. It is a paper on subsidies to tuna fisheries in the western central Pacific Ocean. Rupert said, "It is small island systems that we are helping". It is actually the massive long-distance foreign water boats that control the fishery. They are the ones that fish in it. Three companies own, I think, 25% of the total global tuna catch and about 900,000 tonnes of fish in the WCPO waters; three of the major fishing companies. These are the guys that are behind Pacifical, which is behind the certification of the Western PNA.



To go to that quote, "Developed countries are responsible for more than half of the subsidies spent in the predominantly developing region, underlying the fact that the majority of tuna value extracted from the national waters of developing countries in the region benefit larger, developed countries. The total resource rent, or return to society, from tuna fisheries, once adjusted for subsidies, is a net negative US\$750 million in 2009". It is a bit old, but it is still relevant, I think. "Fisheries subsidies are enabling foreign fleets to operate at sub-market rates, putting local fleets out of competition for their own fishery resources."

Crux number one of the matter is who is representing the non-industrial boats? Who is valuing them? This is not just the MSC. It is the whole MSC support system. It is the retailers. It is people like WWF. It is other NGOs that are married to this theory of change of, "Let's get in at the industrial level" and, in fact, they forget about the small sailboats.

Q139 Caroline Lucas: I should have said beforehand in terms of declaration of interests that I was listed but, like Kerry, I have stepped back for the purposes of this inquiry and because I want to know where the funding comes from. I want Mr Howes, if you would, to respond to what you have just heard from Mr Redfern.

Rupert Howes: There is an awful lot there to try to respond to. First and foremost, as I said earlier, our oceans are in trouble. The UN has reported that there is a three-fold increase in classified stocks as overfished or depleted. That is just in the last 30 years. Fifty percent of stocks are fished as hard as they can be. They are fully exploited, and production from our oceans has gone up five-fold since the 1950s. It is imperative that we manage our oceans sustainably and holistically for food security, for livelihoods and for ocean resilience.

MSC is not perfect, but I would argue our standard is high and robust. We only have 14% of fisheries demonstrating that they can meet that standard. We follow, for credibility reasons, the United Nations guidelines for credible certification and labelling programmes, which stipulates we cannot differentiate between gear types. Charles is right: certain gear types are inherently lower impact; pole and line, for example. Our programme has to be open to all gear types. We cannot exclude any gear type, with the exception of any fishing with explosives or dynamite, which the UN obviously believes could never be operated sustainably.

We are open to all fisheries. We have a high level of small-scale developing world fisheries engaged in the programme; we have over 40 developing world fisheries. Many of these illustrate what we have referred to as the theory of change, but I would argue after 20 years is a proven theory of change. We have evidence to show that change is being delivered; 1,200 impacts reported in our last global impacts report. I look at the Ashtamudi clam fishery: 9,000 fishers, eight co-operatives. They have rebuilt the stock, they are winning new export markets and they are adding value.



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It is also important to realise that, although MSC operates a high bar pass/fail certification labelling programme, as the organisation has grown we are beginning to hypothecate some of the income we generate from the use of the label and we have created a Global Sustainable Fisheries Fund. We are channelling funding on an application basis back to small-scale developing world fisheries in Indonesia, South Africa and Latin America. We call it our Global Sustainable Fisheries Fund. We have already distributed £400,000.

It is not just about MSC, because I mentioned we are part of a broader movement. There is a whole space that sits below certification called Fishery Improvement Projects; WWF, O2, Sustainable Fisheries Partnership and other organisations partner with a fishery, often with business, to look at that fishery. They are using the MSC standard as a framework for developing improvement projects, which are all listed. There is a website called fisheryprogress.org that lists over 106 FIPs, as they are called, 80% of which are based on an MSC standard.

As we have grown and as we have more resources, we are trying to target small scale and engage them, because all of the social issues that Charles mentioned are super-important. It is about food, livelihoods and environment, but as a programme premised on the FAO, we cannot preclude purse seiners, as was mentioned.

Q140 Caroline Lucas: Can I come back to Mr Redfern for just a second? I just wondered if you would agree there is a potential contradiction in your argument. On the one hand you want the MSC to adopt tougher, stricter rules, but on the other hand you want it to be easier for smaller-scale fisheries to pass the accreditation process. Can you just explain how those fit together?

Charles Redfern: Yes, very easily. The MSC has three pillars: science, management and methods. It has been historically weak on methods. I think it is beefing it up, but it has been quite weak on methods because it allows all methods, in my opinion, in the worst cases. Weakness on methods: it is debatable, because I think there is a flip of a coin on, "This fishery is sustainable, this isn't". The more I have learnt about fisheries the less I know, so I do not really want to comment that much on the situation of total fish stocks. It is very different to call that, and I think that should be in the public sphere, calling the fisheries stocks. What was the actual question there?

Q141 Caroline Lucas: Is there a contradiction between on the one hand wanting to have tougher, tighter rules in the MSC and at the same time wanting them to be easier for smaller fish accreditation to happen?

Charles Redfern: What I am saying is that there should be two versions of the truth. One version should be for the industrial boats and one version should be for the—

Q142 Caroline Lucas: You mean two different kinds of certification standards?



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Charles Redfern: We do not have to have one truth, yes. I would love it if Rupert helped. We are trying to do this through Slow Fish, but we are all very poor, we are all small companies or fishermen, so we do not have the resources. But yes, for example, Atlantic tuna would not be able to be certified under MSC because of what other people have done. This is always the case.

Q143 **Caroline Lucas:** I am sorry, what do you mean?

Charles Redfern: By the fact that it has been overfished by the purse seiners historically. That just seems absolutely ridiculous to me.

Q144 **Caroline Lucas:** Let me get it clear then. You are suggesting that we set up a new certification system that is specifically for small artisanal fishing?

Charles Redfern: That would be great, yes, if that is possible. I think then it should be supported at retail level and so forth so that the retailers are not saying just MSC, but saying, "Yes, this other symbol is good" and trying to promote it and saying when—

Q145 **Caroline Lucas:** Do you think that given what you know—as obviously you do know a lot about the MSC model—it could not do what you are suggesting and, therefore, that you need two separate bodies? If that is the case, then I am wondering why you are challenging quite so much, if you are accepting that their model does a certain thing and you want a different tool to do something slightly different.

Charles Redfern: There are two things that I said at the beginning. One is that there is a need for a different model and that model is not there. It is not the MSC's fault per se, but the whole buying structure is saying MSC or not. Therefore, in this fear of change, there is a collateral damage on all the small-scale fishermen, not just mine in the UK. I am having exchanges outside of On The Hook, outside of Make Stewardship Count, within the Slow Fish movement. I have had an answer from Denmark, Mexico, Japan and Italy, all pointing out different aspects of the problematic nature of the MSC insofar as they are concerned in their small-scale fishing.

There is an argument for something different, but wherever you go, you are told, "MSC equals sustainability, end of". I think they have to leave and say, "We are not the gold standard". As far as I understand, 90% to 95% of their fish—I do not think they have published figures—are from industrial fishing in volume terms, so for me, I want them to keep the industrial logo and say there are other approaches, and I want the whole MSC support system to stay the same. That is what I would like, ideally.

Q146 **Chair:** Do you want to make a quick response, Mr Howes, and then we will get to the climate bit?

Rupert Howes: Yes. MSC is not perfect, but we want to engage with fisheries globally. We want continually to improve our processes and



procedures. We have small-scale fisheries engaged in the programme: the Ashtamudi clams, octopus fisheries, sole fisheries in Africa and Asia. We have recently won a postcode lottery award from Holland, where we are working on what we call project preassessments in Indonesia, South Africa and Mexico that bring together many—in the tens of—small-scale fisheries to use the MSC framework to improve.

In fact, in the UK we worked with DEFRA support to look at what we called Project Inshore, an eight-year project that looked at an MSC preassessment of 400 inshore fisheries under 10 metres. In fact, the right honourable George Eustice said that Project Inshore provided exactly what they wanted, which is a route map for these fisheries to improve their performance. Some of them are going forward.

