



Cynulliad  
Cenedlaethol  
Cymru

National  
Assembly for  
Wales

# Cofnod y Trafodion The Record of Proceedings

[Y Pwyllgor Newid Hinsawdd, Amgylchedd a  
Materion Gwledig](#)

[The Climate Change, Environment and Rural  
Affairs Committee](#)

16/03/2017

[Agenda'r Cyfarfod](#)  
[Meeting Agenda](#)

[Trawsgrifiadau'r Pwyllgor](#)  
[Committee Transcripts](#)

## Cynnwys Contents

- 4 Ymchwiliad i Ardaloedd Morol Gwarchoddedig yng Nghymru: Archwiliad o Dystiolaeth a Phenderfyniadau mewn AMGau gan Ddefnyddio Cregyn Bylchog ym Mae Ceredigion fel Astudiaeth Achos  
Inquiry into Marine Protected Areas in Wales: An Examination of Evidence and Decision Making in MPAs using Scalloping in Cardigan Bay as a Case Study
- 30 Papurau i'w Nodi  
Papers to Note
- 30 Cynnig o dan Reol Sefydlog 17.42 i Benderfynu Gwahardd y Cyhoedd ar gyfer Gweddill y Cyfarfod  
Motion under Standing Order 17.42 to Resolve to Exclude the Public for the Remainder of the Meeting

Cofnodir y trafodion yn yr iaith y llefarwyd hwy ynnddi yn y pwyllgor. Yn ogystal, cynhwysir trawsgrifiad o'r cyfieithu ar y pryd. Lle y mae cyfranwyr wedi darparu cywiriadau i'w tystiolaeth, nodir y rheini yn y trawsgrifiad.

The proceedings are reported in the language in which they were spoken in the committee. In addition, a transcription of the simultaneous interpretation is included. Where contributors have supplied corrections to their evidence, these are noted in the transcript.

**Aelodau'r pwyllgor yn bresennol**  
**Committee members in attendance**

Jayne Bryant <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
Sian Gwenllian <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Plaid Cymru The Party of Wales
Huw Irranca-Davies <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
David Melding <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Ceidwadwyr Cymreig Welsh Conservatives
Jenny Rathbone <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Llafur Labour
Mark Reckless <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	UKIP Cymru (Cadeirydd y Pwyllgor) UKIP Wales (Committee Chair)
Simon Thomas <a href="#">Bywgraffiad</a>   <a href="#">Biography</a>	Plaid Cymru The Party of Wales

**Eraill yn bresennol**  
**Others in attendance**

Yr Athro / Professor Michel Kaiser	Athro Gwyddorau Cadwraeth Forol, Ysgol Gwyddorau Eigion, Prifysgol Bangor Professor of Marine Conservation Sciences, School of Ocean Sciences, Bangor University
Dr Emma Sheehan	Cymrodor Ymchwil Sefydliad y Môr, Ysgol y Gwyddorau Biolegol a Morol, Prifysgol Plymouth Marine Institute Research Fellow, School of Biological and Marine Sciences, Plymouth University

**Swyddogion Cynulliad Cenedlaethol Cymru yn bresennol**  
**National Assembly for Wales officials in attendance**

Louise Andrewartha	Dirprwy Clerc Deputy Clerk
Wendy Dodds	Y Gwasanaeth Ymchwil Research Service
Sean Evans	Y Gwasanaeth Ymchwil Research Service
Marc Wyn Jones	Clerc Clerc

*Dechreuodd y cyfarfod am 10:01.  
The meeting began at 10:01.*

**Ymchwiliad i Ardaloedd Morol Gwarchoddedig yng Nghymru: Archwiliad  
o Dystiolaeth a Phenderfyniadau mewn AMGau gan Ddefnyddio Cregyn  
Bylchog ym Mae Ceredigion fel Astudiaeth Achos  
Inquiry into Marine Protected Areas in Wales: An Examination of  
Evidence and Decision Making in MPAs using Scalloping in Cardigan  
Bay as a Case Study**

[1] **Mark Reckless:** Bore da. Welcome to both our witnesses. Thank you very much for coming in to see us this morning. Translation from Welsh, if required, is available on the headsets at channel 1. Could I ask you both to introduce yourselves and your academic roles for the record? Professor Kaiser.

[2] **Professor Kaiser:** My name is Michel Kaiser. I'm professor of marine conservation at Bangor University. Prior to working at Bangor University, I worked for the Centre of Environment, Fisheries and Aquaculture Science for eight years. I did a PhD in marine behavioural ecology. When I worked for CEFAS, I worked on a load of, basically, research projects, trying to understand the environmental effects of fishing on the marine environment, and I've continued to do that, and I think we're probably regarded as one of the world-leading groups of researchers in this area, at Bangor University. In addition to that, other roles that I have: previously, I was on the board of the Sea Fish Industry Authority. I was also deputy chair of the board for a while. I now chair the science advisory group for the Sea Fish Industry Authority. I also sit on the Joint Nature Conservation Committee as an independent for

my marine expertise, and I'll be taking over chairing the marine protected areas sub-group for the JNCC. I won't carry on any further than that—I do hold a wide variety of other things, but I think that's more than enough.

[3] **Mark Reckless:** Thank you. That was fully comprehensive. Thank you for highlighting those key roles. Dr Sheehan, at least for the record, a sort of summary of information about your academic and other role would be very welcome.

[4] **Dr Sheehan:** Okay, thank you. Well, first of all, good morning, and thank you very much inviting me to contribute to today. My name is Dr Emma Sheehan, and I've been leading a research team at Plymouth for the last 10 to 14 years. We study marine environment, and particularly the association with human impacts—so, to provide evidence to help management and, sometimes, mitigation of those activities. We have three main topic areas, which are: marine protected areas, marine renewable energy, and sustainable fisheries and aquaculture. To do this, we've developed a range of deploying underwater cameras so that we can measure the marine communities in a non-destructive, cost-effective, time-effective way, and we always make sure that we design the kit so that it can be deployed off fishing boats, because that's one ethos of the group, that we always use local people, because they often know the sea a lot better than we do, and they're also definitely better deploying kit off the back of a fishing boat in the marine environment.

[5] **Mark Reckless:** Thank you. In the committee, we're having this marine inquiry, and we've a sort of macro interest in the marine plan that the Welsh Government is developing. We've just had a briefing from some of our research team, so we're sort of coming up to speed in an area where both of you are I think very expert. What we're trying to do to assist us is we're focusing on a case study of the opening of part of Cardigan bay to scallop fishing and how that's being monitored and the academic input into that perhaps to help us understand the wider issues we'll be doing on a macro issue, too.

[6] I wonder if I could start by just asking about your experience using experimental design in marine ecology research, particularly the before-after control-impact principle and the extent to which you perceive that is being applied or otherwise in Cardigan bay as it's opened to scallop fishing in particular areas?

