TRANSCRIPT OF PROCEEDINGS

ENVIRONMENTAL PROTECTION AUTHORITY
HEARING

Trans-Tasman Resources Limited
Marine Consent Application

HEARING at
LEVEL 4 MEMBERS LOUNGE,
THE WESTPAC STADIUM FUNCTION CENTRE,
105 WATERLOO QUAY,
PIPITEA,
WELLINGTON
on 22 February 2017

DECISION-MAKING COMMITTEE:
Mr Alick Shaw (Chairperson)
Mr Kevin Thompson (EPA Board Representative)
Ms Sharon McGarry (Committee Member)
Mr Gerry Te Kapa Coates (Committee Member)
### Hearing Proceedings

**Day 05 Wednesday 22 February 2017**

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MR SHAW: Good morning, everybody. We are due to hear again from Leigh Torres but in the meantime I just want to respond to issues around the re-caucusing that we talked about yesterday.

We’ve looked, and thank you, counsel, for your memoranda on the matter. We’ve thought very carefully about the issues and I want to start by saying that the re-caucusing is about the model. It is not about the effects of the model and I think that’s important to understand.

In the memorandum from KASM and Greenpeace, they raised a question as to issues of fairness that may apply with the assumption, I think, that appeared to be that experts in the area of effects would not have the opportunity to review material that came out of re-caucusing. They will. They will. There is no question at all about that. The whole purpose of the exercise is to assess effects. And really, I think that takes us quite neatly back to the original question in terms of the participation of Dr MacDiarmid and Dr James.

There will be in our assessment no disadvantage to anyone from them not participating and I know that I’m into double negatives which I loathe, but there will be no difficulty for anyone as a consequence of that because they will have the opportunity to contribute to a question of the effects that follow from any remodelling that we see. So we’re not going to expand the cause. We don’t think that would be fair and transparent in terms of process and it will not assist us in getting the best available information because there will be the opportunity for those experts to review that material after it is presented.

So in essence, we’re accepting the position outlined by Ms Haazen on behalf of Greenpeace and KASM yesterday.

I want to emphasise that the enquiries that follow from this, we don’t know exactly what the extent of those is going to be but I suspect they’re not going to be as exhaustive as maybe imagined. But they’re not going to require, we think, from what we can see, a huge amount of work. It is a matter of just putting in some other variables. NIWA will take their advice as to how that is best achieved and away we go and then, as I say, there will be opportunity to assess effects.

Important to note, we will be making it clear that this remodelling of a worst-case scenario goes to the matter of conditions and respective waves, rain in terms of the issues around increases in background sedimentation that may arise from that. It does not presume that the operational constraints and the constraints imposed by way of conditions are not in place. They are. For the purpose of this it will be the constraints that are an inevitable consequence of the technology
that's being employed in respect of this mining and the conditions that have been proffered by the applicant in respect of the volumes. Okay? Questions on that, Mr Holm?

5 MR HOLM: Yes, sir, just one. Obviously, remodelling involves agreement on the parameters that would be looked at and I've been taking instructions overnight on this topic and discussing it, obviously. No issue about doing the remodelling but very important to have clarity and I think you've provided some already, sir, about which parameters go in there, which are the ones of concern. I agree that Dr MacDiarmid and Dr James can have an input in other ways. So that's fine.

I think my instructions are we need to be crystal clear what it is the panel would like to see in terms of parameters going into that model, and I wonder if it would be possible for us to provide to caucusing and to the panel the parameters that our advisors believe are relevant to make sure that before it's remodelled that's tick, tick, tick, so to speak.

[9.05 am]

20 MR SHAW: My own response to that is that I think that would be helpful and makes good sense and that, of course, would be available to other parties as well.

25 MR HOLM: Yes, absolutely.

MR SHAW: Because one of the difficulties we faced when we had the conversation when we were talking with the witnesses involved was the question of what does worst-case scenario look like and, frankly, we got nothing approaching a helpful answer to us which is partly why we're now involved in this exercise.

MR HOLM: I'm no expert, sir, but my understanding from the discussion is potentially a lot of parameters could go into this so-called worst case, including mining operation variations, as you say, the conditions and what effect they have. But we wouldn't want to do a lot of modelling and then come back and find a whole lot of parties say, "Well, the wrong parameters are in there".

40 MR SHAW: I want to emphasis again that the parameters around the operational realities and the profit conditions remain because those are consistent and I think they have been accepted as being what is going to be the case. So those things are there and whether everybody agrees with that or not is by the by. That is what we want in terms of information. So that's consistent.

The question of effects will then be a matter for assessment and consequent upon a worst-case scenario for the plume will then be
available for assessment and comment by experts in those fields around optical and all the primary production and so forth. Ms Haazen?

MS HAAZEN: Just on that last point, is the DMC able to give some clarity around how they expect the further assessment to progress? For example, if experts, like Dr MacDiarmid and Dr James, give further evidence on the worst-case scenario --

MR SHAW: Others will have the opportunity as well.

MS HAAZEN: Are you expecting that to be in reconvening appearances before you?

MR SHAW: Possibly. Don't know the answer to that at the moment. I mean, let's get what we've got, what we need, it'll come to us, it'll go to parties and there'll be the opportunity then to comment on the way forward. But let's just go back to what the Act tells us we've got to do and that is to get the best available information and that's the objective of the exercise and we want to keep that information as relevant and as tight as we can so that we are keeping our eye on, for want of a better word, the ball. Does that make sense?

MS HAAZEN: Yes, sir.

MR SHAW: Mr Holm, you're happy with that approach?

MR HOLM: Yes, sir, and just to be clear we'll provide the parameters proposed to go in the model to the panel and the parties and before the modelling is actually run, make sure that's covering what's important to the panel.

MR SHAW: And in the end the question of the parameters, we'll be happy to hear the input from parties but at the end the DMC is going to say, "That makes sense", because we're not going to get into an endless --

MR HOLM: Iteration of parameters.

MR SHAW: No, can't do that. Make sense?

MS HAAZEN: Yes, sir. We will feed into what the applicant puts forward.

MR SHAW: Absolutely. Yes. All right?

[9.10 am]

MR SHAW: I think that is the only preliminary matter apart from the question of today's schedule. We are behind. We are going to see Professor Torres in a few moments and we'll then move on to Dr David Thompson. Dr Chiffings will not be heard today. It's not at all clear to us right at this moment as to when we're going to have the opportunity to talk to him

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but in order to make the day work it is not going to be possible. We do not want to see ourselves pushed in the way we were yesterday. It doesn't make for a good relationship between me and witnesses because I've got my eye on the clock rather than my eye on the information and it doesn't make, I don't think, for good process. So we need to give ourselves a bit of breathing space. But we will be seeing the other parties as listed. I think that's right, isn't it, Gen?

Okay, look, sorry, there has been a change. The witness from Te Ohu Kaimoana will not be appearing today. That person has been spoken to and she will be appearing on another occasion and Dr Don Robertson, who has also prepared a paper which will be circulated to everybody on effect on fisheries, he will be appearing later as well. We will be seeing Dr Chiffings. All right? Any question? Everybody happy? Okay, fine. Dr Torres?

Sorry, one last thing, there is going to be another day next week. It will be Thursday or Friday, again so that we can play catch up. I know that's a burden on some people and I've got to pay tribute to those of you who are managing to be here all the time. It shows dedication and focus, so thank you for that. It's important that you are here and we have a decent level of participation so we don't need to rerun things. Dr Torres?

DR TORRES: Good morning.

MR SHAW: I think we're just on questions, Dr Torres, but that shouldn't stop you from saying anything within reason that you want to say.

DR TORRES: No, I think we can go ahead with the questions. That's fine.

MR SHAW: Okay, fine. You do like to be called Dr Torres or Professor?

DR TORRES: Yes, that's fine.

MR SHAW: Doctor. Okay, fine.

DR TORRES: Either's fine.

MS McGARRY: Good morning. Now some of my questions here, I just really want to understand some of the methodology behind what you're doing out there and how this works. So I'm particularly looking at paragraph 19 of your evidence.

MS McGARRY: Yes. I'm interested in these MARUs.
DR TORRES: MARU, yes.

MS McGARRY: How close would the blue whales need to be for them to be picked up by this --

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DR TORRES: Yes, that's a great question and it depends is the answer. So like we've been discussing with -- trying to measure ambient noise levels. It depends on the conditions in the environment. So the bathymetry, the salinity, the temperature and also how loud the whale is when it's calling.

So really, our best guess based on the conditions in general is about maximum 40 to 50 kilometres away but we don't know for sure yet. We're going to do some modelling when we get the data back and we do have temperature and salinity and bathymetry information, and then we'll be able to do some back calculations of trying to figure that out, which is what we kind of tried to do when we estimated -- we used the loudest call detected at MARU 2 and we did some simple back calculations to determine that it was within 1 kilometre, and that was a very conservative estimate using a cylindrical spreading model as opposed to geometric spreading model. But yes, the best guess would be probably a maximum of 40 to 50 kilometres from each of the MARUs.