Q147 Caroline Lucas: Very last question, sorry. We heard last week that large fishing operations generate higher emissions by travelling longer distances than small, localised fisheries. I wanted to ask if there are any moves to take the carbon footprint of fisheries into account in MSC certification.

Rupert Howes: I think climate is the biggest threat to the ocean. It is a very good question, but when you look at the combined emissions from fisheries, livestock and agriculture, fisheries is 4%. The challenge MSC faces is that we are already seen as complex and costly. We have over 700 pages in 11 scheme documents, and it is hard enough for the fisheries to pass the ecological component. It is not to dismiss the importance of climate, but we have welfare groups wanting to look at how fish are killed; we have climate groups wanting us to bring in climate and to bring in social.

We are evolving in that area, but there is evidence about the MSC-certified fisheries. The stocks are healthy. We have an absolute example of this in Iceland, where the fish take has doubled and the carbon footprint has halved, because the stocks are operating sustainably. They are closer to shore, there is less steaming out to get to them and the boats catch more fish when they get there. In fact, seafood—it is one of the reasons why I am so passionate about this—is 100 million tonnes of low carbon, high-protein food taken out of the oceans every year. It is very good from a carbon perspective.

Q148 Caroline Lucas: Sönke Fischer, do you want to add anything?

Sönke Fischer: On the carbon topic, market-based analysis tools are very effective for certain topics and are proven to be effective, but I think there is also a role for governance. On carbon and fuel, I think there are subsidies also for fuel and there are actors that are much more powerful with regulation. I feel it is important to say what the places are where voluntary staff have a role and where they have the voluntary traction and what the places are where other actors have to step in. Sometimes this was probably not discussed openly and honestly enough and then false expectations were raised.



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Maybe if I make another second small point, I think this dichotomy about small scale and industrial is a wrong one. It is more difficult for small-scale fisheries, yes. There are more barriers probably for everything, access to finance, lots of other topics, and therefore also the journey to global sustainability standards is a longer one. That is something most standards systems recognise. The Forest Stewardship Council was set up to solve the problems of the tropical forest and they were first successful in the boreal northern forest. That is the same as other standards systems. It is just harder to get to smallholders, harder to have capacity building, harder to reach them. I think you need a review of barriers to entry and then consolidated forces of different actors together.

Q149 John McNally: I am mindful of the time now. I, too, am a signatory to On The Hook. You said earlier, Mr Howes, that this is good and it is a timely inquiry. We are at a privileged moment in time, thanks to "The Blue Planet" making us all aware of the need for conservation throughout the whole world.

I want to take you back to the objections process within your MSC. An academic paper published in 2013 reviewed all the formal objections raised against fisheries proposed for MSC certification between 2000 and 2012. In this period, conservation organisations and other groups had filed 19 formal objections to MSC fisheries certification. Only one objection was fully upheld and the fishery was not certified. Why are so few objections to certification decisions upheld?

Rupert Howes: The objections are one aspect of the checks and balances to the independent certification process. It is important to realise that we estimate that 50% of the fisheries that come forward for a preassessment are told, "Do not go forward, you have issues to fix". We already have a screen right at the beginning. Fisheries then go forward through assessment and we have an objections process if engaged stakeholders disagree with the outcome. That enables an independent adjudicator to look at whether or not that certifier made an appropriate decision in terms of scoring or whether they made a procedural error or any conditions—

Q150 John McNally: There are not concerns against the independent adjudicators here, because the independent adjudicators are appointed, if I remember correctly, by the fisheries.

Rupert Howes: Again, reflecting stakeholder comments, MSC has introduced what we call—I am sorry, it is the peer review. The independent adjudicators are appointed, I am pretty sure, independently. The panel might want to ask Sönke about that. I am having a momentary lapse.

Q151 John McNally: I would quite like to get a definite answer on that one.

Rupert Howes: Can I quickly respond, though, to your point that very few objections have resulted in fisheries losing the recommendation and not being certified? Most objections have resulted in fisheries having to



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improve their action plans. They have resulted in them having to implement additional conditions, and in many cases there has been lower scoring. I think three fisheries have, on the objection, been told we are overturning the independent adjudicator's decision. The process does work. Is it perfect? Perhaps not, but again, as part of our commitment to continual improvement, MSC has said we will review our objections process next year.

Q152 John McNally: I am mindful of the time, Mary. On that point of review, would you agree then to an absolutely totally independent review of how the system works?

Rupert Howes: It is an independent review. MSC has no influence or control over the outcome of that review. It is a separate review of the evidence by an independently appointed adjudicator, but they cannot rerun the certification. What we might look at is whether there should be more than one person making that final decision; should there be an opportunity to bring in more expert opinion? These are some of the issues WWF has raised that we have discussed with them and that we will look at.

Q153 John McNally: I wonder if you could comment on that yourself then, Louise.

Louise Heaps: Exactly. We would like to see more checks and balances in the objection procedure so that the certifiers themselves are not the only ones that are responsible for looking at the scientific evidence and making a final decision. Perhaps a third arbiter would be brought in if there was no agreement between a peer reviewer and a stakeholder and the certifying body. A third person could be brought in to look at the science behind it and make sure that agreement is reached.

Q154 John McNally: I think the mere ask of that question would promote some sort of response and that is probably what is required here. I think, as Zac said earlier, we are all quite happy to see MSC carrying on the way it does, but it needs to be improved. Things evolve; you have said that yourself. We need to be reassured. I think there were 66 organisations that wrote in January this year. That raises alarm bells, doesn't it? I think we need to feel reassured that you are progressing in the right way.

Rupert Howes: Chair, if I may, my momentary lapse of memory: the independent adjudicator is appointed not by MSC, not by ASI, but by the lead adjudicator that looks at all of the objections and then allocates one of our registered adjudicators, just to clarify that.

Q155 Chair: Mr Fischer, do you have any final thoughts on this objection adjudication?

Sönke Fischer: Just to add that it is unique. I think that MSC is the only system that has such a powerful dispute resolution mechanism as an objection, because it basically pauses the certification process, bringing it



to a halt at the last minute. I do not know about any other standard systems. In addition, it also has a complaints mechanism. Any party can raise a complaint at any time in the process. This is administered by us and the two independent dispute mechanisms and the complaints mechanism are free of charge, so it is a very accessible mechanism.

It does not have the power to stop the certificate, but it is the power to review whether the certification body adhered to requirements and whether the decisions were justified? If not, it may lead to the certification body losing the accreditation, which then may have add-on effects that anything wrong must be corrected.

Q156 **Chair:** Thank you. Mr Howes, based on what you have heard today, what changes can we expect to see in the MSC's standards over the next 12 months?

Rupert Howes: MSC, on the 25th of this month, will be issuing the terms of reference for our next fisheries standards review. We are welcoming all stakeholders—On The Hook, Make Stewardship Count, WWF, industry and Governments, to engage in that process. We will be looking at some of the core issues that we have touched on in this inquiry in terms of endangered, threatened and protected species and so on. That will follow prescribed UN processes and timelines in terms of implementation for any changes that are brought in.

But responding to Dr Heaps' comments about assurance, absolutely right, there are opportunities to move more quickly on aspects of assurance, ie how the certifiers are performing. We will be working again with those stakeholders to look at aspects of the assurance programme and to try to bring in some improvements more quickly.

I guess my concluding comment, though, is that MSC is not perfect, but it has fantastic governance and a commitment to continually improve. I think sometimes there is a potential danger of expectations of perfection sort of detracting from the good work that is going on through the leadership of engaged fisheries and indeed market players—we have not really talked about the market at all in this panel. Their engagement and support for sustainable fisheries is having a profound impact on the water. I just wanted to get that acknowledged.

Q157 **Chair:** Because they are prepared to pay a premium price for the blue tick and that is where the theory of change comes in?

Rupert Howes: Interestingly, it is not just about price premium. I have just come back from Korea last week, where Korean retailers and Korean producers are saying, "We want to do this because it is the right thing". Companies and fisheries are made up of people and it is not always the profit motive. They want to do this because of "The Blue Planet" and other education. They are aware that this is a real issue, so many people do this because they believe it is the right thing. It is important if there is a business. Again, interestingly, when the Hastings fleet was MSC



certified they were getting significant price premiums, access to new markets, and at the very least preferencing their markets.