[7] **Dr Sheehan:** I was introduced to experimental design as an

undergraduate by the guy who wrote the book—I went to University of Sydney to work with Professor Tony Underwood. So, from an early age, I've appreciated that it's absolutely essential that these experiments are done very rigorously. The thing about experimental design is it's nothing clever—it's just about applying the logic.

[8] So, from an MPA example, if you were monitoring the recovery of an MPA, if you only had sites inside the protected area and you saw increases in, say, the crab population inside, you couldn't attribute it to that protected area. It could be just a national trend, it could be going on everywhere. So, you need to have control areas that continue to be open to fishing in order to say it's the release of that fishing pressure that's caused that recovery.

[9] So, in Cardigan bay, if you were doing an impact study, for example, the controls would be used in an opposite way, in that the controls would have to not have been exposed to the pressure of fishing in order to show what a control area would look like.

[10] **Mark Reckless:** Professor Kaiser.

[11] **Professor Kaiser:** In an ideal world, we'd all like to have access to control areas, where there were no human activities, against which we could compare the response of the system. You don't always have, though, in the real world, the perfect system. So, sometimes, we have to adapt our experiments to be able to account for the situation that we find ourselves in.

[12] In particular, in Cardigan bay, you have to remember that the area, prior to its designation as a special area of conservation, was subject to a variety of forms of fishing. Those forms of fishing were then excluded, and they were excluded for a very considerable period of time, after 2009—and for certain areas prior to that as well. So, the area has had towed mobile fishing gears excluded for a considerable period of time. The important thing in relation to that is that there was an area that was maintained under a level of fishing. So, if you like, it's the opposite type of comparison that you can look at. So, it was, if you like, maintained under a condition where it's under pressure.

[13] The other thing that's really important as well with any of these areas is to take into account the natural physical environmental processes that affect them. There's a considerable body of evidence now that has looked at the sensitivity of the sea bed, around the UK in particular, to pressures. That

varies very considerably, depending on the environmental context where that area occurs. So, for example, as you go into deeper and deeper water, you find that those areas are far less subjected to natural disturbance because they're below the depth that wave action can actually reach down to, whereas when we go into more shallow waters, in particular where you're exposed to considerable fetch, as Cardigan bay is, then natural disturbance regimes are much more severe. What that means is that the natural animal communities that can actually live in that environment are adapted to that sort of disturbance. By default, they have life histories or lifestyles, if you like, that are adapted to that. So, they tend to be characteristically described as short-term opportunistic species.

[14] So, when we look at Cardigan bay, given the amount of time over which fishing was removed from the area, given its highly disturbed nature, we would expect that that would be more adequate for the sorts of species we would expect to live there to have recovered, in the areas that are closed to fishing.

[15] **Mark Reckless:** You said, I think, earlier that it's a very considerable period of time for which fishing had been restricted.

[16] **Professor Kaiser:** Yes.

[17] **Mark Reckless:** I think elsewhere there was some reference to between five and 20 years being required for full recovery. Is your assessment that eight years is a sufficient period for such recovery?

[18] **Professor Kaiser:** Again, the key thing is it depends on the environmental context. So, you hear that range of figures that is used, five to 20 years—in fact, it could be one to 20 years. It comes down very much to the level of natural disturbance that a particular location is exposed to. So, we were just talking before we came in about Lyme bay down on the south coast, which is where Dr Sheehan spends most of her time, and we've just been doing some work there ourselves. The indication is that some of the sensitive species that occur in Lyme bay, for example, which is a very different environment, have recovery timescales of 17 to 20 years. However, if we go into very shallow waters that are just subtidal and that are being battered by storms—. We saw in north Wales huge racks of marine organisms this last winter—. Members of the public were sending in photos to the press, asking, 'Is this pollution?' No, it's just storm effects, digging the animals out of the sea bed and throwing them up on the beach. That's just a

natural event. So, when we think about recovery, we need to think of it in the context of each location that we look at.

[19] **Mark Reckless:** And in the context of Cardigan bay, do you consider eight years as a sufficient time for recovery?

[20] **Professor Kaiser:** For the species in question in the sites that have been the focus of the study and that are the focus of the area under consideration for the scallop fishery, yes, that's the case. With other parts of the SAC coming further inshore, where the sea bed has a much more stable composition because there are more cobble reefs—within, say 3 nautical miles of the coast—those recovery times would be on much longer timescales. So, it comes down to the exposure to natural disturbance and the geomorphology of the sea bed that dictate which sorts of animals can actually live there.

[21] **Mark Reckless:** Can I ask: within what Natural Resources Wales described as the fishing intensity study area in Cardigan bay, we have 17 sample sites where, I understand, a range of different intensities, from zero to the most intense, are going to be allowed—do you consider that those 17 sample sites should allow robust evidence to be drawn, including that which would give us policy advice and input, in terms of future decisions to allow scalloping or otherwise?

[22] **Professor Kaiser:** Well, of course, I would say that I think that that's a very robust piece of scientific evidence, because we did the work—

[23] **Mark Reckless:** Indeed.

[24] **Professor Kaiser:** But that was independently reviewed by international experts as well, who concurred with that conclusion. Just to give you a little bit of context, this is not just some academic exercise. There were 18 months of science undertaken prior to the experiment going ahead, just to ensure that the experiment itself would have no damaging effect on the status of the SAC. So, that's 18 months of evidence gathering before we even began this exercise.

[25] The purpose of the design of the experiment that we put forward was to really provide the evidence that managers need to manage the fishery in a way that has conservation interests as the primary management target. So, normally, we manage fisheries on the basis of quotas for target species. So,



in a typical context, in talking about scallop fishery, you would be talking about setting a quota for the amount of scallops that can be caught—and we will do that as well. However, in this context—. This is the unique thing about the situation with the SAC—it does offer a unique opportunity, because in the UK, we have no legislative framework for managing scallop fisheries, but the SAC provides that. What we've proposed, then, is—. In the experiment, what we are trying to understand is the point at which the amount of fishing activity will tip the system into a negative status. Of course, once you understand what that point is, you can set a threshold that is appropriate, so that you don't ever reach that particular target.

[26] This is why we had such an extreme range of fishing intensities. In fact, the most extreme fishing intensity would be considered unrealistic by the fishing industry itself. But it was very important to have that full range of intensity so that we could see more precisely where that threshold sat. Having defined what that threshold is, it provides the Welsh Government with the evidence base to say, 'This is the point at which we will stop fishing, because if we go beyond this point, then there is likely to be a negative impact on the system.' So, if you like, it presents a unique opportunity—for the first time anywhere in the world, I think—to actually have a truly ecosystem-based approach to fisheries management, where a conservation threshold is the primary target. It will also incentivise the fishermen to reduce their fishing footprint, because they have no interest in reaching that conservation target before they would take the scallop quota.