[9.15 am]

MS McGARRY: You referred to background noise there. Background noise is important in terms of how far away you can detect the whale over the noise in the background. Is that how it is? Is that simplistic?

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DR TORRES: To some degree, but we can detect the whale calls through the noise. So we hear the seismic survey and the spectrograms, so what you get out is a visual representation of the noise because blue whale calls are very low frequency. They're not within our hearing range, so we actually can't hear them, so we look at the spectrogram and throughout that we can see the seismic gun noise, or vessel traffic noise, but within all that we can even see the earthquake that occurred in November, was it? Yes. But through all that we can also still see the blue whale calls.

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So it doesn't deter from our ability to detect the calls. We can just also see other noise going on and that's sort of what we also want to compare, is how their calling rates, their calling efficiency, might change with different anthropogenic noise sources.

45 MS McGARRY: So have you had the opportunity to look at the position proposed by the applicant in terms of the acoustic survey monitoring that they propose?

DR TORRES: Yes, was that condition 12?
MS McGARRY: Yes.

DR TORRES: I have reviewed that.

MS McGARRY: So what I end up there with is a pattern of background noise happening and then you would distinguish over the top of that any calls of particular marine mammal species?

DR TORRES: Sorry, I don't understand the question. Could you repeat?

MS McGARRY: When I read that question you sort of think about it just picking up the signals of marine mammals but, in fact, that will record the background noise as signals going by what you've just said, that you can see these other things going on?

DR TORRES: You mean the hydrophone that's being proposed to be put down and listen?

MS McGARRY: Yes.

DR TORRES: Yes, that's true.

MS McGARRY: So they'll end up with basically a background noise signal going on and then you'll be able to see the noise of particular species over the top of that?

DR TORRES: Yes. Of course, it depends on which species is. So blue whale calls travel quite far so you can detect them at quite a distance. Other species are quite higher frequencies and different ranges and their acoustic calls don't travel nearly as far.

MS McGARRY: So when you place your MARU device, you place them far enough away from each other to try and not overlap? So you're not picking up the same call of the same animal with two sites?

DR TORRES: No, we probably are picking up the same call at different sites and that would actually be a good thing because that would allow us to triangulate the location of the wale. So, based on the delay in the call signal received at any of the MARUs, we can triangulate and try and figure out where in the bight the animal is, or whether it's offshore, inshore, north or south. So some will just be picked up on one. Some might be picked up -- some calls might be picked up on more than one. Again, it depends on the conditions and where the whale is.

MS McGARRY: Your photo identification techniques, I imagine it's quite difficult --

DR TORRES: It's very intensive.

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MS McGARRY: So how certain is that kind of identification methodology in terms of being sure that you've got different individuals?

DR TORRES: Yes, it's highly certain. It's a very common and established method in marine mammal science. It's used probably for the past four to five decades and probably in every marine mammal study that's occurred. So most of these animals have very unique markings, whether they're pigmentation patterns or nicks in their fins or shapes of their fins. Those are constant features and so we are very conservative when we do matching. We have to find multiple points of matching and if they don't match -- and they go through multiple expert reviewers of the fins. So my graduate student does it and then I look at it and confirm it and I'll have a research technician look at it, too.

Yes, so when we make a match we're 100% certain that it's the same animal, and we also rate each of the photos to make sure they're in focus and that the glare isn't too much or it's not backlit. So if you can't see the features then it's not considered a match. So the photo quality also has to be high enough to allow matching to be confident.

MS McGARRY: Thank you. In terms of what the blue whales prefer and their preferred habitat, do they prefer the deeper ocean, and I mean out where you've got more sightings? And I take what you say about the effort and that's where they're spaced, but do they prefer the deeper ocean water or are they likely to also prefer the sort of depths around the application site, the more on-shore?

[9.20 am]

DR TORRES: Yes, I think it's interesting when we think about blue whales. Traditionally people think about them being in more deeper water, from 100 to 200 or 300 metres of water or greater, but here in the South Taranaki Bight we find them in relatively shallow waters. So during this last survey we were finding them in even 70 to 75 metres. So this is a 20-metres long animal. So 75 to 60 metres of water. So I think they really do follow where their prey is. I know that the applicant site is 45 metres or less. So we didn't see any in that area during our surveys although there are some records, and I've laid it out in the evidence, about occasional sightings in shallower water. So they do occur there. I would think that in general those depths might be on the fringe of their preferred habitat regarding depth, but in the South Taranaki Bight, in the bight itself, it's generally fairly shallow, anywhere between 60 to 90 metres depth, and we do see them quite regularly in that range of depths.

MS McGARRY: Are you aware if there is an upper limit or a threshold for speed for vessels that minimises the extent of damage and collision with whales?
DR TORRES: Yes, injury to the whales? Yes, there's been a couple of really interesting studies looking at the injuries and lethal mortality rates and that's generally thought to be about 10 knots. If the vessel -- really, what it is it allows the whale enough time to detect that a vessel is approaching and manoeuvre out of the way. And so we're still learning a lot about how animals detect it and it really depends on their behaviour state. So if they're resting they might detect it less readily, or if they're foraging, deep in the foraging, they might not perceive the vessel coming because they're paying attention to where their krill patch is or something.

But 10 knots or less is generally believed to be a good recommendation to allow whales to detect a vessel approaching and manoeuvre out of the way in time.

MS McGARRY: You've addressed the Hegley Report, the noise assessment, in your evidence and I talked to Dr Childerhouse about this yesterday, that there's two sides that concern me about the Hegley Report. One is the lack of any sort of background information on what the existing noise levels are around the application site and the second part being that there's been no actual measurement of the source of noise, that it's been extrapolated from studies and other noise sources.

Dr Childerhouse said that the answer wasn't setting a limit, and that as long as the applicant came under that limit, that would ensure that there's no behavioural changes. My question to you is whether that is the complete answer, or is the magnitude of change from background to what's proposed an important consideration for us?

DR TORRES: Yes, I believe it is an important consideration. I think setting a limit as they have done at 135 decibels is a way around not having an ambient noise measurement. So instead of looking for change they're just setting a target, but I think I would say I don't think that's an appropriate approach. I think you do need to measure what is currently there in terms of noise and then also what the added noise in the environment is going to be from the mining operation.

That will give us much more information about the potential impacts of the noise operation on the environment, the noise, the soundscape in the area. I think that 135 decibels might not be truly an appropriate threshold anyway. I think there are studies that show that there are behavioural responses from marine mammals at much lower thresholds. I think that the impact from the sound, especially since they're low frequencies, the sounds produced will travel much further than I think 500 metres. Was that the maximum? No, it's 2 kilometres is the maximum.
I think the sound would certainly travel farther than 2 kilometres, so there is a potential for a much broader range of impact from the noise and also like I mentioned yesterday, I think that impacts from elevated noise can go beyond just changes in distribution patterns of the individuals. So animals can tolerate noise in order to have access to great food in an area but that can have other ramifications to an animal, elevated stress or inability to communicate effectively, or having to output more energy to communicate.

So I'm sorry, I've circled around there, but I think in general an ambient noise measurement in the area should definitely have been obtained and that would have fostered a lot more clarity on what we can expect to measure and any comparison before or after or because of the mining operations.

MS McGARRY: Why is the magnitude of change important? I mean, I hear what you're saying about a threshold and it might not be the right threshold for all species. Is that correct? I mean, it might be a threshold for one species but that threshold might be different for different threatened species?

DR TORRES: Yes. And certainly I think Simon alluded to this yesterday that different demographic units, so mothers and calves or a single male, and also behaviour state as I alluded to earlier, all of that goes into animal's response to noise.

MS McGARRY: So if we put that threshold aside, then why is the magnitude of the change important to the animals?

DR TORRES: I think it's incremental. It's not just yes or no impact. So I think knowing -- it's like going from a silent library to suddenly a really noisy environment, that there's going to be gradation in between that the animals will respond to. It's not one or the other. And because we don't know what it was before, just saying that anything louder than this might be a huge change. If the background noise out there right now is 40 decibels and then suddenly going to 135, that is a massive change to these animals and that is a massive addition to noise in the environment on top of any other background noise, vessel traffic or seismic survey or the oil rig's operations there that are currently going on.

So it's not one or the other. They'll be fine if it's under that and they'll be not if it's above that. It's a continuum of impacts.

MS McGARRY: Does it also go to the heart of the issue of their ability to adapt? I'm conscious in your evidence that you've given us an example where blue whales have already shifted their frequency range, and my question to
you was going to be doesn't that demonstrate to us their ability to adapt? That's the first question. But if it does, then I guess as a capacity to the ability to adapt, and is that linked to that magnitude of change?

5 DR TORRES: I think they're able to adapt, and I think the evidence that they stay in an area where there's seismic surveying occurring and continue to forage, that's evidence of adaptation there. They're at least tolerating it. I don't know if you want to call it -- but they've adapted to this change in their natural environment. So certainly, yes, they've changed their -- blue whale populations globally have changed their frequency range of calling and we don't really know what's caused that, and there are many hypotheses out there, one of which is elevated ocean noise over the past six or so decades.