But if I go to Western Australia, where, in fact, the Western Australian Government did due diligence on credible programmes, they chose MSC. We are not a monopoly. I think there are three or four, if not five, schemes recognised by the Global Sustainable Seafood Initiative. The Western Australian Government chose MSC and has leveraged \$14 million to pay for all of their fisheries in Western Australia—of which many are small community fisheries—to go through that preassessment, as we have done with 400 fisheries in the UK, and to develop route maps to improve. Many of them are now getting certified.

I mention that anecdote because one of the big drivers was licence to operate and to improve relations with communities, where there is often tension between communities and recreational fishers and commercial fishers. So the motives are very varied.

Chair: We have to leave it there; we are out of time. Thank you all very much indeed for your evidence this morning.

Examination of witnesses

Guy Linley-Adams, Dr Adam Hughes and Ben Hadfield.

Q158 **Chair:** Please do not take it personally. It appears as if we have a walkout from our audience, from members of the public. This is our final panel today. You are all very welcome. Could you please introduce yourselves from my left to right?

Ben Hadfield: Good morning. Thank you for the opportunity to appear. My name is Ben Hadfield. I represent the Scottish Salmon Producers' Organisation, but I am also Managing Director of Marine Harvest in Scotland and the COO of their food operations globally.

Chair: Can you sit forward a bit, please, and please speak up when you reply, because we have quite a lot of background noise and noise in the corridor as well? Thank you, Mr Hadfield.

Dr Hughes: Morning. My name is Adam Hughes. I am a senior lecturer in sustainable agriculture at the Scottish Association for Marine Science. I also chair the University of the Highlands and Islands Aquaculture Group and I am the convenor of the Marine Alliance of the Science and Technology Scotland Sustainable Aquaculture Forum.

Guy Linley-Adams: I am Guy Linley-Adams. I am a solicitor in private practice, both in England and Wales and in Scotland, and instructed in relation to aquaculture by Salmon and Trout Conservation Scotland.



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Chair: Thank you very much, you are all very welcome. We are going to start off with a question from Colin Clark.

Q159 **Colin Clark:** We have heard evidence that by 2030 as much as 63% of fish could be coming from aquaculture. There is a hugely ambitious plan or target to grow aquaculture in the UK from £1.8 billion to £3.6 billion. These are massively ambitious targets. Could I ask Mr Hadfield how much scope there is for aquaculture production to grow in the UK?

Ben Hadfield: I think there is significant scope on the west coast of Scotland and for other species production in the south of England and Wales. We currently employ around 10,300 people in the Scottish industry, which is by far the largest in salmon. There are around 165,000 tonnes. There is clearly ambition for growth. We need more protein produced from the sea, because of some of the comments and evidence that you heard in the previous session about its low carbon footprint and its health benefits, addressing the CO₂ emissions, which largely come from other protein products like beef, chicken and pork.

It is very important to state that the industry is acutely aware of this, that any growth must be in the right place and it must be sustainable and it must have regard to the stakeholders and natural heritage around the marine and freshwater sites. The short answer to the question is huge potential for growth and value creation and employment creation, but definitely in a sustainable and transparently sustainable way.

Q160 **Colin Clark:** Just on the jobs, you mentioned there just over 10,000 jobs; the estimates we have seen in the evidence is as many as 18,000 jobs if the industry can achieve its targets. In light of Pinneys of Annan closing and the Young's Fraserburgh factory processing closing a couple of years ago, how many of the jobs do you think will be in Scotland, let alone in the UK? Do you see most of the job growth being in the UK or, considering that this is an exported product, is it inevitable it has to be in the UK?

Ben Hadfield: No. It is regrettable that businesses have had to close and that obviously caused some disruption, but at the same time, in fact, other larger businesses have opened and employed more people within the same period in fish processing, particularly salmon, so there is always some flux there. Generally, the majority of job creation will be in aquaculture, where fish are farmed. It has to be efficient. It is expensive to have long logistics. It is a fresh product. The value is created by provenance, so Scottish salmon trades at a premium over Norwegian salmon and provenance from Scotland is associated with high quality Scotland.

Q161 **Colin Clark:** Just to move further outside Scotland for a moment, at the moment most of the production is in Scotland and we understand that is because of sheltered waters, but how much scope is there for fish farming in England, Wales and Northern Ireland? Dr Hughes, would you like to speak to that?



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Dr Hughes: I think, as you stated, most of the production is in Scotland and most of the production is salmon, where there is a good market and ready technology there. Salmon is probably not the species that we can move into the rest of the UK. It is at the limit of its southern distribution, due to the cooler waters in Scotland, but there is potential elsewhere in the UK for other species, whether they are fin fish or whether it is shellfish or things like seaweeds. There is a large development on the south-west coast, Lyme Bay, where there is a very large offshore mussel farm going in, so that is the sort of development I would probably expect to see in England and Wales rather than a copying of the Scottish industry.

Colin Clark: Mr Hadfield, anything further on that?

Ben Hadfield: One of the interesting developments is the use of cleaner fish, where the industry is breeding wrasse and lump sucker to replicate what happens in the natural environment, where they eat parasites, particularly sea lice, off the farmed salmon. Some of this development has taken place in Scotland, but Wales particularly has some assets that have been acquired by the Scottish sector to produce both lump sucker and wrasse and they have led to quite large investments and employee creation. It is absolutely beneficial to have some isolation of these cleaner fish produced in a different region for disease control reasons.

Q162 **Colin Clark:** The Holyrood Committee for the Environment said that further development must be based on resolving the environmental problems and the status quo was not an option. What steps are salmon producers in Scotland taking to ensure that fish farming can be expanded sustainably?

Ben Hadfield: It is a very broad question, but in terms of the food ingredient, what the fish farmers have done over time is reduced the amount of fishmeal down from typically around 30% to now often less than 5%, and the same with fish oil. What you have seen is that salmon has become a net producer of fish protein from the oceans and in Europe it takes around 700 grams of wild fish to produce over 1 kilo of farmed salmon, so achieving net fish producer is a big step. We agree obviously that the status quo is not an option. We spend a very large amount of money on innovation and R&D.

We accept that we farm in a shared space and in particular sea lice present some hazards for wild fish, particularly when it is at high levels and it is uncontrolled. There is a lot of work into the transparency of sea lice levels on fish farms, the level of mortality and the methodology of controlling sea lice, which some years ago was very dominated by medicinal treatment. What we have moved to now is a more holistic strategy of sea lice control, including the cleaner fish that I talked about before and mechanical removal of sea lice from farms.

Q163 **Colin Clark:** If the industry doubles in size because of the improvements you are making, will that have less of an environmental footprint in the



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future?

Dr Hughes: Yes, I think there is a move towards sustainability in the industry. I think there has come a recognition that the aquaculture industry is dependent on a good environmental status of the waters its farms are in and, therefore, it has an interest in developing the innovative technology that will support that sustainable development. But I think there is also possibly a need for a change in the management relationship between the regulators, between the industry and between the knowledge providers so that those three are working closer together to provide a more evidence-based, more adaptive management-type framework for the industry as it goes forward.

Colin Clark: Mr Hadfield, did you want to come back?

Ben Hadfield: I think that we have to increase our sustainability, but the track record of the industry is exactly that.

Q164 **Colin Clark:** So they could reduce their environmental footprint?

Ben Hadfield: Yes. No one wants a situation where production is doubled and the level of environmental impact is the same. I can pretty much guarantee with my time in the industry that that will not happen. Growth needs to be conditional on good environmental practice and on solving challenges related to disease and particularly sea lice. What we talk about in the industry is quality growth and that means ticking the sustainability boxes in a real sense.

Q165 **Colin Clark:** Considering the targets, a question to Mr Linley-Adams: what concerns do Salmon and Trout Conservation Scotland have about the sustainability of the industry's growth plans?