[27] **Mark Reckless:** Could I bring in Jenny Rathbone?

[28] **Jenny Rathbone:** It has to be true to say that all fishing activity has a negative impact on the ecosystem, does it not? It is all about the management of the levels and damage.

[29] **Professor Kaiser:** Sure. Any human intervention in the marine ecosystem is going to lead to some sort of an effect. Undoubtedly, there will be a change. The key question is whether that change, or amount of change, is considered to be sustainable. In other words: does the system have the resilience and the capability of recovering and restoring itself to the condition that it should be in should you remove those pressures from the system?

10:15

[30] **Jenny Rathbone:** One of the concerns about the areas that you sampled was that they didn't actually include any reef-like areas because the 17 boxes you chose were all on the western side of Cardigan bay where there are, as far as we understand it—.

[31] **Professor Kaiser:** Absolutely. That undoubtedly is the most critical thing. There is no suggestion whatsoever that any scallop dredging is going to be allowed in any area of the SAC that has cobble reefs because the cobble reefs are one of the features of the SAC and, as both Dr Sheehan and I know very well, scallop dredging and reef fauna are not compatible with each other. This goes back to the point I was just saying: we did this 18 months of science just to ensure that the experimental work and the box that was examined had no cobble reefs within it. Had we found cobble reefs within that box, the experiments, simply, would not have happened.

[32] **Jenny Rathbone:** Yes, that's a useful—

[33] **Mark Reckless:** I'm sorry, Jenny; I was just wondering whether Dr Sheehan wanted to come in with her perspective on your question as well.

[34] **Dr Sheehan:** I would just like to add that my perspective of reef is a bit broader maybe than what yours is, Mike. We accidentally found—we didn't realise we were looking for this when it happened. When we were monitoring recovery in Lyme bay, we were focusing on hard substrata that we could visibly see: rocks, cobbles and stones. After the reef was protected for about three years, something surprising happened, in that reef-associated fauna—so, animals that rely on hard substrate to attach to—started coming out of the sand, which we'd previously been ignoring, and they indicated that this pebbly sand area that had been previously written-off as an in-between reef area was actually technically reef. I went back to the legislation and the interpretation of the habitats directive had actually predicted this. It says that reef can also be pebbly sand as long as the animals that you're relying on to indicate it are relying not on the sand habitat, but the underlying reef habitat.

[35] **Professor Kaiser:** Can I just respond to that? The initial work that we did on behalf of the Welsh Government, back in 2009, was probably the only time when I've taken a ship to see and actually sift rocks—not animals, but rocks—because there's a very precise definition of what is considered to be cobble reef and it's defined by the Joint Nature Conservation Committee. So, when conservation features were defined and designated within special areas

of conservation in Natura 2000 sites, there had to be these very precise definitions. Cobble reef is very precisely and accurately defined and our task literally was to go out and see what proportion of the sediment environment was composed of cobbles over a size of precisely 64 mm in diameter and what proportion of the sea bed was sand and gravel. I'm not disagreeing with Dr Sheehan in any way; however, our conservation objectives are actually defined by quite precisely termed definitions.

[36] **Jenny Rathbone:** Okay. But picking up on Dr Sheehan's point, could you describe why you are looking at this through the lens of just the site as opposed to an ecosystem, given that there's a lot of concern raised about the way in which sea life that's in areas adjacent to reef areas enhances the reef area? There's a co-relation. Sea life doesn't understand boundaries; it, presumably, moves around.

[37] **Professor Kaiser:** No, I entirely agree, but I think we need to refocus on the context of this particular exercise. The context was Cardigan bay special area of conservation and the fact that that happened to overlap with a particularly valuable commercial fishery for scallops, and the Welsh Government was interested to see whether the interests of conservation and also fisheries could sit side by side in a manner that was sustainable. The key thing, and the key question that we have tried to address through the experiment, is whether, in fact, certain levels of fishing activity do have a negative impact on the ecosystem, and I think what we've shown very convincingly is that if you push the system beyond a certain level of fishing intensity, then, yes, recovery back to a normal state, if you like, would take longer than we might desire, and could potentially have an impact on other components of the system, as you're suggesting. But, what we've also been able to define is the amount of fishing activity that is entirely compatible with those wider ecosystem aims and objectives.

[38] **Jenny Rathbone:** Okay. One of the points picked up by Dr Tuck was that, in areas where you didn't find reef-like life, that could have been because those areas have only been closed to fishing since 2009, and so that may not have given enough time for recovery. So, although you described them as areas where sea life can only survive that is compatible with movement, that may or may not be the explanation. It could just be that the sea life hasn't had time to recover.

[39] **Professor Kaiser:** I understand the point entirely, and I think that's why, if you only look at this particular problem from a purely biological point

of view, you miss the environmental context. One of the things that we also did, which is quite innovative, is that we did a considerable amount of geophysical survey of the sea bed. That wasn't just to describe the distribution and nature of the sediments and the geology within the area, but we also went back and surveyed the same areas over a period of time, because one of the important premises that sort of underpins our argument, if you like, is the fact that this area is subject to a considerable amount of natural disturbance.

[40] So, what you'll actually see when you look at the sea bed in these offshore areas is that you see these incredibly mobile sand-wave systems. So, effectively, what you have is a more coarse underlying geology, over which there is a veneer of sand—sand waves, literally, one or two metres high, which are moving across the sea bed at quite a considerable rate. And so, what this means is that at different points in time, over the timescale of a year, areas of the sea bed will be exposed, so some rock might be exposed, and opportunistic animals like barnacles and tube worms settle out because they can settle and grow very quickly within that timespan, but then over the intervening next six or 12 months, sand then will re-cover those areas and those animals will be smothered.

[41] That's an entirely natural cycle of change within that system, and that's entirely driven by physical processes of sediment transport through tidal currents, but also as a result of storm activity. And we are lucky in that we have a wave buoy fairly close at hand off Aberporth, and just before Christmas that was registering 18 ft high waves, so this is a really dynamic system. That said, where you do have hard geology protruding from the sea bed that is within three nautical miles of the coast of the SAC, then undoubtedly, because obviously it's fixed—the rocks are bedrock; they don't get moved around—we will see animals that are longer lived and would be far more sensitive to fishing. And that's why there has never been any consideration that mobile towed fishing gear would be allowed back into that area.

[42] **Mark Reckless:** Dr Sheehan, do you have a perspective on that?