10 So many species continually adapt and we see animals change in their distribution patterns because of climate change. So yes, I think the answer is animals are able to adapt. The problem is that human impacts on the environment often happen at a much greater rate. We can make a change within a month that will take hundreds of years for animals to adapt to. It takes a long time for animals to adapt. It's not a change like that.

[9.30 am]

25 MS McGARRY: So in terms of adaption, there's two aspects to it that are important. One is the time over which the change occurs and the second would be the magnitude of that change, would it?

DR TORRES: Yes. Yes, those are two very critical components to consider, yes.

30 MS McGARRY: You've talked in your evidence about the cumulative impacts of noise, and that just raised for me what that other list of noise sources could be and I could think of fishing, oil and gas exploration and development, marine traffic. And then I wondered about what other cumulative impacts -- I guess I'm not just thinking noise but I'm thinking about stress things, obviously food availability, potentially climate change, anything else that I've overlooked?

DR TORRES: You're talking in the South Taranaki Bight particularly?

35 MS McGARRY: Yes.

40 DR TORRES: Well, those are probably the major ones. Also important to consider are changes in water clarity, and you're all familiar with this because of the sediment plume modelling, but first how krill are able to reproduce and aggregate in the area, which is the main source of blue whales, that is dependent on productivity. So if that productivity changes because of light penetration into the water column, that obviously will impact
the availability of food for blue whales. So it's important that either off-flow from rivers or other operations that might increase turbidity in the region or the mining operation, that could certainly be another impact to their food availability and of the blue whale health and ability to forage effectively.

Also, we're not entirely sure how blue whales actually locate at a fine scale like where a krill patch is but to some level it's likely a visual detection, at least at close ranges, and we have some observations recently of watching blue whales actually close in on krill swarms at the surface and it does look like it's a visual ability. So again, if that is impacted by clarity of water, then their ability to actually localise a food patch might be deterred -- impacted.

MS McGARRY: How loud are the whale vocalisations? I'm just trying to get a comparison, trying to compare noise sources. I think I would have read somewhere it might have been up to 188 decibels.

DR TORRES: Yes, so I think table 2 in my evidence is the best evidence we know about. So this table has four different populations of blue whale that have been acoustically assessed and the Antarctic blue whale from the western Antarctic Peninsula; pygmy blue whale from the eastern Indian Ocean population; and other Antarctic blue whale population; and pygmy blue whale from the south-western Indian Ocean and their source levels.

Which your question is how loud they are is between 174 and 183 decibels. You can also see in the second column there is their frequency range which I think came up in a question, I can't remember to whom yesterday, about what range blue whale call in. Or I think that was in a conversation with Simon, and you can see here from these studies they range from about 17 hertz to 75 hertz.

MS McGARRY: In terms of the location and the distance offshore with your five hydrophones, what's the logic behind the placement of those and the distance off shore?

DR TORRES: Yes, that's a great question. So we considered a number of things. We wanted them spread out across the region in order to get good coverage because what we're trying to -- one of the main objectives with our study is trying to obtain a better understanding of the spatial and temporal distribution of blue whale across the bight.

So we wanted to have good spatial coverage but we also wanted them to not be too far apart so that we had the ability to triangulate if possible. So we spread them sort of at the different corners per se of the South Taranaki Bight with one in the middle and we also located them in areas where there was minimal trawling efforts. So we looked
at reports of where trawling was because we didn't want to lose our units. Also where there were minimal currents because again we don't want to lose the unit and it being dragged away by a current or a big storm, and also we wanted to place them actually far, at least I think our minimum was 15 kilometres away, from any oil rig in order to not have that background noise too loud in our sensors. So that was sort of the logic behind where we placed them.

[9.35 am]

MS McGARRY: Thank you. You've talked in your evidence about the signs of stress on the animals and that they've been skinny and looked in poor conditions at times. The obvious one there is food limitation but your evidence also seemed to be suggesting that the temperature changes in the water is the other key driver. Are they the two most likely causes of the stress?

DR TORRES: I think that they're linked totally: temperature and prey availability. So I don't think that the whales are directly impacted by temperature. It's an indirect effect because I think temperature -- what happened was last year was this big El Niño event across New Zealand and that changed the whole dynamic of that up-welling system that I described yesterday about how there's productivity and how that generates krill aggregations that the whales eat. So that whole system was sort of broken down last season and there wasn't these big wind events and the whole ocean just sort of heated up and there wasn't mixing. So when the ocean mixes, that's when we get a lot of productivity and that wasn't happening last year so we got really hot surface waters and there wasn't prey availability.

This year was very different. It was quite windy, as probably everybody here knows. It was a very different summer and that caused, I think, more productivity generally in the oceans around this area and so more prey availability. So yes, that certainly is one of the main determining factors and that's just normal environmental cycles. El Niño events happen about every seven-ish years but it's when we cause other impacts on top of that, and these animals do have a certain level of resiliency to adapt to those natural changes. It's when we add on top other changes such as climate change or added noise or habitat disturbance that we start compiling, and that's this cumulative effects concept, that we compile on top of that all of these added stressors.

So one thing we are doing is we fly a drone over the whales as often as we can, so last season and this season. The purpose of that is to do photogrammetry. So that's basically we measure the length of the animal as well as the width and we do that ratio comparison of body length to width at various spaces along the whale's body and that gives
us a sense of basically how fat or how skinny the animal is and from
that we can compare their health, basically.

So right now we've only started that process. So we know now that the
whales are about 20 metres long, an average blue whale in New
Zealand, but we haven't started doing the body width measurements
and we'll do that actually in the next few months. But from that we'll
be able to compare, "Okay, this animal looks really fat".

And so visually in the field when we're taking photos and we're
examining body condition we'd say, "Oh, that's a fat whale", and it's
obvious. You can look at some features. They have a post-cranial
hump. So behind the blowhole there's a big area of fat deposit and if it
sort of lumps up it's generally got good fat there. These animals need
these fat reserves to fuel their whole bodies for a whole year. But if it's
depressed in that area, which we do see occasionally out there, that's
sort of a skinny animal, and then you can also see the backbone, and if
you see the backbone going down the animal's ridgeline, that's also an
indication of a skinny animal. So we do see that, I don't know, maybe
10 to 15% of the animals out there, just visible detection.

MS McGARRY: Thank you. Just one final question and I guess we're probably all
thinking it on this side of the table, that talking to Dr Childerhouse
there's a possibility that much of New Zealand waters, and you went
through the places they've been sighted, could be important habitat for
the blue whale. But for us it's just getting an idea of just how important
the South Taranaki Bight is within that wider ranging habitat. How
certain are you that this is an important habitat? I guess it's the foraging
aspect that we're particularly interested in.

[9.40 am]

DR TORRES: Yes, I can understand why this is a very critical issue to address. So
yes, yesterday when I listed off the other areas where blue whales have
been sighted that's accurate. So they have been sighted sort of
randomly around the country but one important thing to note is that
some of those sightings might actually be Antarctic blue whales. So
there is a different population that goes down to Antarctica to feed
during the summers and then migrates north and they likely do migrate
past New Zealand. So some of those sightings might be a different
population just travelling through.

So far all of our genetic evidence that we've obtained from the animals
that we have sampled from strandings have been of this pygmy blue
whale ecotype, or sub-population. So that's just to clarify that.

The other part of the question is how important is the South Taranaki
Bight? Based on all of the evidence and data that I've compiled over
the past five or so years, I would say that it's definitely a very important area. There's no other place in New Zealand where there is such a frequency of sightings. So we have sightings of blue whales in the South Taranaki Bight every month of the year and those have been reported, and there's no other place in New Zealand where that has been reported.

Also, we have large, dense aggregations reports. So a recent seismic survey out there in November and December, they reported group sizes of 20 to 30 animals and many sightings. We see aggregations out there this past summer and in previous summers equally as large. So in no other area around New Zealand has anything similar been documented.

So these animals are used to travelling quite large, far distances. That's what their sort of evolutionary trait is: to migrate. So the fact that they migrate around New Zealand and have been observed in other areas is not surprising. It would be surprising if the animals only stayed in the South Taranaki Bight but they likely know that is a very important feeding area; that they're probably dependent on the predictability of prey being available there. So that concept of food predictability is incredibly important to marine mammals, to be able know that that's there.

So I think that the South Taranaki Bight provides that, and then the animals might venture around to different areas that they might know about to also feed occasionally.

MS McGARRY: Is there anything comparable to that Kahurangi upwelling?

DR TORRES: In other areas of New Zealand?

MS McGARRY: Yes.

DR TORRES: I guess no, to the best of my knowledge. I'm not an oceanographer but to the best of my knowledge, no. But there are upwellings that I think that occur from canyon systems, like Kaikoura and potentially the Otago canyons. But they likely function in a different way and have different patterns, like seasonal patterns of upwelling, and they likely product different prey sources. So it's certainly a different system.

MS McGARRY: Thank you.

MR SHAW: I want to go to your conclusions, Dr Torres, and that's about as far as I want to go, I think.