Guy Linley-Adams: As the name of the organisation suggests, our concern is with wild salmon and sea trout and the impact of open-cage salmon farming on those species. We have discussed the sea lice already. That is our main concern. Sea lice are a natural phenomenon; they do occur on wild fish. The problem comes when those sea lice enter the fish farms and, because of the large number of potential hosts for the parasite on these farms, breed up to very significant levels and you get adult ovigerous egg-producing lice on the farmed fish. If they are not treated, the farms release an enormous quantity of sea lice larvae into the natural environment, many orders of magnitude higher than you would expect to find naturally.

When you have the departing juvenile fish coming down the rivers for the first time, the salmon and sea trout, and they are going out to sea, normally they would not expect to come across the undersea soup of sea lice larvae that they are having to go past when they go past these farms, so they are suffering a level of mortality that means the populations of salmon and sea trout in the aquaculture zone of the west coast of Scotland are being suppressed. They are under threat all over



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Scotland, the east coast as well, where there are no salmon farms, but on the west coast the threat is disproportionately large.

We are concerned that if you expand this industry, you will by definition expand the lice problem unless you use novel techniques for controlling sea lice, and ideally, over the medium to long term, move the industry into closed containment technology, whether that is floating at sea or on land, so you have a biological separation between farmed fish and the wild fish, so the lice interaction problem is dealt with that way.

Q166 Colin Clark: Can the location of the farms be moved or are the lice so free moving that it would not really matter how far from the mouth of rivers you could put them?

Guy Linley-Adams: There is some evidence that if you move the farms offshore, further away from the mouths of the salmonid rivers into more open water, the lice problem becomes less. Obviously, if you are going to move them out and then increase the biomass of the farmed fish—the numbers of farmed fish—then you may create more of a problem, but further out. It is very difficult to point to a particular area where offshore it would be good and inshore it is bad. I think the inshore farms are the ones that were put there right at the beginning of the industry and quite often they are in the wrong place; they literally are right at the mouths of the salmonid rivers, and that causes a problem.

I think Ben would recognise that those farms do need to be relocated as a first step, but the long-term future, the sustainable future for this industry, has to be in closed containment. You mentioned whether this could be done in England, whether salmon farming in England could occur. It could not occur in open cages, essentially because the water is too warm, but if you bring it on land into closed containment with all the technical ability that we do have, there is no reason why salmon could not be grown onshore in tanks.

Colin Clark: Mr Hadfield, did you want to—

Ben Hadfield: Of course, yes. First of all, I recognise the concern that Guy has and his organisation has, but I think that it is stated too simplistically and it is overstated. We have—

Chair: We are going to come on to sea lice, so we will maybe move on to our next question on that.

Q167 Caroline Lucas: Very quickly, can you give me a sense of the size of these tanks, particularly if you are going to put them onshore, and what the animal welfare perspective is on containing fish that are used to swimming wild into something that is so contained?

Guy Linley-Adams: Yes, of course. There are welfare concerns with open-cage farming and the nets. I do not know if any of you saw the BBC One show last night that illustrated the problem, where you have high



stocking densities within cages, and in the open cages there are still very high stocking densities. Salmon are not designed to be packed together.

Q168 **Caroline Lucas:** Would it be worse onshore or not necessarily?

Guy Linley-Adams: It depends on the stocking density within the tank. One thing I would say is because it is in a tank, because you are able to control the diseases coming in and the lice coming in much more readily, then with proper management, proper husbandry, you should be able to manage that aspect of it. There are initial upfront costs of building these structures.

Q169 **Caroline Lucas:** It would need to be huge, would it? What kind of size?

Ben Hadfield: I think that I am probably best placed to answer that, as we—

Chair: We have a specific section on this, so we are jumping around now. I do not want everybody's questions to be asked before they have had a chance. We will come back to lice with Robert.

Q170 **Mr Goodwill:** I would like to specifically ask about the problem of sea lice. Indeed, when the Committee was in Tromsø in Norway two weeks ago, we were shown examples of fish farms being taken further offshore to limit some of the effects that we have heard.

I suppose the first thing that we need to know is how bad the problem of sea lice is on Scottish salmon farms. Is it widespread across all farms or is it just particular locations, such as the one that maybe was in the press on Loch Roag?

Guy Linley-Adams: The problem does tend to occur in the second year of production. The production cycle for a farm is two years, and at the end of the second year, on most farms the threat from lice will rise. Some farms do manage to control the lice numbers and keep them below thresholds; others do not. An example on Lewis is where they clearly have not. The lice levels rose to, I think, 12 times the threshold, so the average number of adult ovigerous egg-producing lice. That is an enormous number if you add up the number of fish in the cage, so huge lice production.

Yes, it helps to move the farms offshore, but while we have the problems that we do have and the treatment chemicals that are being used are not as efficacious as they used to be, there is resistance coming into the system and the sea lice are becoming resistant.

Q171 **Mr Goodwill:** And they have effects on other crustaceans?

Guy Linley-Adams: Yes. They are designed to kill crustaceans. Sea lice are crustaceans, so they will have an effect on lobster larvae, on crabs, on prawns, if those are in sufficient concentration. There is some evidence. Dr Hughes' organisation did some work on this very recently and suggested that there was an impact on crustacea near farms that are



using these chemicals that we have not been particularly aware of until recently.

Currently, the standard for one of the in-feed treatments, emamectin benzoate—the tradename is Slice—is being looked at by the UK Technical Advisory Group. It is looking at whether we should be lowering the environmental quality standard to the residues of Slice that we allow out into the environment. If they reduce the level of the EQS, then that has a knock-on effect. The farmers will be able to use less of Slice and, therefore, they have to find other ways of controlling the sea lice. That is why we do favour—and I understand we are going to get on to this later—the closed containment route.

Q172 **Mr Goodwill:** Perhaps I could turn to Mr Hadfield. You mentioned about physical removal. We have heard about chemicals, but given the intensity and the location of some of these farms, is it possible to control this problem?

Ben Hadfield: What you heard there, in my view, is very much an overstatement beyond actual evidence for this. We recognise that uncontrolled lice levels in a sheltered sea loch may present a hazard, but there are many cases where fish farming has expanded quite markedly and the river and the estuary has gone on to have more fish in it quite recently. The river that you refer to in Loch Roag—the Blackwater—had its highest catch of fish in 2012. Its normal average is around 200 and in 2012 we caught 555 fish, so to suggest that the river is perilous is not correct.

Q173 **Chair:** But that is not the suggestion. It is not about the level of fish; it is about the level of sea lice infestation. It is about two different things.

Ben Hadfield: Sorry, with respect, what I quite clearly understood was suggested was that the levels of sea lice were causing peril to wild fish. Context is important here, because this river had performed and increased in the number of wild fish coming back to it while there have been sea lice issues in the loch.

Q174 **Mr Goodwill:** There have been widespread reports, for example, quoting Andrew Graham-Stewart, who is the Director of Salmon and Trout Conservation Scotland. He said on the BBC, “We believe that the explosion in lice numbers on the Loch Roag farms spreading out into the wider sea loch environment has had deadly implications for wild fish as they are waiting to enter the Blackwater. Adult salmon are well-adapted to cope with a few lice, but when plastered with hundreds, they simply do not have a chance”. Is that an exaggeration?

Ben Hadfield: Yes, it is. I am aware of that. Andrew Graham-Stewart is a colleague of Guy’s. They have worked hard to get an inquiry on this. They have worked hard, in my view, to sensationalise the issue in advance of the inquiry. That is not to say we do not take it seriously, but what I am saying to you is that using words like “explosion” is sensationalising the issue. What we need here is quality science to



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monitor the effect on wild fish and also a precautionary approach where the levels on the farms are held to the lowest possible level while still maintaining good production and animal welfare and ultimately to be open to suggestions of movement and relocation of the farms.

I do not wish to be hostile, but context is important and it is not acceptable to overstate the effect and pin it disproportionately on fish farming when many other factors are causing the decline of wild salmon. But the industry takes very seriously this hazard and we must resource and research and be open to work with our critics, like Guy, to try to find the least impacting operation of farms for wild fish.

Q175 **Mr Goodwill:** Are you suggesting that more scientific work needs to be done on the impact of lice and other implications of fish farming? Maybe Dr Hughes could comment.