[43] **Dr Sheehan:** I would just to like to add this concept of natural variation, when considering storms, and that is: the storms that we had in 2013–14, just prior to the baseline of the Cardigan bay survey, were really extreme, and they were reported to have not—. We haven't seen storms like that for at least 20 years, and some of the storms that we had were one in

30, one in 50 years, and so I personally wouldn't be looking at that to explain natural variation; I think that's as bad as it gets. That's the extreme, and that's not how I would be looking to the environment. I would like to look to what I consider to be a representative marine community, under the years where we have 'normal' storms, or more regular storms, that the system, within 20 years, then has its own natural recovery trends. So, we need to be allowing it to recover to that level, so that it has its own redundancy, not maintaining it at the worst that it can be.

[44] **Jenny Rathbone:** But I'm struggling to understand why the fishing industry would be wanting to get in to an area where scallops aren't generating because there's too much movement of the sand.

[45] **Professor Kaiser:** Well, that's actually—. No, that's quite the opposite. The reason that Cardigan bay is so productive for scallops is because of this strong tidal current regime that transports food into the system. So, one of the other things that we do is we provide the science and advice to the Isle of Man Government that underpins their scallop fisheries and other fisheries as well. And, certainly, we use marine protected areas as part of that management system. Cardigan bay is quite similar, actually, to parts of the Isle of Man in that the growth of scallops is very fast indeed. So, these scallops are growing to a marketable size within four years, which is very unlike, actually, the English channel—or the western part of the English channel—where the scallops are much more slow-growing, simply because it's about an issue of supply of food.

[46] The other aspect of that is you have to remember that, in Wales, all scallop dredging is excluded within one nautical mile of the coastline. So, we already have, at a national level, this very draconian marine protected area around our coast, which is a good thing. And then, in certain parts of the coast, not just including Cardigan bay, scallop dredging is excluded out up to three nautical miles from the coast. So, in the context of Cardigan bay, based on the oceanographic work that we've done, and looking at the genetic make-up of scallop populations in the Irish sea, we know that Cardigan bay is genetically distinct and it's also self-recruiting based on the oceanography. So, the reason that I expect—

[47] **Jenny Rathbone:** Self-recruiting: you mean that scallops naturally go there?

[48] **Professor Kaiser:** So, what's happening—. My interpretation of what I

believe is happening—and this is inference based on the oceanography and the genetics—is that we have these large areas that are protected from fishing, effectively we've built up a very large brood stock of scallops within those areas, they're producing a lot of spat, which are then—. Well, the larvae then are circulating in the water column, they're going out to sea, offshore in Cardigan bay, but then they're circulating back into Cardigan bay and recruiting back in. In other words, they're not recruiting in from other patches of scallops elsewhere. So, protecting that brood stock of scallops is really going to be an important part of any management system for scallops that we have in place. That's a very important part of the picture. It just so happens that what's currently termed 'the Kaiser box' and this new proposed box next to it happen to be particularly favourable types of sea bed for scallops to settle upon and live in—similar to some of the areas outside the area as well. This is why we have this consistently recruiting and very productive population of scallops in that area.

[49] **Mark Reckless:** Can I bring in Simon and then Huw?

[50] **Simon Thomas:** Thank you, Chair. I just wanted to understand to what extent the legislation—. Because both of you have mentioned legislation in particular in this regard and, Professor Kaiser, you said that we didn't have legislation to deal with scallop dredging as such, and we're using this SAC in a way—this special area of conservation—as a tool to deliver the management of scallop dredging. In that context, to what extent is legislation in Cardigan bay and Lyme bay a help or a hindrance, in that it takes a features-based and then some species-based approach, rather than this whole-ecosystem approach? So, in what way can you marry that kind of approach to management with this wider demand, if you like, from a range of stakeholders to have this sort of eco-based approach?

[51] **Professor Kaiser:** Would you like to go first?

[52] **Dr Sheehan:** Thank you. In Lyme bay the first statutory level of protection was a site-based approach. So, they drew a box, which was known locally as 'the box', and everywhere in that had the same level of management. So, in there, you can still dive for scallops and set pots and nets, but there's just no bottom towed gear. So, all trawling and dredging was excluded in 2008. Now, at that time, as I said, we were still focusing on the reef habitat, but because it had all been protected, we were then able to see that the visual reef—rocks—was smaller than the functional reef that was much further spread across the whole area, and I really then understood

about how the reef is—

10:30

[53] **Simon Thomas:** Just like an iceberg, in effect.

[54] **Dr Sheehan:** And then we thought more about the species' life history. Of course, that's where we saw increases in crabs, lobsters and scallops because there are different life stages of these animals. Some of them use the sediment. Crabs like to bury into the sand when they're buried with eggs. We think the lobster juveniles bury into the sediment. So, because they hadn't been disturbed again and again, suddenly the whole system was flourishing. Even the scallops themselves—I consider them a reef-associated organism. We had a big recruitment this year of sea fans. I've got pictures to show you of a scallop with a sea fan growing on it. They often support hydroids and things, which are well-known to help scallop spat settlement. So, the whole system flourished, and therefore we got more recruitment. So, I'm really in favour of the site, because if it was just a feature, then it would just be the rocks protecting in isolation.

[55] **Simon Thomas:** But Cardigan bay is a little different again, isn't it?

[56] **Professor Kaiser:** The context of the physical environment is different in Cardigan bay. However, your question was about whether site features are useful. I would say, undoubtedly, they are, because they provide a focus for management. Although we've talked about reef rather a lot, the reason really behind the experiment that we undertook in relation to asking the question, 'Is there a certain level of scallop fishing that is sustainable within a particular small part of Cardigan bay?'—and we're talking about 15 per cent of the SAC—it was related to bottlenose dolphins, not to the reef, because as I said, had there been any cobble reef within that area, the experiment never would have happened and we would not be having this discussion today. But the actual link comes back to the ecosystem point that you raised, and it was an objection or a query, if you like, that was raised by environmental groups. And so, the argument ran like this: the special area for conservation is designated for bottlenose dolphins; bottlenose dolphins eat fish; fish eat worms; therefore, if scallop dredging kills worms, could it have an effect on the bottlenose dolphins?

[57] So, really, what we've been trying to do is answer that question: is there a certain amount of scallop fishing that has a tolerable—from an

ecosystem point of view—effect on prey for fish, and so on and so forth, up the food chain? I think that's the question that we have been able to address. But without the focus of having the site feature, which in this case was bottlenose dolphins, it's very difficult to actually frame the science to answer that question. So, I think the answer to your question is 'yes'. I think site features are useful. I think, by default, they take into account the wider ecosystem.

[58] **Simon Thomas:** Just for clarity, then, when you said earlier that you'd designed the experiment and the work going forward to look at where the—I think you used the word 'crash', although I'm not whether you did use it—

[59] **Professor Kaiser:** The threshold.

[60] **Simon Thomas:** The threshold, yes, between a sustainable fishery and such an impact on the scallop population that would not be sustainable. That tipping point is as much about the wider impact, right up the food chain to the protected species, as it is about the scallops themselves.