DR TORRES: Okay.
MR SHAW: In your conclusions, Dr Torres, last paragraph and you'll have to give me a moment to get back to it. I was just looking at somebody else. I'm sorry, I'm just finding my place so it'll take me a few moments.

What you say is this, and I discussed with you the drop in the bucket yesterday.

DR TORRES: Yes.

MR SHAW: I now want to go to the whole of that paragraph because I am wondering when you say things that:

"It's important to recognise the innate right of animals to live in their natural habitat without disturbance, to feed without compromise, and to communicate without disruption."

It's a pretty absolute statement.

DR TORRES: Well, that's my opinion, and I agree.

MR SHAW: Yes, but does that take you to a point where any activity by man, any additional activity, because that seems to be what you're saying, represents a threat which is not acceptable to this population?

DR TORRES: No, I don't think that. I just --

MR SHAW: So tell me those things that might be acceptable? Is mining ever going to be acceptable?

DR TORRES: I just think that we, as a society, need to carefully consider each impact that we put into an environment, whether it's this mining operation or building a road through a habitat, that we need to carefully consider that it's not a minute impact on animals.

MR SHAW: Yes, but with respect that's not what that last sentence says.

DR TORRES: Well, we do. I think it's important to recognise the innate right of animals and that's part of I think you all are tasked with, is making judgement calls about what is an appropriate level of impact.

MR SHAW: That is precisely the point.

DR TORRES: Right.

MR SHAW: What I'm asking you is when you say something like, "To live in the natural habitat without disturbance, to feed without compromise, to communicate without disruption", that is absolute. I'm struggling --
[9.45 am]

DR TORRES: I think they do have an innate right to that. I mean, whether we --

MR SHAW: Look, I'll leave it there, Dr Torres. I think it's inescapably an absolute statement.

DR TORRES: Well, I would agree they do have an innate right for that and we need to consider that whenever we consider another impact to an environment.

MR SHAW: That creates problems.

DR TORRES: Yes, no doubt, and that's why we're all here.

MR SHAW: That's dead right. And we've got legislation that we've got to apply. I'm going to leave it there but thank you for presentation and for answering questions. There'll be probably questions from other members of the panel.

DR TORRES: No problem.

MR SHAW: Dr Thompson, anything more from you? Mr Coates?

MR COATES: Yes, Dr Torres. I'm just going to do a pretty general sort of ramble, a bit like the conclusions thing. We heard from Dr Childerhouse that the Cawthron survey, aerial survey, didn't really show anything about whales and yet you're saying that so far your hydrophones are showing up that there's daily activity of whales, not necessarily at the mining site but within 40 kilometres.

We're looking at existing interests here but if this was, for example, Kaikoura and someone proposed to put a mining site there, there would be a lot of community concern about that I think because it would be a major tourism activity that was being affected. There's no reason, I guess, why the South Taranaki Bight couldn't become the Byron Bay or the Kaikoura #2 for New Zealand. What's your opinion about -- given your statement about blue whales should live in their natural habitat without disturbance, what's your opinion about activities such as tourism?

DR TORRES: Yes, it's a fine balance. So ecotourism -- so I do study the impacts of vessel disturbance on grey whales mainly in Oregon, so mainly from tourist vessels. So it's certainly something we need to carefully balance. Ecotourism can bring revenue, which is very important to a community. It also can educate people and make them impassioned about the environment or any environment that they're visiting. So it's a very beneficial activity but it also needs to be carefully regulated.
So in many places around the world, including in New Zealand, there are regulations about how close vessels can approach whales, the speed at which they approach and how they approach and so forth and I do study that quite closely with some populations.

In the South Taranaki Bight there isn't currently any ecotourism operation but it was interesting after I first documented this population that was definitely a question I was asked many times by media and other people, "Do I think that an ecotourism operation will generate around this population?" And my answer is I don't know. The South Taranaki Bight is a very hard place to work. The conditions are quite windy and swelly, so I think it would be a hard boat based tourism operation but there are many aerial tourism operations that can develop which would also have to be regulated about the height above the whales that planes can fly and how frequently they can be there and how long they can stay. Same for the boats.

So I guess the answer to your question is that it would just need to be - - or it should be everywhere very carefully regulated and evaluated.

[9.50 am]

MR COATES: Thank you. Secondly, the sound characteristics. You were quite scathing in some ways about the sound characterising provided by Dr Hegley. How can we deal with that, because there seemed to be opportunities perhaps lost not to get some sound characterisation from the De Beer's mining operation which would give a better idea of what the noise profile of the crawler and the integrated mining vessel would be. That's probably not particularly relevant for you to comment on but it's a matter of -- the sonic information being inadequate. What would you say about that conclusion?

DR TORRES: Yes, I believe it is inadequate evidence for the applicant. I mean, I think noise is a highly recognised potential impact to all marine mammals. It's studied constantly across the world and whenever there's a proposed operation that will add noise to the environment, the two critical things to know is what is going to be that added noise and what is the current level of noise in the area, and neither of those two factors were evaluated here. So I definitely think those are two glaring pieces of information that aren't available that really would have helped everybody.

MR COATES: The third piece is that the Cook Strait area is a major shipping lane for container ships going to the east coast of New Zealand. So even though the extra shipping operations are minimal for the mining operation, do we have any idea as to what the amount of shipping traffic is at present? With CentrePort closed, of course, we're not getting container ships
going to CentrePort but they're still going to the other east coast ports like Otago or Hawkes Bay. Has there been any data collated about the present shipping environment?

DR TORRES: In the South Taranaki Bight? Yes, well, I think the applicant, Merico(?) provided a -- used AIS data. So every vessel out in the ocean today carried a transponder that has its location and that can be detected by satellite or shore-based stations and -- sorry, I don't have it in front of me but one of the applicants provided it and it has a nice -- I think it's a year-long map of vessel traffic throughout the bight and in general -- it's an excellent map, to be honest. Very informative to me from my perspective in comparing it to where our blue whale sightings are.

But in general it shows the major shipping to be through the Cook Strait and then up to the northwest towards New Plymouth or towards Nelson but yes, avoiding -- not avoiding but much relatively less traffic to the mining sites.

MR SHAW: That's a bit to the south of the mining site?

DR TORRES: Yes, well around -- the mining site is to the north of that region but what's important to think about is that because there's less vessel traffic up there that might be considered a noise refuge for these animals. Like, it's a quieter environment so maybe animals prefer that area because they're able to communicate better or just live in a quieter environment. So adding noise to that environment might be a more dramatic impact, which is why having an ambient noise measurement there would have been very valuable.

MR SHAW: Thank you.

DR TORRES: You're welcome.

MR SHAW: Okay, thank you, Dr Torres.

DR TORRES: Great.

MR SHAW: Oh, I'm sorry. I should indeed. You've got questions for us to ask, I'm sorry, Mr Holm. I'm sorry, Dr Torres.

DR TORRES: That's okay.

MR SHAW: You stated, not in your written evidence but orally, that sightings of blue whale within 50 kilometres of the mine site would seem to be well in excess of any other observer including DOC. Can you provide Dr Childerhouse with your data on sightings and the source of such data?
DR TORRES: Yes, certainly. We have that tabulated in the back. I think my graduate student has it back there but as I recall there are three sightings from the DOC database, a couple from a New Zealand Oil & Gas, some are from ourselves over the past couple of surveys.

MR SHAW: Anyway, the short answer is yes, you'll provide the source information and the tabulated information to Dr Childerhouse?

DR TORRES: Yes.

MR SHAW: Do you agree the blue whale seen in the South Taranaki Bight/Cook Strait area have extremely large home ranges and feed in other and different areas around New Zealand?

DR TORRES: Blue whales in general have very large home ranges typically so that is probably what we would expect here. Our evidence so far is indicating that these animals are probably resident to New Zealand. So when we think about how large their home range is it may just be around the New Zealand waters. We're trying to figure that out more thoroughly.

MR SHAW: That's part of the study at the moment?

DR TORRES: And so do they feed in other areas around New Zealand? Probably, but we don't know where or how important those other areas are.

MR SHAW: You are aware that ambient noise monitoring is proposed in the BNP?

DR TORRES: Yes. The BNP meaning condition 12? Is that right?

MR SHAW: I think it is. Mr Holm, condition 12, is it?

DR TORRES: Yes.

MR SHAW: Yes. How realistic is your estimate that the ambient noise is as low as 40 decibel?

DR TORRES: It's a guess. We have that information now because our hydrophone is in that same region. So we will be able to assess that within the next few months.

MR SHAW: The last question, which is really consequent upon this.

DR TORRES: Okay.

MR SHAW: Would it be more realistic to put this at 80 to 100 depending on whether --
DR TORRES: Oh, the estimate of background noise?
MR SHAW: Yes.

DR TORRES: I can't say. I mean, I was just -- when I threw that number 40 out saying that, that's sort of an average offshore quite environment. So I was saying it could be as low as that but I don't know. It's probably between 40 and 80 but we don't know.

MR SHAW: Yes. That's cool. No, that's fine. Thank you. Nothing more, Mr Holm?

MR HOLM: No, sir. Thank you.