Dr Hughes: Just a couple of points. I think for Scotland we do not have the figures for the relationship between the number of salmon farms and the number of lice on wild salmon. In Norway those figures exist and there is a correlation between the density of the fish farms and the number of lice on the wild salmon. We also know that above a certain threshold, lice can cause mortality in wild salmon, but we do not have those figures and we do not have that understanding for Scotland at the moment.

It is important to understand that lice production is cyclic. As we have heard, it goes through phases and troughs and there are tools and models to understand the dispersion of lice from sites and across migratory paths of wild salmon. There are some technological fixes, but we do not have a clear enough picture yet for Scotland about what that is.

Q176 **Mr Goodwill:** Would it help build up a better picture if there was a statutory obligation to report numbers of lice so we could get a wide picture? Mr Linley-Adams was nodding there.

Guy Linley-Adams: Yes. We have argued for some time with the Scottish Government, this being a devolved matter, that the sea lice data should be public and it should be published in real time. The Environment and Climate Change Land Reform Committee report requested from the industry publication of sea lice data and on-farm sea lice data in as close to real time as possible and they hope that this will be published by April.

The industry is publishing some data. It is three months in arrears, so the May figures have just come out; we do not know what the lice position is, for example, in Loch Roag at the moment, but we do know what it was like in May. From the beginning of the year through to May, it was on the upward trend, so we suspect it has gone up further, but it would certainly help an awful lot if the real-time data was published in the same way that it is in Norway.

Q177 **Mr Goodwill:** Finally, could I ask Mr Hadfield how big an impact these



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lice have on the actual productivity, the food conversion and the quality of the salmon produced? Because if it is a major factor, surely it is in everyone's interests to get on top on the lice problem.

Ben Hadfield: First, they have very little impact on the quality of the salmon. You can still eat the salmon with sea lice on it, and in fact for wild salmon returning to the river, the mark of freshness is that they carry a moderate number of sea lice when they come up the river. It is not a food safety issue at all, it is a reputational issue, it is a potential hazard for wild fish and it also has an extreme cost within the industry to control it. Typically, the Scottish industry spends in excess of £70 million per year controlling sea lice, so when sea lice pressure is high, the cost of production rises dramatically. It can impede growth because a lot of the treatments require the fish to be starved for a couple of days before so that you can then administer a treatment with the highest welfare, so it has a penalty in production.

I would just like to address one point that came up before in terms of impact on crustacea, because I think that this is unfair and it does not do Scotland and the UK justice, when it has the highest control methods related to any medicine from a fish farm.

Q178 **Chair:** Dr Hughes, you are a scientist. Is this an issue of fairness?

Dr Hughes: I think it is understanding where the state of the science is at the moment. The report that people refer to was carried out in 2015 and 2016 and it shows that there is a relationship between the amount of aquaculture activity and some far-field effects on the components of the benthic ecosystem away from the salmon farms.

Q179 **Mr Goodwill:** Is that the one that showed a 60% reduction in crustacea after the use of EMB?

Dr Hughes: I do not have the figures off the top of my head, so I could not say, but that report is very clear in that there are limitations to the way the data is collected. It is not saying there is an issue, it is saying there is a possible environmental correlation there. I think the next step is to do a detailed study. The data collected for that study was not meant to be collected to look at the link between Slice and crustacea; it was using datasets already collected as part of routine monitoring. Therefore, if we want to get a more definitive position, we need better science to get that answer.

Q180 **Chair:** What does the data from Norway say? They seem to be a bit further ahead on some of this.

Dr Hughes: I am not aware of any data from Norway on this relationship.

Ben Hadfield: May I? I lived in Norway for just under five years and I also am part of the global management team from Marine Harvest, which has the most amount of farms in Norway. What I am trying to say is that



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Scotland has a much stricter control of medicine residues from farms than Norway, Chile or Canada and pretty much anywhere else that farms salmon.

At this stage, what we have seen from the work from SAMS is one study that shows that at reference sites away from the farm the level of benthic crustacea was reduced by about 60%, as you say. That can also be due to climatic change, or to sample error, but it certainly requires much more investigation.

Scotland has the tightest control on medicines released from fish farms, which has dramatically reduced them. The fish farmers have found other methods of control related to cleaner fish and mechanical removal and have reduced the discharge of emamectin, and quite a significant amount of resource from the industry is being spent on researching this with the Government.

Chair: We are going to move on to the next question, which is going to come back to some of these issues on disease control.

Q181 **Mr Philip Dunne:** I have seen some salmon fish farming in a couple of sea lochs on the west of Scotland, so I have a sense of the density of fish within the open-cage nets. We have focused very much on lice and parasitic problems. The density of stocking rates would suggest to me that there are also significant risks from other diseases within the fish stock. Could you comment on what kind of diseases are found and what loss rates you expect to get from the fish farms from other diseases other than lice infestation?

Ben Hadfield: The company that I work for, which is a member of SSPO, produces around 55,000 tonnes. We have a stocking density of 17.5 cubic kilos of fish per cubic metre of water.

Q182 **Mr Philip Dunne:** Is that at the start of the cycle or at the end?

Ben Hadfield: That is a maximum at the end of the cycle. At the beginning of the cycle it is much lower, less than one or two, when the smolts go to sea. The smolts go over an 18-month period, then we harvest, and we have 17 as a maximum.

Scotland has some of the lowest stocking densities of global salmon aquaculture. Only Ireland has less, where it has organic production, and that is at 10 kilos per cube. Anyone who thinks that fish farmers would overstock to support profitability does not understand the economics of a salmon farmer. What you are trying to do is keep your fish in optimum conditions, with the highest welfare, and to have the best water quality around the fish; then, as a farmer, you are rewarded with growth and quality. This misnomer that we create disease problems for ourselves by overstocking fish, that is like rule number 101 of "do not do" in salmon farming. I have seen the most beneficial production when levels have been at 17 kilos or slightly less, and all the companies in the SSPO operate on that basis.



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Q183 Mr Philip Dunne: We were told by the Chief Scientific Adviser last week that Scotland is relatively disease free compared to Norway or Chile. Is that your understanding, Dr Hughes?

Dr Hughes: Yes, that is my understanding. It is important to understand that wherever you have farming, or any animals, you need to aggregate them. You will get disease issues that any industry has to deal with. I have no evidence to say that the disease issue in Scotland is any worse than Norway or Chile; in fact, it is probably much better than Chile.

Q184 Mr Philip Dunne: Can you give us a sense of what proportion of the stock is diseased and has to be discarded?

Ben Hadfield: Scotland has a higher disease status than Norway and Chile. In terms of mortality within the industry, this has been a problem. Typically, rates, up until 2012, were around 7% mortality of fish in the sea stage. Bearing in mind that the life cycle of a salmon is to lay thousands of eggs and it is a species that has high mortality, 7% mortality was very good and, in fact, best in class when compared against peers in Chile and Norway.

Q185 Mr Philip Dunne: Do you have comparable figures for Chile or Norway in your head?

Ben Hadfield: Yes. Norway runs on around 20% mortality currently, Chile a little bit higher, around 24%, Ireland, much higher. Scotland at the moment is in a difficult situation where mortality has typically risen from around 7% to around 20%, and 24% in the highest year. That has come as a result of warmer coastal temperatures in the sea and, as Guy mentioned before, a declining efficacy in the medicines used to control sea lice. This has been a very difficult period for us. What we have managed to do is broaden the treatment base for sea lice over the last few years, and what you see now is a decline in the mortality rates and a lowering of the sea lice pressure since around 2016.

Q186 Mr Philip Dunne: On escape of medicines into the wild population, presumably, you treat the fish in the tank in the feed, but the feed can be dispersed outside the cage by the natural movement of the water. Do you have a sense for what proportion of the feed is absorbed by the salmon and how much escapes?

Guy Linley-Adams: There are two separate ways of treating for lice chemically: one is in feed, as you describe, and the residue ends up on the sea bed. The Scottish Environment Protection Agency will monitor that against the environmental quality standards I mentioned. There are also bath-type treatments, where a tarpaulin is put around the cage, the treatment chemical poured in, and the fish held in usually an organophosphate or a pyrethroid chemical, and then the tarpaulins are opened and that washes out into the wider loch. There are two different ways that those chemicals can get out there.