[61] **Professor Kaiser:** Absolutely. And just to be clear, you can define a threshold, okay? But given that we're talking about a conservation area, my advice would not be to work up precisely to the threshold, but being precautionary, one would add a buffer as well, of course.

[62] **Simon Thomas:** Okay. Thanks.

[63] **Mark Reckless:** Professor Kaiser, did you say that you were expecting a further area beyond the Kaiser box to be opened to scallop fishing?

[64] **Professor Kaiser:** That is what we have been discussing through the entirety of this committee, yes. That is the proposal by the Welsh Government that was signed off by the Minister.

[65] **Mark Reckless:** Which area? I didn't see a definition of that area in the consultation. I just wondered whether you were aware of the proposal.

[66] **Professor Kaiser:** Sure. The experimental reports that we've published, which are publicly available online—. There's currently what's known as the Kaiser box, which, if you like, effectively is in the middle of the SAC. We're talking about an area of an equivalent size to the west—slightly south-west—and adjacent to it. It's outlined in the experimental reports that we've



published. My expectation would be that the Kaiser box would be closed to fishing if this new area was reopened, for the reason that it would allow scallop populations to rebuild within that area.

[67] **Mark Reckless:** How long would you expect it to need to be closed to allow the population to rebuild?

[68] **Professor Kaiser:** Probably somewhere between three and four years, based on growth rate.

[69] **Mark Reckless:** Can I bring in Huw Irranca–Davies?

[70] **Huw Irranca–Davies:** Can I just ask, for my own understanding first of all, following on Simon’s line of questioning: is this, in effect, a maximum sustainable yield approach? Or is there a difference between this and the conservation–based threshold approach that you were talking about?

[71] **Professor Kaiser:** We’re not in a position to advise on a maximum sustainable yield. So, if—and I say ‘if’—the fishery proceeds, my recommendation would be that there are two management targets: one that is a scallop biomass removal target, and the other one is the conservation threshold. The conservation threshold is actually easier to define, and we can measure that very precisely because we can ensure that we measure exactly how much of the sea bed the fishing, and vessels involved in the fishery, have disturbed.

[72] The other survey that we have done in Cardigan bay has been to quantify the amount of scallops in Cardigan bay—both within the SAC and outside the SAC, across the wider Cardigan bay. That’s the information that we would use to advise what an appropriate amount of scallops to remove from the proposed area that is to be opened would be. My thinking on this, to be precautionary, is that we should only really consider the total biomass of the population of scallops to actually be within the boundary of the SAC. That’s very, very precautionary.

[73] If we were being less precautionary, we would probably take into account the full range of scallop beds right across Cardigan bay. But I think from a precautionary point of view, it’s useful to remain focused on Cardigan bay SAC because of this issue that I was discussing before, about the importance of the biomass of broodstock that occurs within the permanently closed areas of the SAC, and so the amount of biomass that we would

propose to remove would be set against that. So, you'd be talking about no more than 30 per cent of the total biomass within the SAC as the amount that one would recommend could be taken—and when I say 'could be taken', it doesn't mean that you fish up to that threshold.

[74] **Huw Irranca-Davies:** Right, okay, that's very helpful. Emma Sheehan, can I ask you—? This issue of the precautionary principle is often interpreted by some people as: if you use the precautionary principle, then stay away; don't do anything. Now, Michel Kaiser has just described a more precautionary or a less precautionary approach. Based on your experience and the studies you've done, what is your interpretation of the application of precautionary principle?

[75] **Dr Sheehan:** I think what Professor Kaiser was just saying was—just to add from your previous question about maximum sustainable yield—that this is still very scallop fishery-focused, and that's not how I would look to manage an area that has been closed for conservation. But for the precautionary principle question that you asked me, I think it's there for when we don't have evidence available, and there is risk of an activity, and that there's reasonable reason that it could cause serious long-term harm. I consider it a temporary measure while we are then able to collect data to support, either way, and inform on what is an appropriate management measure, or a mitigation measure for that activity.

[76] **Huw Irranca-Davies:** So, both in Lyme bay, but also off Cardigan within the areas we're describing, the pure precautionary principle, you'd both probably say, is not appropriate in its purest application.

[77] **Professor Kaiser:** The purest application of that principle would normally mean a circumstance where you have no evidence whatsoever with which you can base any informed assessment, and that's the approach that is adopted by the NEAFC—North-East Atlantic Fisheries Commission—who are responsible for fisheries out in the middle of the Atlantic, where you're dealing with deep-water coral reef systems and things that are very fragile. Their approach is entirely in line with the precautionary principle in that they have identified existing footprints of fishing and they have closed all other areas where fishing has not occurred. Should fishing industries wish to pursue fishing activities within those closed areas, they have to effectively go and undertake an environmental impact assessment, and hence, everything, step by step, along the way is very, very precautionary. So, the industry is actually forced to gather the evidence that then can be considered by

scientists and they can make an evidence-based judgment as to whether that's appropriate or not.

[78] Going back to your point about maximum sustainable yield, Dr Sheehan is very—. Can I call you Emma?

[79] **Dr Sheehan:** Yes.

[80] **Professor Kaiser:** Thank you very much. You can call me Michel. So, Emma quite rightly said that the focus tends to be very scallop orientated, but thinking in the context of Cardigan bay, as I said, the proposed area that would be opened is only 15 per cent of the total area. So, even if you killed every single living organism within that area, you would only reduce the biomass of organisms by 15 per cent. In the context of fisheries, we fish many fish stocks down to 50 per cent of their virgin stock biomass and the recoverability of fish is far lower than it is for other marine organisms. So, I think we're well within that criterion, if you like.

[81] **Huw Irranca-Davies:** As an extension of that, can I ask, in terms of the poor Minister who has to make decisions, whether it's in England or in Wales, and they come to the men and women in the white coats—the scientists and specialists—and they say, 'Can you give me a clear, definable answer here on what we can do?', how do you communicate to Ministers and to others who are not of a scientific background degrees of certainty and degrees of confidence in the data that you have, in the knowledge of the environment that you're talking about, in the possible projections of fishing effort that could go within any particular area, or the environs of an area? How do you communicate degrees of confidence and certainty, or uncertainty? Dr Sheehan, if I can turn to you, first of all.

[82] **Dr Sheehan:** I think that it's a really difficult position to be in to have to base decisions on sites that you haven't undertaken yourself, because we know all the limitations and we know the variability of our data. That variability, and sometimes uncertainty, is important to take into consideration for important decisions—it depends on what decisions they are.

[83] So, it's our job to make sure that we are clear and we use the appropriate language to make sure that the Minister would understand the limitations of our science. So, you won't hear ecologists saying, 'We've proved this, we've proved that'. We'll use language like, 'This indicated this,

because...’ We’re generally never 100 per cent certain. We’re usually about 95 per cent certain about our science. So, it’s a difficult one.