MR SHAW: Ms Haazen, I'm sorry for just about disappearing off into the ether without asking you to ask questions.

MS HAAZEN: No problem. Dr Torres, are you able to comment on what may be the factors of the South Taranaki Bight that make it so productive in terms of the food source for blue whales?

DR TORRES: Yes, I think it's this unique upwelling that occurs off the Kahurangi Point there that then pushes nutrient-rich waters into the South Taranaki Bight, the current generally flows north northeast and then eastwards and the food chain there goes from nutrients to zooplankton, which are the krill, and then to blue whales. It's a fairly short food chain and the predictability of that is probably very important to these whales. They need to know that they can find food to support themselves and support their reproductive capacity.

So that is a unique upwelling system and it certainly is productive. There the krill that they eat aggregates in very dense quantities there so these whales, they can't go around and just pick a krill here and pick and pick a krill there. That's not how they eat. They really need dense aggregations.

[10.00 am]

So we actually have some pretty amazing drone footage of a whale swimming and it's bypassing krill aggregation.

MR SHAW: Look, we're straying well off the question.

DR TORRES: No, no, no, this is very important. It bypasses smaller krill aggregations and then goes after a dense one and that's just showing you that they make energetic choices about what is worth their cost, their energetic cost, to get dense krill patches. So the fact that there are dense krill
patches in the South Taranaki Bight is the important factor for these whales and why they come.

MR SHAW: Okay.

MS HAAZEN: Is the abundance of food the only factor that makes the South Taranaki Bight suitable for blue whales?

DR TORRES: Probably not. It's also the social factor that there are lots of whales that come there and so that has social consequences, which is why we hear the males do their breeding call over and over again because it's probably also used as a social setting to find mates and to breed.

MS HAAZEN: Last question. If the area is important for blue whales, could the same be said for other marine mammals?

DR TORRES: Yes, well, there have been sightings. In 2014 we saw a sei whale in the region and then I know that the seismic survey, marine mammal observers also reported fin whales this past season in addition to blue whales. And they're likely also feeding on the same aggregations of krill but they're certainly seen in much lower densities than the blue whales.

MR SHAW: Ms Haazen, is that it?

MS HAAZEN: Yes, thank you.

MR SHAW: Okay, thank you. Thank you, Dr Torres.

DR TORRES: You're welcome, thank you.

MR SHAW: Miraculously on time for Dr Chiffings.

MALE SPEAKER: It will just be a voice call?

MR SHAW: Sorry?

MALE SPEAKER: It will just be a voice call?

MR SHAW: It will just be a voice call. Good morning, Dr Chiffings.

DR CHIFFINGS: Good morning.

MR SHAW: Dr Chiffings, I wonder if you could begin by introducing yourself and qualifying yourself and then we'll expect from you any elaboration on or any comments you want to make around your evidence.
DR CHIFFINGS: Yes. Look, certainly, let me just kick off by saying my role in this. I was engaged by the EPA to undertake a review of the plankton, fish and marine mammals in the TTRL submission and I've also participated as a result of this in three of the expert conferences over the last few days. The principal brief from the EPA which, I assume you've heard already, was to basically report on whether the work was adequate and best practice.

So, having said that, let me say that my qualifications to undertake that sort of review is that I have a research background in marine primary production. I've frequently assessed fish and fisheries in EIAs. I should stress I'm not a marine mammal specialist but I have worked on dugong population estimates at a dugong research programme and I've assessed marine mammals again as part of the EIA process. Noise is a major element in this assessment and I'm presently working on marine noise impacts on fish using modelling tools and I have extensive experience in preparing or reviewing EIAs and their associated EMPs.

Very basically a BSc in zoology, PhD in biological oceanography that focused on phytoplankton and nutrient interactions. Probably best described as a marine systems ecologist with 45 years of work experience as a research scientist and manager, and that's in academia, government and the private sector and as an environmental practitioner. I've worked for two Australian state environmental regulators and one national regulator, and that was in Saudi Arabia, and that involved me in policy formulations, spatial planning, EIA assessment and research programmes.

Probably most importantly though I've been involved in preparation of a number of EIAs and their associated monitoring and mitigation programmes. My first was in 1973, a uranium mine in Australia. Probably of more relevance is that in the last two years I've worked on four reclamation projects in Malaysia, one in Vietnam and others in Singapore, all of which have involved dredging and the mitigation of impacts. And prior to this I worked on several port developments in the North West Shelf in Western Australia, again involving dredging. All right? I think that sort of sums it up.

[10.05 am]

MR SHAW: So do you want to move now and comment on the task you undertook?

DR CHIFFINGS: Yes, look, I'm happy to do that. So from a primary production point of view, I was asked to look at productivity in the water column, not in the benthos, so that's an important distinction. Let me say that the hydrodynamic modelling and the optical modelling which is critical to that assessment I think was very well executed. The assessment of the impacts on primary production took a relatively simple approach.
basically using the light and sediment models and applying these to the SMD boundaries, the sediment modelling domain, and within a timeframe of a year.

The comment I'd make about that is the SMD is an artefact, a modelling artefact. It was never intended to represent an area with natural boundaries within the Southern Taranaki Bight. I initially proposed that the hydrodynamic and optical models should be used to drive a primary production model, as this would be considered best practice, particularly so if plankton were considered a critical environmental receptor in the system, and I think it's emerged that that's definitely the case.

Now, the reason that's normally done is to allow the extent of critical factors to be assessed at a range of time and space scales, not just one. Having said that, I also would say, based on what I've read and what I've heard, particularly in the last few days, that I think the assessment of the scale of the SMD is probably adequate for the task at hand and that the conclusions that the impacts are small is reasonable and I think that's quite an important aspect. There's one caveat to that which I'll talk about a little later and that's blue whales, so we need to talk about whales a little later, I think.

In terms of the expert conferencing on primary production, as you know, the process is focused on a range of questions but what comes out of that is discussion of a range of issues. In this particular case, the issue of space on temporal scales was considered and there was an overall consensus that, while it's very important, impacts are anticipated to be small and I think that reflects basically what Professor Cahoon has put forwards.

In terms of both primary and secondary production, I mention secondary production because this is important to particularly krill and the feeding of such species as blue whales. The other thing I think that's really important about this is that both primary and secondary production are driven by nutrient upwelling to the south of Taranaki Bight, and as a result it's extremely highly variable.

So does that variability matter? I think over the scale of the proposed project it probably doesn't. Where it does matter is when people want to talk about fine scale as in the area of the mine operations and its impacts and also over probably annual variability, so they're both critical impact elements. I actually think that if you take the long-term view that you're assessing this project from a 32-year period, it's probably not an issue but it is something that has to be considered in the monitoring and I'll come back to that.
So, yes, I've mentioned blue whales; we'll talk about that a little. So in essence, the conferencing on the marine productivity merely came to a consensus with no major dissent and I think that's a good outcome. Fish: look, fish are ecologically important but they're also important as commercial and recreational fisheries, and there's a great deal of data available on capture fisheries in this part of the bight. That's been extensively analysed by NIWA. More importantly in that analysis, they took a risk-based approach which I think is exactly what was required and I would offer that this particular analysis would set a benchmark for what is best practice.

[10.10 am]

The conclusion that they came to that there's little risk to fish and fisheries is, I think, very reasonable, noting that the assessment in part is based on the fact that the Southern Taranaki Bight is only a small part of the overall range of most of these fisheries. So, if you take a percentages view the percent area impact is quite small.

MR SHAW: Could I just interrupt you there, Dr Chiffings, just to make sure when --

DR CHIFFINGS: Sure.

MR SHAW: -- you say the "extent of these fisheries", are you talking about the quota management areas, the boundaries, or the fishery as a whole? Because we've been talking about FMA 8 and FMA 7.

DR CHIFFINGS: The fishery as a whole.

MR SHAW: The fishery as a whole? Okay. Makes no difference, I just wanted to understand.

DR CHIFFINGS: Yes, I originally had concerns that they'd used the boundaries as a way of partitioning the impacts and that was an issue for me. I felt that was an inappropriate way to do it. I think in the final wrap-up though in undertaking the risk assessments, the risk assessments were done in a slightly different way and therefore do reflect risk assessments with respect to the bight but also the overall domain, if you like, of these particular fish groups.

MR SHAW: Sorry to interrupt.

DR CHIFFINGS: No, that's fine. That's why I'm here, I think, in part. Okay, so I think in essence that's the fish story. The conferencing on fish again was driven by the questions, and there were questions around entrainment, tuna and their response to turbidity or light in the water, noise and foraging behaviour. These questions all relate in effect to what you might call mesoscale or microscale impacts associated directly with the
mining operation. I think there was overall consensus achieved with respect to these and these things are not seen as issues, and a notable exception to that would be noise and I'll come back to that.

Marine mammals. I think the marine mammals issue is something that's going to require some additional work. The conclusion that the project will have negligible effects or minor effects on marine mammals is probably reasonable, given the amount of available information. And it's important to note, I think, that TTRL are proposing a number of mitigation measures relating to this but there is going to have to be some modification of that approach, I would suggest.