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There is a concern, particularly with the organophosphate chemicals, about what impact that also might be having on crustacea. Donkeys years ago, my own work as a research student was on the impact of organophosphate chemicals from sea lice treatments on non-target organisms—lobster larvae and so on—and there is an impact in poorly circulating lochs where that plug of polluted water stays together for a decent length of time. The concentration of the chemicals can stay relatively high, so there are concerns with that as well.

The best solution is to move away entirely from chemical treatments, and, ideally, move away from the need to treat by isolating the fish from the wider environment so you do not get the sea lice in in the first place.

Q187 **Mr Philip Dunne:** We have touched on the impact on crustaceans. Is there any evidence of chemicals being found in wild salmon or other fish populations?

Guy Linley-Adams: Not that I am aware of. The concerns have focused on crustacea; because sea lice are crustacean, the mechanism of action is to target the crustacean so it can bypass—

Q188 **Mr Philip Dunne:** Sea lice is not the only disease that is being targeted with the chemicals?

Ben Hadfield: Yes. It is important to say that these are pesticides, so the control and the proportion is high in terms of SEPA issuing licences for their discharge. These medicines or chemicals, whichever you want to call them, have been used for in excess of 20 years, and there has been no recorded impact on crustacea below the near-field effect of a farm when this is within a few hundred metres. This is the issue with the language and element of sensationalism. Of course, in high concentrations, in a tank in the laboratory, they will kill crustacea, but there is enormous dilution when they are released from the farm, so to suggest that lobsters or crab or anything like that may be impacted from the farm is not really fair.

To put it very simply, I am also a scientist. I do a lot of diving. I work around fish farms. I dive a lot regularly around fish farms. They attract crab and lobsters in quite significant numbers, unless the impact below the sea bed is so high that it precludes them for very small areas. When you dive around a farm you see a lot of bio-stimulation of crabs, lobsters and other life.

Q189 **Chair:** Thank you. We have had concerns raised with us about the impact of waste discharge on the environment around Scotland's fish farms. Dr Hughes, what do we know about that and the impact on marine ecosystems?

Dr Hughes: When you are farming fish in a cage in open water, out of the bottom of that cage will fall a mixture of faeces and uneaten food. That settles in a footprint around the sea cage and that level of organic



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enrichment has an impact on the benthos on the seabed. It changes the fauna and biochemistry of the seabed.

Q190 **Chair:** Is that why the lobsters and crabs are moving in, then—easy source of food for bottom feeders?

Dr Hughes: Probably one of the reasons they move in is that as you move out from the direct zone underneath the cage, there will be an increase in food availability and, although we do not have the evidence to support it at the moment, there will be species moving in there to feed on that.

Q191 **Chair:** This is quite a large volume of waste: it is half the volume of the human-treated effluent of Scotland. That is quite massive, isn't it?

Dr Hughes: It is a large number, but I am not sure how useful that figure is because it is not human effluent, it is entirely different from that, and it is not coming out in diffuse—

Q192 **Chair:** It is different in that it is untreated, isn't it? That is the difference: the human effluent is treated; the fish effluent is not.

Ben Hadfield: Absolutely. With respect, it is very different. First of all, human sewerage is treated—

Chair: I am keen to hear from Dr Hughes. Thank you.

Dr Hughes: Faeces fall out of the cage in the same way as manure falls out on to a field, so it is untreated in that way, but it is assimilated within the environment by the natural processes that go on underneath the cage. As I made the earlier statement, no form of farming or no form of food production is without environmental impact. When compared—

Q193 **Chair:** It is regulated on a farm, isn't it? You have silage regulation, slurry regulations, tanks for storage, rules about when it can be distributed into the environment.

Dr Hughes: Absolutely, and it is highly regulated at the farm. It is modelled and monitored so that the impact below the cage does not pass a certain threshold. That threshold is based on the biotic life underneath that cage, so if it passes a certain threshold then SEPA has a duty to step in there. It is quite carefully modelled so that we understand the relationship between the amount of fish in the cage and the impacts on the benthic environment. Just like with terrestrial farming, there is an impact, but it is well regulated.

Q194 **Chair:** Mr Hadfield, SEPA has disclosed Freedom of Information documents naming the salmon farming companies that have not complied with those regulations. They seem to be Norwegian-owned Scottish Sea Farms with 10 farms, Norwegian-owned Marine Harvest, which is your employer, and Canadian-owned Cooke Aquaculture, with nine failing fish farms each. What steps are you taking to manage the discharge of waste into the environment and to meet the regulations? Are



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you meeting those standards now?

Ben Hadfield: The compliance rate is around 85%—

Chair: Yes, and you were not in compliance.

Ben Hadfield: We were compliant on the majority of our farms operated, and on those farms that were not compliant there is work ongoing to make them compliant as soon as possible.

Q195 **Chair:** How many farms do you have in Scotland?

Ben Hadfield: We have 58 farms in total, of which around 48 are currently operational.

Q196 **Chair:** What are you doing in the nine or 10 that are not compliant?

Ben Hadfield: They are not just in the marine environment, but the compliance rate for the industry is around 85%. SEPA acknowledges that the legislation needs to change in the way that it models the effect on the seabed, and it is generally acknowledged that if that—

Q197 **Chair:** You are answering a question I have not asked. My question is: what steps are you taking to make your nine farms compliant, not whether the modelling is correct or not. There is a regulation, as it stands; what steps is your company taking to ensure compliance?

Ben Hadfield: Some of the nine farms are not compliant because of administrative errors and failure to submit benthic data on time, and it takes a long time to have the samples analysed and returned. It is quite a prescriptive timeframe. The first step is fairly obvious there, that we are speeding things up to comply on an administrative level.

Q198 **Chair:** These were not complaint in 2016. Are they compliant now?

Ben Hadfield: We have increased the resource that we are spending on environmental monitoring and speeding it up. Where farms are impacting the seabed below prescribed levels, then we have reduced production or we have changed the orientation of the farm. We employ 10 environmental scientists and their key objective is to have all the farms compliant at the same time. We are disappointed that we have nine that are not compliant, and we, and other companies, have reduced that number as we move into 2018.

Q199 **Chair:** If it was nine in 2016, what is the number now?

Ben Hadfield: Those numbers are held by SEPA and will not be published for 2018 until 2019.

Q200 **Chair:** You work for that company; you know, don't you?

Ben Hadfield: I work for Marine Harvest, yes, and we have nine farms. I can come back to you and tell you how many we expect to be non-compliant in 2018, but that analysis has not yet finished.



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Q201 **Chair:** When is the analysis done? Is it an annual analysis?

Ben Hadfield: The full analysis of the many factors—chemical, environmental, administrative, reporting—are all collated in 2019 for 2018.

Q202 **Chair:** Do you have the 2018 for 2017 numbers?

Ben Hadfield: We have the 2017 numbers now, yes.

Q203 **Chair:** What are they?

Ben Hadfield: They show a slight decline in compliance for the industry.

Chair: I am not asking about the industry, I am asking about your farms.

Ben Hadfield: I will have that—

Q204 **Chair:** Are they worse? Are you saying that your farms have got worse between 2016 and 2017 in terms of compliance?

Ben Hadfield: It is fair to say I do not know and I will come back to you with specific numbers for Marine Harvest.

Chair: Thank you; that would be helpful.

Ben Hadfield: I would like to answer your question about human waste comparisons, if you would permit me.

Q205 **Chair:** I did not ask a question; that was a comparison. I am keen to carry on; I have questions for Mr Linley-Adams. What mitigations would you like to see implemented before the industry expands?

Guy Linley-Adams: In relation to seabed waste or generally?

Chair: Waste.

Guy Linley-Adams: The Scottish Environment Protection Agency has asked the industry to look at moving towards technologies that might capture the detritus, the waste, falling through the nets. Of course, I appreciate that the technology required for that sort of retrofit to the open cage farms is going to take time. Nevertheless, it would be a sensible way; if you could capture the detritus falling through, or a percentage of it, and bring it back to land, that would help not only with the organic waste smothering the seabed underneath, but also with any chemical feed residues that are in that waste.