[84] **Huw Irranca-Davies:** And in your experience, do policy makers and decision takers heed those nuances?

[85] **Dr Sheehan:** I think that when you produce a report or a paper, you would show that variability clearly showing variants around a mean, and so, then, they can visually see whether the data you’re presenting is—I don’t know what the word is—more or less reliable for them to base a decision on. But yes, often people don’t ask for that, so you have to make sure—you have to take that lead and make sure that people understand the limitations of your data.

[86] **Professor Kaiser:** And the advantage of having been able to undertake a tightly controlled experiment is that you have the ability to control, to some extent, the strength of the conclusions that emerge from that experiment. So, a well-designed experiment will lead to strong conclusions and you can do all sorts of interesting fancy statistical techniques to tell you how much statistical power that has. I doubt very much that the Minister is interested in that, but that gives us an indication of how certain we can be. I think one of the independent experts said that they felt that the experiment met the strongest levels of evidence for evidence-based policy making. I think it’s that peer review process that also gives credibility and assurance to Ministers that they can move forward.

[87] However, I’d just like to re-emphasise one of the points I made before, which is that, on the basis of the experiment, we’re able to define that threshold that you touched on. But, of course, that’s an average figure and there’s some uncertainty around that threshold. That’s why I’ve been very clear to emphasise, particularly when discussing with Welsh Government officials, and particularly given the context that this is a conservation area, that we shouldn’t work up to that threshold, that we should step a little bit back from that threshold, because science is never perfect—unless you’re a physicist, of course. So, it is important that we leave ourselves room to—. Bear in mind this will be a trailblazing fishery. This will be the first time this has been attempted, and so we should move forward in a very precautionary way, feeling our way very carefully and then, actually, evaluating afterwards how well that management system performed. If it performs very well, then we’ll be confident to maybe increase the levels in future and get a little bit closer to that threshold. So, it’s about learning by doing, I think, and that’s

the whole basis of adaptive management.

10:45

[88] **Huw Irranca-Davies:** So, my final question: to get to that nub of the interrelationship between the evidence that's presented and the analysis and the recommendations that flow from that from the scientific community and the decisions that Ministers take, one aspect is those degrees of confidence, degrees of certainty and the fact that the science is never perfect—apart from in physics, as you say, although I guess some would argue that even in that sphere there are unknowns out there at the moment. What would be your take on the—? How would you expect Ministers to respond to a well-designed experiment and robust data that lead to certain conclusions? How would you expect them to respond, and what is your take on how they have responded to this particular piece of research and the recommendations that have flowed from it?

[89] **Professor Kaiser:** Well, my interpretation of the way that the current Minister in Wales has responded to this is that they place sufficient confidence in the results to instruct Welsh Government officials to look at how this fishery could proceed, taking into account the legal requirements to ensure that there is no damage to the special area of conservation. So, I would say, from that point of view, that that is a strong endorsement of the work that we've done.

[90] **Huw Irranca-Davies:** And if they were to fish up to that threshold limit—if, within the way it's taken forward, there was fishing to be done right up to that limit that you were talking about, is that something—? You clearly expressed your view that that is not a preferred outcome that you would want to see. Is there a point at which Bangor University turns around and says, 'We might have to look at doing some more work here'?

[91] **Professor Kaiser:** No, because, at the end of the day, we've been asked the question, 'What is the threshold?', and so we've defined what that threshold is. You could be wildly optimistic and push it above that threshold, or you could be super cautionary and go below that threshold. As I say, my advice would be: there's the threshold, let's just step away from that and see what happens.

[92] **Mark Reckless:** Can I bring in one question for Simon Thomas before—?

[93] **Simon Thomas:** It's specifically on that, actually, because my understanding is that Welsh Government has commissioned a working party or group, including the fishermen themselves and officials. On the basis of what you've just replied to Huw Irranca-Davies, what would you expect the ongoing science evidence to be within that working group? Would you expect that to be in—? I don't know if you're a member of that or whether you have individuals from your team who are members of that, and whether you'd be continuing to monitor the decisions that are taken on the basis of what you've outlined to the committee this morning.

[94] **Professor Kaiser:** Well, the—. So, let's just remind ourselves where we've come from. So, we're talking about a complete void of scientific evidence prior to 2009. Once you enter into this process, there is then a commitment to carry on gathering scientific evidence, going forward. I think, at the moment, that's primarily—the experimental studies that have been done, if you like, they have tied down the conservation issue in a robust way and I think the need—. One would still wish to monitor the response of the system and the wider system in Cardigan bay SAC, but perhaps on a lower time frequency than we have been doing more recently, so perhaps once every five years. However, if you're going to have a fishery that is contemplated on an annual basis, there is then a need for an annual assessment of the status of scallop populations, and that is planned at least for the next two years. So, we've already done survey work in December and also last September; there is another cruise planned in June. The survey results from both the December and June cruise will inform the scallop threshold, and that will be fed through that group that you just mentioned. So, I am a member of that group.

[95] There's quite an onerous cycle of assessment that needs to be done, and the other thing to point out, actually, is that the fishing that has been undertaken in the Kaiser box annually within Cardigan bay SAC has been subject to a habitat risk assessment undertaken by Natural Resources Wales in relation to bottlenose dolphins and the other features of the SAC. So, the management around this fishery already is quite onerous, but there's going to be a step change in the scientific requirement with this moving forward. Perhaps rather ironically, there is a real opportunity here for this scallop fishery. Because it will be so well-managed and so tightly enforced, and managed from an ecosystem point of view, it could actually achieve Marine Stewardship Council accreditation, which would—

[96] **Simon Thomas:** That's what the fishermen hope.

[97] **Professor Kaiser:** Well, if I'm being really honest, I'm not sure too many individual fishermen are bothered about that, but I think the ambition is a good ambition to have, and, at the end of the day, I think it's very important, particularly in Wales, that we add as much value as we possibly can for every scallop removed from the sea bed and for every worm or whatever that is killed as a result of that, as part of that ecosystem effect. Because if we add value, of course, that will also feed positively back into reducing environmental footprints as well.

[98] **Mark Reckless:** Can I bring in David Melding, who I think has some questions for Dr Sheehan?

[99] **David Melding:** Yes. I think we've covered some of this, frankly, or at least by inference. You said, Dr Sheehan, that you were quite surprised, actually, once there was greater control or a prohibition on fishing activity, by how much the whole environment recovered, to the extent of even redefining what you consider a reef. Environmental groups often say to us that the real problem with a lot of what we're now doing, as Professor Kaiser said, is that before 2009 there had been no real robust science in this area, and we don't have an effective baseline. By default, the baseline we use is very much referenced to the degraded environment. So, how do we actually establish a reasonable baseline?