And the two areas where this is critical is the need to determine whether the impacted area by the mining operation is a preferential feeding area, particularly for blue whales, and the other one is the issue of noise overall. There is no way of obtaining at this time any indication, except in very generic terms, what the expected noise from the operation will be, neither in terms of its intensity nor in terms of its frequencies.

In dredging generally, it's considered that dredging operations generically are comparable to merchant shipping. That's a very broad generalisation and obviously there's parts of dredging operations that vary. I think in this case, part of the problem that can't be addressed at this point is the crawler, that is the dredging head on the sea bottom. We don't have a very good idea of what the noise levels will be. The other thing is that there is at present no background noise levels. Background noise levels are important because of cumulative impacts.

There is an increasing global concern around the impact of present ambient noise levels as a result of anthropomorphic effects, and at this point in the bight there is no background noise levels available to put those into the equation, if you like. NIWA is recording values at the moment, as I understand it, but they're not available at this point.

So in summary, the expert conferencing has addressed this. At this point, and the final minutes from that are being compiled today, there was no agreement on the likely impacts of noise on marine mammals, partly because there's concern about the surveys that were done and whether or not the distribution of some of these animals is properly understood, and I think blue whales feature strongly in this. Māui dolphins are probably the other group that stand out. We don't know about the noise spectra and intensity and I've talked about that.

The other thing that's important but not well documented in the context of this assessment is that the noise characteristics of the area is not
documented, so noise propagation through water is strongly influenced by temperature and salinity, it's strongly influenced by bathymetry, and not only the absolute depth but also the type of bottom. That strongly affects the sort of absorption and redirection of noise and currents. Currents can also affect the noise profile, if you like.

And so interpreting noise measured without knowing those conditions, it's extremely difficult to predict how far noise will travel and - as you probably already know - the way noise is assessed in terms of marine mammals. And the risk to marine mammals is that you try to determine the range, if you like, and the intensity over distance to the point where the animals are not at risk. Now, that will be done through some sort of modelling and I don't think there's been any modelling of that nature done in this assessment. The net agreement is that there was no agreement around this and I think these things need to be addressed.

That sort of brings me to condition 12. The use of that criteria is probably quite an effective mitigation tool but I think there's some issues there that I'll come back to in a minute. The most important one though is that the criteria proposed by TTRL probably needs to be reviewed. The other issue that emerged, particularly with respect to blue whales, is that the area of operations in, if you like, the downstream area is not clearly identified as whether it's a preferred or not preferred feeding area for blue whales. Blue whales feed preferentially spatially, if you like. They're functionally hunting for krill. The mine, the PPL, sits on the edge of a well-defined stream of nutrients, phytoplankton, zooplankton, including krill, that flows from the top of the South Island into the bight and then around through to Cook Strait, and it seems to me that the general consensus is that that needs to be qualified how important that is.

The monitoring programme: monitoring programmes of this sort play a critical role in getting the right outcome because there are a number of uncertainties to be addressed and this sort of monitoring programme needs to be adaptive. It needs to be adaptive in two ways: the proponent needs to be clearly responsive to new datasets and the regulator also needs to have access to these data so that there can be a regulatory interaction. The programme, as I've seen it in the impact assessment and the subsequent witness statement, I think it's well considered and I think it's robust. I think it will do its job, with two specific comments. I've already mentioned the issue of noise. The criteria need to be reviewed. The specification of a distance of 500 metres is a practical issue. It's common to do this but it represents a practical difficulty with how you make these measurements, particularly when you've got a set of moving machinery.

It probably means that profiling is the preferred method, not static measurements, and there are practical difficulties with that. The other
thing I'd say about the monitoring programme is monitoring of the dredge plume optically using satellite imagery should also be considered. That again would be considered standard best practice in terms of dredging impacts.

[10.20 am]

What it allows you to have is a regular measure of the nature of the plume in terms of its distribution. The caveat on that is this, that satellite imagery is only as good as how clear the cloud cover is. High cloud cover: poor imagery or none. I think the scale of process we're talking about, that doesn't matter so much, and I think that the development of the optical model is something that should be used as a strength and built on. And I think at this point, that's all I really want to say.

MR SHAW: Well, Dr Chiffings, I'm sure that there'll be some questions for you and I'll begin with Mr Coates.

MR COATES: Good morning, Dr Chiffings.

DR CHIFFINGS: Good morning.

MR COATES: You pointed out that on the noise levels we're a bit short of data, on the crawler in particular, but I guess that we can actually do something about that. You also said that you had no agreement at the expert witness conferencing about the effects of noise on mammals, so I guess we're going to have to rely on the evidence we're getting, and we have already got some today from Dr Leigh Torres.

DR CHIFFINGS: Yes.

MR COATES: Apart from the satellite imagery suggestion, do you have any other comments about conditions?

DR CHIFFINGS: Not at this point, I don't, but I'd agree that the noise criteria need to be looked at, and clearly in the group there was dissent about what was the right value. It struck me that, given the context within which that group meeting was being held, that there's probably the need for some sort of - not independent necessarily - but further consideration of those values, particularly as NOAA last year published a revised set of criteria which are probably important to consider.

MR COATES: Could you provide a reference for that publication?

DR CHIFFINGS: Yes, absolutely I can do that, yes.

MR COATES: Thank you, Dr Chiffings.
MR SHAW: Mr Thompson.

MR THOMPSON: Dr Chiffings, I think you've honed down to the two areas of concern, or one area of concern, and that is the generation of noise and the ability of the whales to exist in that noisy environment. You've said we don't know the noise that's going to be generated from the crawler. This is probably outside of your expertise but you might like to comment anyway. Presumably the applicant will be specifying a machine and it will be put out to design and construction, and I'd imagine that one of the design criteria will be a noise level generated. So, maybe you can redirect and I can ask that question of someone else: what is the level of latitude that a constructor would have to manage the noise output from such a device?

DR CHIFFINGS: Yes, look, I can make two generic responses to that, I suppose. The first one is that it will be challenging for an engineering group to design and build a machine within a specified criteria. They can try very hard to do that but no one will really know what the outcome will be until it's on the bottom and working. Having said that, it's generally recognised in the dredge industry that probably the most important factor with operating machinery of this type is maintenance. High-quality maintenance means lower noise than poor-quality maintenance, so that's something they can deal with.

[10.25 am]

Secondly, there is being rapidly developed a range of mitigation factors with respect to not only dredging machinery, but also things like wind farms and other noise-making processes, and a very simple example of that is the use of bubble curtains to attenuate noise. Another example would be the use of pingers to "scare away" some species of dolphins. So there are mitigation measures that could be taken. What exactly they are with respect to this particular set of operations, I'm not qualified to talk about.

MR THOMPSON: Okay, thanks. Given that there is some uncertainty about what noise will be generated, does that not call into question and risk the setting of a noise limit condition?

DR CHIFFINGS: No, the noise limit condition is really set from a set of criteria that's being developed. The one that's used now is a reference called Thompson et al 2007. So this is a meeting of marine mammal experts who have worked within an agreed framework for assessing risk impacts to marine mammals and what the noise levels should be at any distance. That's independent of the noise source, noting that from a noise source point of view you also need to consider the difference
between what it might call "impact noise", that is, short, intense noises versus longer-term continuous noises.

But these criteria are developed around all of that, and from a protection of marine mammals point of view, you can adopt these criteria and then go back to the proponent and basically say, "Well, you must meet this if you want to continue to operate".

MR THOMPSON: Yes, that was the point I was getting to that, yes, you can from a receiver point of view stipulate a limit but then it does put at risk the ability of the equipment to operate within those limits if it's not that well known as to what it's going to generate. So, there needs to be a high level of confidence about that ability before the design is complete or the construction is complete.

DR CHIFFINGS: Look, that's certainly true. The other approach is, they might want to build a prototype as a trial unit, if you like, around the whole issue of noise. But I would've thought that, yes, that is a challenge for the proponent. From an environmental point of view, it's important to set the criteria that protect a species of interest; that's just my point of view. In the dredge industry generally and the way environmental impact assessments are done, the noise being generated is seen as, if you like, a source term into the modelling that's done to determine what's an acceptable limit.

MR THOMPSON: Okay.

DR CHIFFINGS: And certainly it creates some uncertainty for the proponent but that's an engineering issue in my mind.

MR THOMPSON: Right, thank you. And what's your view on the limit that is proposed: 135 decibels at 500 metres?

DR CHIFFINGS: Yes, look, my very specific comment on that would be that if you read the NOAA guidelines, the latest set of guidelines, it probably should be a lower limit, noting that noise in this sense is logarithmic, that my understanding is if you look at the NOAA guidelines you get a value of 120 decibels, not 134. That's a significant reduction in noise. But I also think that it would be sensible not to simply adopt that value without having somebody review, not only the NOAA publication but some of the other publications that have appeared since that value was set.

MR THOMPSON: Thank you, Dr Chiffings.