Again, I do not want to jump to the last question, but in terms of future technologies, closed containment makes all this so much easier to handle. You have the waste in a closed environment and at the end of or during the production cycle you suck the waste out from the bottom and take it back to land for proper treatment, in the same way that you would if you were a chicken farmer on land.

Q206 **Chair:** What about the sea lice issue? I saw you were keen to come in when that was being discussed.



Guy Linley-Adams: Yes. In terms of the sea lice issue, what we need to see from the Scottish Government—because this is a devolved matter—is stronger regulation of the farms so that when sea lice numbers start to creep up on farms, biomass on those farms has to be reduced. That means early harvest culls. It is a very important point that we understand the numbers here. The numbers of farmed fish held in these cages exceeds the number of wild fish by many orders of magnitude and, therefore, the parasites generated on those farms exceed the background natural level by many orders of magnitude. When we get a lice problem on the farm, we do need to come down on it very hard and very quickly.

That clearly has not happened in Loch Roag and in Lewis this year. We have had terrible footage on the television last night showing the impact of that on both the farmed fish and the wild fish. Those are not Ben's farms, they are not Marine Harvest farms, but I am sure Ben will have seen those sorts of—

Q207 **Chair:** Which farms are they?

Guy Linley-Adams: They are owned by the Scottish Salmon Company. They have seven farms in Loch Roag, one of which is not stocked at the moment, so it is six active farms.

Chair: All right, thank you. We are going to move on.

Q208 **Dr Matthew Offord:** I wanted to focus more on the ecological side and ask Dr Hughes and Mr Linley-Adams, first of all, some questions about what your understanding is of the impact that the demand for salmon feed is having on the wild fish population and, indeed, the ecosystem as a whole.

Dr Hughes: As has already been alluded to, salmon feed is made up of a range of ingredients, and those include fishmeal and fish oil, which is mainly sourced from the South American anchoveta fisheries in Peru and Chile. Over the course of the last 20 years, there has been a reduction in the amount of fishmeal that has gone into the salmon feed and a reduction in fish oil that has gone into the fish feed. That is driven by two things: economics, because they are both really expensive ingredients, and also an awareness of environmental sustainability. The figure that was given by Ben earlier I believe is correct. The ratio of forage fish to salmon production is about 0.7, so for 700 grams of forage fish you get about a kilo of salmon protein.

Q209 **Chair:** Can I just come in? What effect has the fishing of the Peruvian anchovy had on the Peruvian anchovy fish stock and the plankton that is fished from the Antarctic? What has happened to those populations?

Dr Hughes: As I understand it—and I think the salmon companies are quite careful in this—their fishmeal and fish oil are sourced from fleets that seem to be sustainable.

Chair: We have had a big argument about sustainability.



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Dr Hughes: Absolutely, yes.

Q210 **Chair:** Are they MSC sustainable? What does “seem” mean? It is not a scientific definition.

Dr Hughes: I am not sure. You would have to ask—

Q211 **Chair:** Mr Linley-Adams, you wanted to come in?

Guy Linley-Adams: The Environment, Climate Change and Land Reform Committee report looked at this in some detail, and if I may quote their conclusion on this, “Sustainable fisheries used as a source of fishmeal and fish oil are currently at maximum sustainable yields and cannot supply the volume of fish feed required for industry expansion.” That is where we are in relation to wild-caught fish that goes into the feed, with the proviso, of course, that Ben will tell you about, that the production of fishmeal for fish feed is being reduced in order to replace it with vegetable source, and so on.

Q212 **Chair:** Yes, we have heard that. Do you have anything to add to that, Mr Hadfield?

Ben Hadfield: Yes. In Norway I run a company that produces 330,000 tonnes of fish feed, and in Scotland we are building one on the Isle of Skye. It is about a €140 million investment, and we will produce 170,000 tonnes of fish feed. We buy a lot worldwide. Basically, everything that we have is certified—

Q213 **Chair:** By whom?

Ben Hadfield: By the International Fishmeal and Fish Oil Organisation. That standard says that the total allowable catch is sustainable relative to the biomass. It is not as advanced as MSC, which then goes on to say that whales, dolphins, cetaceans, other mammals and birds are also protected, and that is another tier on top of that. Fisheries is moving towards MSC certification for feed-grade fisheries in fishmeal and fish oil.

Chair: Thank you, that is helpful. Matthew, sorry, I interrupted.

Q214 **Dr Matthew Offord:** I will come back on that, if I find it, in a moment. I am very interested in the sustainability of feeding fish to fish. In the evidence given by Professor Ian Boyd, the Government’s Chief Scientific Adviser, he said it was highly inefficient to do so. Moving on to Mr Hadfield, we have been hearing a little bit about the composition of the fish feed itself. What scope do you see to reduce the amount of wild fish within the salmon feed?

Ben Hadfield: If you look at the gains that have been made, 20 years ago salmon feed was over 70% marine ingredients, fishmeal and fish oil, and now it is down at less than 20%. It is possible to produce salmon without using fishmeal and fish oil. Effectively, the fish need protein and lipids, and you can take those from vegetable proteins and vegetable oils.



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One commodity that is quite scarce is omega 3, which comes from all fish, but particularly the Peruvian fishery. The Peruvian fishery is quite sustainably managed. In 2015 and 2016, during the El Niño years, they closed the fishery entirely, which was an enormous socioeconomic hit for the Peruvians to take, but it underlines how seriously they take the preservation of the fishery and how much value it has for them.

What has happened in the industry is that for omega 3 there is a little bit of a log jam. We cannot source any more, so there has been quite a lot of R and D in producing omega 3 from algal fermentation and also from a GM crop in Asia and the US. GM crops will not be acceptable within Europe.

Dr Matthew Offord: In Scotland, in particular.

Ben Hadfield: In Scotland, in particular, and they will not be acceptable to the wider consumer base. What you will see is that the GM crop is an algal gene taken and put into camelina, or rapeseed, and that will be produced in Canada and the US. It will be acceptable in Asia and temporarily it will free up more fish oil for use in Europe, which is a more discerning consumer market.

What will then happen, we hope, is that algal fermentation and production of omega 3 from algae—which is very possible and quite exciting—will become cost effective and scalable over time. We hope that in another decade, or hopefully less, the omega 3 that we need to maintain the health profile of salmon will be sourced from algal fermentation.

Q215 **Dr Matthew Offord:** My understanding, and I will just try to clarify this, is that the Scottish salmon industry wants to keep that omega 3 high, and it would only be able to do that by using both fishmeal and fish oil. My understanding is they are not seeking to replace that, while other parts of the world may choose to do that, meaning that sustainability of Scottish salmon fishing would not be as robust as in other parts of the world.

Ben Hadfield: The science and the process is there to produce omega 3, so that bottleneck that I referred to before has been removed, but it is approximately three times more expensive than fish oil to source the omega 3 at the moment, fish oil being around \$2,000 per tonne and algal oil being three times that value. What we are working to do is scale up an increased efficiency on the algal production so that we grow without utilising more fish. I think that everybody agrees that particularly the Peruvian fishery is a sustainable, reasonably well-managed fishery, but it is at a maximum and cannot increase to support salmon's increased growth.

Dr Hughes: Could I come in with a point about public health there? The majority of the UK population is deficient in omega 3 fatty acids, and farmed salmon is a major source of omega 3 into the UK population.



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Reducing that level of omega 3 through reduction in fish oil and fishmeal has implications for public health as well, so it is a complex issue.

Q216 **Dr Matthew Offord:** You have answered the questions I had, but I think it is fair to ask Mr Hadfield: where do you see the industry sourcing some of the high levels of omega 3-sourced products? I think that you have alluded to looking at GM particularly.

Ben Hadfield: Not in Europe, but the wider industry will look at GM.

Q217 **Dr Matthew Offord:** How would that help you personally in your industry in Scotland?