[100] **Dr Sheehan:** My advice would be to start a long-term monitoring project where the area that's monitored is actually properly controlled, where you limit it as much as you can—no illegal fishing; I wouldn't have towed gear in that area—to actually give that system a chance to show you what it naturally should look like. There are certainly species in that area, like ross coral, which is this amazing—it's called coral but it's a bryozoan, and it's an orange structure with all these caverns. One of my skippers, this fisherman who's got his hands on one before, he said, when you pick it up and turn it upside down—I don't advocate this, but he said it's like a rain shower of all these little crabs and all their little larvae. So, these species are there, and they can recover and they can grow if given the opportunity. So, there's no quick solution. There's no quick fix. If we haven't got those data then I'm afraid it's a case of giving that system time to show you what it naturally should look like.

[101] **Professor Kaiser:** Can I just come back on that particular point? Long-

term monitoring programmes are very important to enable us to understand both the effect of human activities, but also natural change, and obviously climate change is the one that pervades everything at the moment. Having said that, there are other ways to approach this particular issue, and the International Council for the Exploration of the Sea has produced a number of very authoritative reports recently that are backed up by some extremely influential scientific papers where they have looked, using vessel monitoring system data—so, these are the satellite tracking devices on the large industrial fleet of boats that are over 12m in length, so, this is for offshore areas. What they are then able to do is reconstruct the footprint of fishing activity around north-western Europe and you can identify areas of the sea bed that are both intensively fished by fishing activities and those that are never fished at all during that period of time. So, despite what you might be told by some people there are quite substantial areas of the sea bed that are not subjected to fishing for a variety of reasons. You can then look at those areas where fishing is absent, and you can define those areas that have similar characteristics to, for example, Cardigan bay or Lyme bay, and you can make inferences about the maximum carrying capacity of those systems to support biological life. It's like everything: the sea bed is not a uniform environment. It's extremely patchy. There are some areas that are extremely rich in life, and Lyme bay is a classic example—phenomenal biodiversity in Lyme bay—but this is partly set by the environmental context, the geology of the sea bed, as Emma has clearly described to you, but also the physical oceanography of the water mass that lies over it. So, we can certainly get some very robust insights into what the sea bed would look like in the absence of fishing, because, indeed, we can find areas where fishing is absent.

[102] **Mark Reckless:** Anything further, David?

[103] **David Melding:** Perhaps Dr Sheehan would reflect on that. How transferrable are the scientific studies, then, that are made, given that we're not replete with evidence, then, but there are now some well-conducted pieces of research, as the peer review demonstrated? How transferrable are these insights, would you say? Because we heard earlier from Professor Kaiser that Lyme bay is not at all like Cardigan bay because it's just not a volatile environment, and that has a dramatic effect on where you'd have a threshold for certain activity like scallop fishing. So, you know, it is difficult, isn't it, for the public and for environmental groups that are seeing their role in the popular debate, then, trying to inform and test scientific opinion and its robustness. So, how transferrable are these studies, would you say?



[104] **Dr Sheehan:** Just about Lyme bay, I think it can be highly volatile. The recovery within the box was doing really, really well, and we were seeing really nice recovery trends of our indicator species. And then, after the storms, I've never seen a change like it. I've got some graphs I'd like to show you after where the recovery trends are going up and then the storms just flattened a lot of the recovery. We had sand that was moved across the site and it basically scoured all of these animals that were growing and living on the sea bed. Even a lot of scallops suffered, and we saw open, clean scallops. All the potting fishermen reported all their pots were missing, and lots of people were taking pots home to put in their garden. So, it's hugely volatile. I don't know whether it's as volatile as Cardigan bay, but certainly there are similar habitat types; we have similar species. So, I think it is transferrable. That's why I went to Aberystwyth University recently, because they invited to me to present whether there were any lessons learnt from this study that I've done in Lyme bay for Cardigan.

[105] **Mark Reckless:** Could I bring in Jayne Bryant?

[106] **Jayne Bryant:** Thank you, Chair. These are just some questions for Professor Kaiser, and I'd just like to take us away from science into the impact and using your knowledge of the Welsh fishing industry. Do you believe there's capacity in the Welsh fleet at the moment for scalloping in the new additional areas?

[107] **Professor Kaiser:** Do you mean are there enough boats to actually exploit it? Yes, there are.

[108] **Jayne Bryant:** And do you think—will that actually benefit the Welsh fishing industry, or do you think that it will have a bigger benefit to other areas of the UK?

[109] **Professor Kaiser:** That's a very thorny issue you touch on there. At the end of the day, that depends, I suppose, on who has access to that fishery, and so we're going beyond the—. Well, I'm a scientist, so that's actually a policy issue. But I can perhaps enlighten the committee a little bit if you're unfamiliar. The Welsh Government would not have the capability of disadvantaging any other fishing interests from any other part of the UK. However, as part of your management process, of course, you may place onerous requirements on any vessels that participate in the fishery, which might, of course, be easier for Welsh vessels to comply with because they're

more locally-based, for example. But there would have to be extremely good scientific reasons for doing that, and those probably would have to be underpinned by issues that relate to enforcement, because enforcement of this fishery is going to be absolutely critical. If we can't have robust enforcement, then how can we actually say that the various thresholds that we're talking about have been adhered to?

11:00

[110] I think the long-term ambition, just from sort of anecdotal and casual conversations with the Welsh fishing industry, is to try and develop processing systems that, at the moment, are absent from the local area, so that, as you indicate, the benefits from this unique system are actually realised and landed in Wales, and therefore feed into the wider economy.

[111] **Jayne Bryant:** I appreciate you answering that, because I know we're taking advantage of your knowledge of the fishing industry, not just as a scientist on it. I think you've outlined and covered my last question, really, but, just in case you want to add anything in particular. You've already said about the sample that you've studied and was highly dynamic, and you've alluded to this in other answers, as I've said, but do you think your research is transferable to other areas and MPAs to understand the impact of dredging?

[112] **Professor Kaiser:** It would be transferable to other systems that have a similar geology and physical oceanographic environment, and that goes back to the point that I was responding to you on in the very nice paper published by Diesing et al from the ICES working group. It is possible to transfer this knowledge, but you do have to make sure that you are comparing like with like. So, that is certainly possible. We're also engaged in a very large international project that is attempting to do this on a global scale as well. The particular challenge there is looking at areas of the world like south-east Asia, where there is no information at all on footprints of trawling, but perhaps from the number of trawlers, you can get an indication of what the footprint might look like. But that's a bit of a diversion from Cardigan bay, of course.

[113] Just coming back to your previous point, I'd really just like to point out that when we undertook this experiment, we engaged five commercial fishing boats. One of those was English. And I think the key thing here, really, is that anyone who participates in this fishery in Welsh waters, we

would want those fishermen to be fully engaged with a sustainability point of view. The sorts of boats that one would be trying to deter are clearly those that have rather nefarious practices, shall we say.