MR SHAW: Dr Chiffings, I want to just follow on the noise issue for a moment. With wind farm consenting and conditions around the issue of consent for wind farms associated with noise, one of the debates that has been
is whether or not the noise generated by the turbine should be seen in association with background noise which is of course infinitely variable, or sorry, considerably variable in the sorts of conditions where wind farms are established. Or, whether or not the combined effect of the background conditions and the noise generated by the device is the critical question in terms of turning off machines.

[10.30 am]

10 DR CHIFFINGS: Yes, look it's (overspeaking)

MR SHAW: It's a really interesting question, isn't it, because the argument has been - certainly in respect of some wind farms from my understanding - that in fact the limits that are proposed as being reasonable at many times would be exceeded by the background noise just because of the nature of the environment in which these devices are located. Is that an issue here? Are there lessons for us to learn and to absorb in respect of the way that the noise issues have been dealt with, and I don't think universally in the same way, in respect to consenting wind farm?

20 DR CHIFFINGS: I think there's two ways to look at this. From a consenting point of view the noise generated by this particular operation needs to be thought about in the context of the overall noise environment. If it's adding significantly to that, that's an issue and that could be assessed if there was the right datasets. That is no different than if you are in an occupational environment where there's loud noise and somebody starts up another machine. You're receptive to all of the noise and the overall damage is a product of that, not of any one particular noise necessarily, except at a certain frequency.

30 So, you need to look at that accumulative noise impact and I think you'll see in the committee assessment that comes out. Having said that, you need to also set a criteria for the proponent against which to operate their machinery, and as I said that's done in terms of what the receptors are likely to hear.

I'm not sure if that answers the question but I think that it's a two-step process almost. You go, "Okay, the ambient noise levels are high. The question is, if I start up this machinery, do I increase beyond critical threshold?" And the answer to that question, I think now, will be: probably not in the region. So, the corollary would be there's a certain number of ships moving through Cook Strait right now, adding an additional small number of ships is probably not going to make a difference to the overall impact in the region. For animals within vicinity of the machinery though, starting up the machinery will have an impact and this is why the question of blue whales is a vexed one. The nearest sighting of a blue whale to the PPL is actually 75 kilometres.
MR SHAW: I think we've had an update on that today from Dr Torres, who's been doing some field work immediately which takes them a lot closer.

DR CHIFFINGS: But the point still stands that it's the proximity of those animals and whether or not they are directly affected by this particular noise that matters and that's what I think condition 12 is focused on. The issue about background noise I think is one of cumulative effects, and based on what I've seen so far and based on a generic understanding of the dredge industry, that's probably not going to be significant. But we don't know until the data are available.

MR SHAW: It's not going to be significant? Yes. Look, I'm going to stop there. My colleague, Ms McGarry, is going to ask you some questions. But are you available to come back on in quarter of an hour or so?

DR CHIFFINGS: Yes, I can do that.

MR SHAW: She tells me she doesn't have many questions so we might move directly to Ms McGarry and we'll hold her feet to the fire in that regard, or to the cold coffee.

DR CHIFFINGS: Yes, okay. Okay, not a problem.

MR SHAW: Ms McGarry.

[10.35 am]

MS McGARRY: Thank you, Dr Chiffings. I don't want to go back to noise too much but just in follow-up to Mr Shaw there, the threshold is one thing, that upper limit. What you're saying is we don't have the ambient and we don't have the source noise so we don't have any idea of the magnitude of change; is that what you're saying?

DR CHIFFINGS: In essence that's right.

MS McGARRY: Thank you. On the basis of the joint conferencing, you've accepted the approach by the applicant which is the adoption of the sediment model domain area as the approach. You've highlighted that this isn't representative necessarily of more localised change in primary production. Should this concern us or are you satisfied that that averaging over the SMD is the appropriate scale?

DR CHIFFINGS: I think it's probably not unreasonable or, in very positive terms, acceptable with this one caveat around krill and blue whales. If you look at the movement of currents through that area, there is clearly one part of the SMD that's very strongly influenced by the currents from the south which is where the nutrients, phytoplankton and krill come
from, and there's one part of it which is not. So I think that in terms of the issue of krill this is an important consideration and that's the whole issue or debate about preferential -- otherwise, no, I think it's reasonable to accept the conclusions that the impacts from sediments are reasonably small-scale relative to the larger system.

MS McGARRY: I think Dr Cahoon, in answer to these kind of questions, said that it was the right approach because it was important to assess at an ecosystem scale rather than at the local scale. Would you agree with that?

DR CHIFFINGS: Yes, I'd agree that it's important to assess it in an ecosystem scale. The issue and the debate is where's the boundary to the ecosystem and what is the ecosystem. I think that's not been defined by the work they've done, they haven't made that clear they've simply said the sediment model domain is the ecosystem we're considering and in my mind they haven't actually justified that.

MS McGARRY: In terms of the local scale effects he's suggested that they were more significant but that they were still very small in scale and that they were variable over time and, therefore, not of any real consequence. Would you agree with that?

DR CHIFFINGS: Yes, look, I would in this way, that if you look at the model predictions of turbidity and how they vary over time, so the time series, you'll see that they're extremely variable. That's no surprise because this is an extremely dynamic system and therefore I think averaging the evaluation over a period of a year as opposed to a period of a month is not unreasonable.

The issue of local impacts is really very specifically around any particular habitat or any particular type of habitat that's not generically distributed throughout the entire region, but is specifically in the downstream path of the sediment plume. My understanding is that there are a couple closer to the coast but not a lot within the area between there and operating the PPL.

MS McGARRY: So you're satisfied that any environmentally sensitive areas have been adequately identified and addressed, and I'm thinking more of this localised scale. You've pointed out the krill, but other than the krill and the blue whales?

DR CHIFFINGS: Yes, look, I am, and I think the reason I can say this is because I know the natural variability spatially and temporally is very large, and irrespective of any calculation about per cent production, any part of that area of the bight will be exposed to a variable amount of light, nutrients and therefore the primary production will vary as will the secondary production. So what I'm saying in a synopsis is, on first principles you can pretty much say that the impact from the turbidity
plume is very small relative to the scale of those processes, which is really the core assumption, I think, that the assessors have made.

[10.40 am]

5  MS McGARRY: We've talked to some of the other witnesses about a potential worst-case scenario in terms of rerunning the model with some other parameters which could increase the extent of the plume, and we scratched this out with Dr Cahoon and I said if there was a doubling or a tripling of the plume how comfortable was he, and he in fact responded, I think, that even if there was a five times increase in the extent of the plume that he was still comfortable that any effects on the primary production would be still minor. Would you agree with that?

10  DR CHIFFINGS: No, I'm not sure I would, to be honest. I mean five times, presumably, is five times spatial area as opposed to five times intensity.

15  MS McGARRY: Actually I think, going back to my notes, he even said ten times the effect would be within the bounds of natural variability.

20  DR CHIFFINGS: I think it's very hard to say that without the right numbers, and that would be my primary argument for why some sort of numerical approach is desirable. I would argue that that's a value judgement and that neither he nor I have numbers to substantiate that.

25  MS McGARRY: Thank you. We are going to ask for a rerun of that worst-case scenario based on certain parameters being that there hasn't been a sensitivity analysis done on things like percentage of fines and the wave period, I think, in particular.

30  Now, just my final question in terms of listening to Dr Torres about the blue whales this morning. She explained to us that the food chain for the blue whales was a reasonably short one, and so it raised in my mind that if we accept that the effects on primary production are likely to be minor, therefore any effect on the krill is likely to be minor, then we can conclude that any food source of the blue whale is not likely to be affected in any more than a minor way, then that takes away the direct impacts in terms of the feeding. So that leaves us really with the indirect impacts of noise. That's your primary concern obviously, that it's the access to that food source and whether there's actually an alternative place to go. Does that sum you up?

35  DR CHIFFINGS: Yes. I mean this concept of an alternative place to go is, in my mind, not a particularly useful one. The better analogy might be if you thought of the whole thing as a large paddock where there is a distribution of grass and so in some places they can graze and in other parts they can't. If you fence off a bit of that, the question is do they still have enough grazing to sustain their livelihood or their physiology.
etc? The noise issue is important because it's functionally the fence in my analogy and it can extend much further than, say, the visible plume which affects the primary production, and that's the thing that in my mind is unresolved at this point. I have not seen any sort of decay curve style calculations for where these critical values sit within that part of the bight.

MS McGARRY: So you're suggesting, and it has been suggested to us, that we need to see an overlay of the noise contours over those feeding areas to see how far those noise levels will travel within the South Taranaki Bight.

DR CHIFFINGS: Yes, I'd agree with that entirely. I think that's the right thing to do for two reasons: (1) it allows you to get a better spatial analysis, and (2) I think it also allows you to communicate more effectively the way the decision-making is made around those criteria.

MS McGARRY: Thank you, Dr Chiffings.

[10.45 am]

MR SHAW: Dr Chiffings, I'm now going to just put a small number of questions to you from the applicant and from counsel for the submitters or for some submitters.

I'll begin with the question from Ms Haazen, who represents KASM and Greenpeace. She asks: will an increase in quantities of fine sedimentation in the plume modelling have adverse impacts on krill?