Ben Hadfield: About 100,000 tonnes of fish oils are required by the salmon industry. During periods of El Niño when the Peruvian fisheries, which are the dominant fishery, are a bit depressed, the price rises and it becomes a finite commodity. If you want to double salmon oil production, you have to find other sources of omega 3. What I have explained is that although the technology is there, a GM technology is not acceptable to our company currently or to many members of the SSPO and is not acceptable in Scotland, but it is acceptable in Asia. If that is adopted, then that will free up the resource availability for use.

Dr Matthew Offord: Free up, okay, I understand.

Ben Hadfield: That still will not allow large-scale growth of the salmon industry. When I talked before about quality growth, it means particularly that the feed ingredients are sustainable. What we have to do is scale up the algal technologies; they are there, but they are very expensive. It is a question of scale and efficiency. I believe that within a five to 10-year horizon we will source quite a lot of our omega 3 from algae.

Dr Matthew Offord: Thank you. Sorry, you did explain that; I have not had enough coffee today.

Ben Hadfield: No, it is an interesting subject.

Q218 **Chair:** Mr Hadfield, we know that Marine Harvest is involved in trialling these new containment systems in Norway. How is it going and do you think there is potential there for them to solve some of the problems with the open net fish farming?

Ben Hadfield: I do think there is some potential. I appreciate Guy's position, but he moves rather too quickly to say, "All this can be solved by closed containment". We do use closed containment systems here in Scotland. We produce smolts in what are called recirculating aquaculture systems, but basically we purify the water and keep purifying the water in a giant aquarium, in simple terms.

The last one that we built cost around £28 million and there is one being built currently around £50 million. It is £50 million to treat a biomass of 1,000 tonnes. If you were to replace all the cages in Scotland with these closed containment systems, then the capital spend would be around £2



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billion. They would not be in Scotland, they would be closer to the markets in Central America and Asia, and probably not in the UK. It is far too simple to say, "This is the solution", but we do use closed containment systems. In answer to your question, Chairman, we are trialling these systems in Norway. They are very complex ones where—

Q219 Chair: Sorry, to go back on your argument, if Norway is spending its money rationally, why is it trialling these systems in Norway and not in its end market? Your argument is that Scotland loses its salmon industry if we move to a closed containment system. It does not appear to have moved from Norway.

Ben Hadfield: What is happening in Norway is that the production licences cost around £12,000 per tonne, which is expensive. It is an asset. They have a system where you can pay one-10th of that price provided you come forward with an innovative R and D solution. Even if the project does not work, you can retain the licence and farm in the conventional way. It is a method of funding quite significant innovation. My company—and other sister companies within the SSPO—have trials in closed containment systems where they have structures in the sea that take water from depth to avoid sea lice, which are very much within the top few metres of the water. They have very large and robust structures for offshore farming, and people are trying all these systems to try to reduce the concerns that Guy raises.

We have a duty to make sure that they work before we deploy them and that they can be cost-effective, otherwise companies try these things and go bankrupt and there is huge social loss. We do not want that. Please understand me when I say that we are moving towards this as fast as possible and looking for solutions, but the way it is presented is that these solutions are already there and we are not taking them because we are so focused on profit. That does not resonate with me, and I do not recognise it.

Q220 Chair: It is £28 million to set up a closed containment system. You said there was another one that was £50 million, and then you said there was £50 million to remove all the effluent. Is that correct? Is that an annual cost?

Ben Hadfield: No, it is the capital cost of building a unit that would give you a biomass production of 1,000 tonnes.

Q221 Chair: Is the capital cost £28 million or £50 million?

Ben Hadfield: Unfortunately, these things get more expensive. The last one we built purified a biomass of 700 tonnes and it was £28 million. There is another company, a well-run company within the SSPO now—so I am sure they are doing it as efficiently as possible—but they are spending close to £50 million on doing 1,000 tonnes. If you say that production in the sea in Scotland is 165,000 tonnes, it is a two-year cycle, so you need double that volume; it is around £2 billion to put the capital infrastructure in place to replace what we have in the sea.



Q222 **Chair:** Do capital costs not come down the more you build?

Ben Hadfield: They do, but one of the key arguments here, and the reason we have such a low CO₂ profile and the reason why salmon farming is so efficient, is that the environment around the farms assimilates the waste. Genuinely, within quite a close distance, it will return to normal on the seabed. This is a sustainable system where the waste from salmon farming activity is assimilated by the environment. If we replace that with huge concrete structures, which are hugely hungry in power, then we will not have the sustainability profile that we have now. I believe that the trick to do this is to use closed containment where it makes sense—and we currently are doing that in both Scotland and Norway—be transparent about the risk of sea lice and work for a solution, but not state that this can all be solved by moving the industry on land. People who are involved in the industry do not laugh about it, but they think that the people who make those statements just do not understand what we do.

Q223 **Chair:** Mr Linley-Adams, you do not understand fish farming?

Guy Linley-Adams: The whole point of the closed containment system is that it will force the industry to internalise all those externalities, all those economic benefits it gets from allowing its chemicals to wash out into the wider environment, allowing its waste to be assimilated on the seabed underneath the cages, to cause the damage to wild fish populations that it does. It is not just wild fish; the cetacean people will tell you the use of acoustic deterrent devices is a problem for those populations, and so on and so forth. If you bring them into closed containment you force the industry to address the environmental impacts it has. That will obviously influence the sustainability of the industry; if it is pushed to a position where it has to address all those various environmental impacts it will, by definition, become more sustainable.

Q224 **Chair:** Is it not also going to become more expensive?

Guy Linley-Adams: It may well do in the initial move to closed containment but, as you pointed out yourself, Chair, the experience with these things is that when there is a technology change in any industry, as it progresses the cost of that new technology drops and it becomes routine. Going back not so long ago, the car industry, when faced with the move to put catalytic converters on all cars, said, "It will be the end of the industry in Britain. It will be a disaster. Costs will go through the roof". It did not happen; the world continued.

That is the same situation we are in here. If we get Governments to push the industry to closed containment, it will happen. By all means, incentivise the industry to move to closed containment. Like Ben mentioned, the use of licence fee breaks in Norway is a sensible idea, and that should be perhaps promoted in Scotland as well, but there is no reason why this cannot happen. The technology involved is not rocket science.



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Q225 **Chair:** Dr Hughes, do we need to see a moratorium on new fish farms using open nets?

Dr Hughes: That is not a scientific question. It is for society to decide what it wants out of its food production and what it wants out of its marine environment. I do not think that there is enough evidence to say that there should be a moratorium. There needs to be more scientific research to establish what the major impacts are, and we lack a major risk assessment for the industry. We do not understand exactly what the risks are for the Scottish industry and where we want to rate those risks, because any production system is a balance of trade-off and risk. We do not have that framework for the Scottish industry. That is not a science question, it is for society to decide what it wants from its marine environment.

Q226 **Chair:** We have these 227 salmon farms; 22% of them are within marine protected areas, about a third are within some form of protected areas. Should fish farming be allowed in marine-protected areas?

Dr Hughes: The simple answer to that question is yes. I have done some work on the IUCN group for aquaculture and MPAs, and their findings and their way forward is that it depends on why you have designated an area for protection and it depends on what type of aquaculture you have in that area.

If the form of aquaculture does not environmentally impact the reason why you have protected that area, then there is no reason for aquaculture not to go on. If there is a direct conflict between the reason for the MPA, why you have set up that area for protection, and the aquaculture activity, then obviously those two things are contradictory and you have to decide which is more important, the MPA or the food production.

Q227 **Chair:** Are MPAs not at risk of environmental degradation from effluent and pesticides and the sort of things that are used in these farms?

Dr Hughes: It depends on why you have set up the MPA. If your MPA is set up for wading birds, for instance, and within that area you have a fish farm that is causing a localised environmental deposition on the benthos, which is separated from the wading birds, then there is no real conflict. If you set up an MPA for maerl beds—this coralline algae—and your fish farm is sitting directly over your coralline algae, there is definitely a conflict there. It is more nuanced than saying, "Aquaculture should be excluded from MPAs". We need to understand the reason for the MPA and the impacts of the aquaculture industry.

Chair: Okay, to be continued. We have run out of time. Thank you all very much indeed for your helpful responses this morning.