[114] **Jayne Bryant:** Okay, thank you.

[115] **Mark Reckless:** Jenny.

[116] **Jenny Rathbone:** Looking at it from a conservation point of view, why allow dredging at all when you continue to allow beam fishing and pots to be placed? Why not simply intensify those, if they're less damaging?

[117] **Professor Kaiser:** Well, if you want to harvest scallops, unfortunately scallop dredging is the only feasible way to do that. Of the scallops landed in the UK at the moment, which is approximately slightly less than 60,000 tonnes per annum, only 1 per cent of those are landed by the alternative harvesting form, which is hand diving. Hand diving could occur in a bit of Cardigan bay, but it would undoubtedly be in the shallow inshore areas where that brood stock is, and diving for marine organisms comes with its own problems. There's the famous incident of the extirpation, or extinction in fact, of abalones off the west coast of America, where abalone divers literally harvested every last abalone to the point of extinction. So, any activity, if it's not well managed, can potentially have problems.

[118] I think the other opportunity, perhaps, that is offered, due to the legislative framework of an SAC, is that it does give a little bit more incentive to the industry to explore different designs of fishing gear that might have a lighter environmental footprint. We've done a little bit of tinkering with that in collaboration with the fishing industry, looking at the use of skids to raise these fishing gears off the sea bed, so that they have less of a damaging effect on the sea bed. But there needs to be—. At the end of the day, if there isn't a management or legislative framework that would allow you to use that innovation, there is very little incentive for the fishing industry to use it. So, bizarrely, a special area of conservation, strangely enough, at the moment, for scallops and many other fisheries that are not controlled by quota, which are not quota species, actually provides the only robust framework for their management.

[119] **Jenny Rathbone:** Thank you.

[120] **Professor Kaiser:** You could make the whole of Welsh waters an SAC.

[121] **Jenny Rathbone:** You could indeed.

[122] **Mark Reckless:** Any final word from you, Dr Sheehan?

[123] **Dr Sheehan:** Sorry, my mind just went blank there. I don't understand how scallop dredging could have a lesser impact, because the scallops bury into the sediment. So, that's my main complaint with this fishery, that it scoops under the animals, so nothing can be slightly damaged or bounced back like with potting or beam trawling. It's a very efficient way of taking everything in its path. So, I don't think that's—

[124] **Jenny Rathbone:** I think that is, obviously, the major concern about dredging, that it does actually take up everything in its path.

[125] **Professor Kaiser:** Actually, it doesn't.

[126] **Jenny Rathbone:** It doesn't?

[127] **Professor Kaiser:** No, it's a very inefficient fishing methodology. One of the things that we really struggle with is actually defining the efficiency of scallop dredgers. They're only about 30 per cent efficient. However, there is no doubt whatsoever that they are the most impactful fishing gears on the sea bed. That's not in debate. That is scientifically well understood. The key thing is understanding whether that impact is actually sustainable and, in an ecosystem context, which is what we touched on before, whether that impact is likely to have a wider negative impact on other components of the ecosystem.

[128] Coming back to the science that we've done, the answer to that, for that area, given the limits that we would suggest the Welsh Government impose on that fishery, is that that is an acceptable level of disturbance, and were you to go back to that area the following year, having removed fishing, you wouldn't notice any difference at all.

[129] **Jenny Rathbone:** This 30 per cent efficiency, does that take into account sea life that's been damaged, but not actually retrieved from the bottom of the sea?

[130] **Professor Kaiser:** The 30 per cent purely relates to the target species. I think this is a little bit of a distraction. The point is: scallop dredging kills

animals on the sea bed. The point is: how resilient is the system to actually bounce back from that disturbance?

[131] **Mark Reckless:** You said earlier, I think, Professor Kaiser, three to four years for full recovery, was it?

[132] **Professor Kaiser:** The Kaiser box at the moment—. Purely in relation to scallops—so, I'm just talking about scallops—as part of a fishery management system, that area has been heavily depleted of scallops. There are juvenile, undersized scallops within there, but we would expect, for a considerable biomass to build back up in that area, I'm talking about three to four years for sure.

[133] **Mark Reckless:** And Dr Sheehan, finally, looking at the wider ecosystem, if you prefer, where you have had scallop dredging in an area, perhaps to the degree we've seen in the Kaiser box, how long would you estimate to see a full recovery of that area once the dredging activity ceases?

[134] **Dr Sheehan:** I don't think I've been doing this long enough to give you that answer. But certainly, the recovery that we noticed was very slow to begin, to the point where I was thinking, 'Why have they protected this area? It's not very exciting.' But then, give it three years, the system began to show visual signs of recovery, and then it takes off. I don't know what that answer is. I know that colleagues in New Zealand have assessed similar kinds of habitats over 20 to 25 years, but I haven't been doing this long enough, I don't think, to get there yet.

[135] **Mark Reckless:** Thank you both very much indeed for your different contributions and perspectives. I think it's been very, very useful for the committee to hear from both of you. I'm going to ask our researcher Wendy—. Dr Sheehan, you offered to share a graph to us. Wendy will go out with you and have a look at the graph and perhaps arrange for us to have a copy. Thank you both very much indeed.

[136] **Dr Sheehan:** Lovely, thank you.

11:08

**Papurau i'w Nodi**  
**Papers to Note**

[137] **Mark Reckless:** Members, just before we take a break, I just want to ask you to note a number of the letters we've had back on air quality. I propose to chase a response from Caerphilly council, but there's a number of others in the pack. I just wonder if we could formally note those. I think we'll discuss next steps on this area, potentially next Wednesday, if we have time. But for now, if I can just ask you to note those and we'll have a break until 11:20.

11:09

**Cynnig o dan Reol Sefydlog 17.42 i Benderfynu Gwahardd y Cyhoedd  
ar gyfer Gweddill y Cyfarfod**  
**Motion under Standing Order 17.42 to Resolve to Exclude the Public  
for the Remainder of the Meeting**

*Cynnig:*

*Motion:*

*bod y pwyllgor yn penderfynu that the committee resolves to gwahardd y cyhoedd o weddill y exclude the public from the cyfarfod yn unol â Rheol Sefydlog remainder of the meeting in accordance with Standing Order 17.42.*

*17.42.*

*Cynigiwyd y cynnig.*

*Motion moved.*

[138] **Mark Reckless:** Just before we do that, can I ask for a motion under 17.42 to go into private session once we come back? Thank you.

*Derbyniwyd y cynnig.*

*Motion agreed.*

*Daeth rhan gyhoeddus y cyfarfod i ben am 11:09.*  
*The public part of the meeting ended at 11:09.*