DR CHIFFINGS: Well, the answer in principle is yes. The question that has to be debated is how much.

MR SHAW: Okay, thank you. Given the importance of krill as a food source for larger marine mammals, in your opinion was enough attention paid to the effects to krill, she asks, in the primary productivity caucusing?

DR CHIFFINGS: Yes, I think it was. The only thing I would say about that in terms of the caucusing, the actual experts debate, is that there was no agreement around that issue and I think that needs to be resolved.

MR SHAW: Okay. Do you agree that loss of light in the water column affects feeding patterns of marine mammals?

DR CHIFFINGS: Yes, it does. Certainly I think there's good evidence that says it can affect it in two ways. Some animals, particularly the predators, can use it to "hide" and be more effective. Others will not be able to feed and will move away. So the nature of that effect is actually very difficult to talk about unless you're specific, I suspect, about individual species and their responses.
MR SHAW: Okay, and finally from Ms Haazen: do you agree that ambient background noise is a key determinant of the conditions for noise?

DR CHIFFINGS: No, I would say it's a key determinant of the risk assessment about the overall project and if that risk is seen as low then the determination of the conditions really should relate to the specifics of the operation.

MR SHAW: Finally, Dr Chiffings, from Mr Holm representing the applicant. He asks: you opened by saying you were not a "specialist" in marine mammals. Are you a specialist in the effect of noise on marine mammals?

DR CHIFFINGS: Probably not, in the sense that I most recently have started working with noise and noise models in terms of fish so I have a good understanding of the underlying principles. The number of people who would qualify as experts in the effects of noise on marine mammals is very limited globally, at the level we're talking about, people who could actually say, "This value is the right one as opposed to that value". And you'll note that almost anybody setting criteria for noise in the past have referred to this expert paper by Thompson in 2007 and now it's increasingly common to refer to the paper by NOAA in 2016.

MR SHAW: It's not intended to be in any way pejorative - this is a question from me - but you said the number of people who are specialists in the impact of noise on marine mammals is limited globally. Were any of those people present in caucusing?

DR CHIFFINGS: Not that I'm aware of.

MR SHAW: Okay. All right, thank you. That's us for the morning. Thank you very much, Dr Chiffings. I don't think we need to get re-examination from anybody because you're a witness for the EPA. Thank you very much for your help today.

DR CHIFFINGS: My pleasure.

MR SHAW: Okay, cheerio.

DR CHIFFINGS: Cheers.

MR SHAW: We'll break now for 15 minutes so that will take us to 11.05.

ADJOURNED [10.49 am]

RESUMED [11.10 am]
MR SHAW: My apologies. Dr Thompson, I think, is our next witness. Good day, welcome back. We've got a memorandum from you and I understand you've discussed with our administrator the question as to how you wish to schedule your witnesses later.

DR THOMPSON: (inaudible) after the lunch break?

MR SHAW: Yes, absolutely. I don't see any difficulty is the short answer. But yes, I think after lunch you can talk to us about exactly what you want to do.

DR THOMPSON: Thank you, sir.

MR SHAW: Okay. Dr Thompson, you've been watching a little while from the back so you know the drill. If you would introduce yourself, qualify yourself and then you can present your evidence or comment on your evidence as best you think.

DR THOMPSON: So my name is David Thompson. My qualifications are an Honours Degree in Marine Biology from the University of Liverpool in England and a PhD in Zoology from the University of Glasgow in Scotland. That was obtained in 1990. Since that time I've been employed at the University of Glasgow for 11 years in a mixture of post-doctoral research positions and lectureships. I've been in New Zealand for 20 years, for the vast majority of that time employed at NIWA as a Seabird Ecologist.

I have a relatively short presentation just to summarise my evidence, which I'll run through. Okay. So, a little bit of scene setting: so, New Zealand is often called the seabird capital of the world and that's because the country, the EEZ, supports the largest diversity of seabirds anywhere else. The current total is 162 different taxa that have been recorded throughout the EEZ. Within the STB, the short answer is we don't know how many seabird species taxa occur in the STB, that the definitive total is unknown. Conservatively I would say 45 - 50 taxa and of those there are a number which are classified as either threatened or at risk and there's some numbers there, conservative totals there. The terms "threatened" and "at risk" in this sense reflect those definitions as per the New Zealand Threat Classification System as devised by the Department of Conservation. In addition to those seabirds which are largely pelagic, occurring at sea to a more or less extent, there are also a minimum of 15 shorebird species which are confined to the coast of the STB, and of those there are a number which are also threatened and at risk.

My evidence boiled down to a number of potential effects on seabirds and shorebirds; these include simple physical displacement for the mining site. It's highly unlikely that seabirds are going to try and
The other topic of course, which we've heard a lot about already, the sediment plume increased turbidity, that has the potential to reduce foraging efficiency for those birds which feed primarily visually in the water column. My view is that for seabirds that list of potential effects is likely to be negligible on seabirds primarily due to the high mobility of seabirds coupled to their relatively large ranges; foraging ranges, distributional ranges.

Just continuing on, another potential effect is vessel strike. It's well known that seabirds in particular can be attracted to artificial light sources at night under certain conditions. I think there's clearly a potential there for those birds to collide with a hard structure, a boat in this case, and the outcomes generally for birds where that happens are not too good. However, the applicant, in my view, has developed a fairly comprehensive management and mitigation plan which includes a set of standard and mature mitigation measures in relation to nocturnal lighting which should reduce that risk substantially.

Oil spills of course from the vessel. Lots of high profile examples of that and how they can affect seabirds and shorebirds. Again, my understanding - I'm not an expert in oil spill prevention - is that the applicant has in place a set of measures which are best practice to reduce that risk as far as is practicable. I should just mention, sorry, that in my view the only potential effect out of those listed which could affect shorebirds is the oil spill effect. It's highly unlikely, virtually impossible, that shorebirds based coastally will be exposed to the other potential threats.

A few words on the expert caucusing which took place later last week. I think it would be fair to say there was broad agreement about the occurrence of seabirds within the STB. There was disagreement between the experts on whether sediment and sediment plume, increased turbidity, reduction in light in the water column would be adverse. We agreed that there would be the potential effect of artificial light nocturnally and there was some disagreement around the scale of the proposed monitoring.

So in summary there's a number of potential effects that I think are worth considering. The effects of those are mitigated through, as I mentioned previously, a combination primarily of the high mobility of
the birds in question, their large ranges and the mitigation plans that have been put in place. It's my view that, overall, the effects of what's being proposed would be negligible on seabirds and shorebirds primarily for that large range effect.

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MR SHAW: Right.

MS McGARRY: Thank you, Dr Thompson. So there was agreement on the ten threatened species that could be present within the STB.

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DR THOMPSON: I think so.

MS McGARRY: Was there agreement on whether the application site is part of the habitat for those ten species?

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DR THOMPSON: We didn't specifically cover that point but I think almost by default you'd have to agree to that being the case; if those species occur there then that's part of their habitat.

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MS McGARRY: So it's part of their wider habitat?

DR THOMPSON: For sure.

MS McGARRY: Are any of the endangered species present nocturnal?

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DR THOMPSON: Are they nocturnal? Well, most of the seabirds or a large proportion of the seabirds that are likely to occur through the bight are active to a certain extent at night. Being seabirds they spend most of their time at sea or over the sea. They return to land to breed of course but they can spend many days, weeks in some cases, even when they're actively breeding and have a chick or an egg to tend to on land, away at sea and so it's inconceivable to me that birds that operate that particular sort of lifestyle with those characteristics wouldn't be in the STB at night-time.

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MS McGARRY: So potentially any of those ten threatened species could be attracted to lights?

DR THOMPSON: The species' attraction to light is species-specific or thought to be, at least, within broad groups within seabirds. So, generally speaking albatrosses are more active during the day. Other groups of seabirds, smaller petrels, shearwaters and the like, tend to be slightly more active at night and it's those birds which are active at night which, as far as we can tell, tend to be more attracted to artificial light sources.

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MS McGARRY: So potentially all of them could be affected by lights at night?

[11.20 am]
DR THOMPSON: Potentially, yes.

MS McGARRY: You've talked, in your evidence, that there's not much information about birds in the South Taranaki Bight. I just want to get that in terms of context of New Zealand, is that pretty similar to most places around New Zealand?

DR THOMPSON: It is. I should qualify that by saying in the sense that there have been very, very few structured distributional at-sea surveys of seabird occurrence and abundance. So we have an understanding of where certain species go. We have a good understanding of where virtually all seabirds breed. The detail of how they use the marine environment around New Zealand is the area where information is generally lacking.

MS McGARRY: Dr Cockrem drew our attention to the fact that this is part of an identified important bird area that extends right through Cook Strait. Was there a reason why that wasn't brought to our attention in the application or through your evidence?

DR THOMPSON: Not particularly, no, there was no particular reason why I didn't include that. It's my view that it's surprising to me that there are areas which haven't been classified as important bird areas around New Zealand. The seabird fauna here is so rich, so diverse; many species are of high conservation status. To my mind it's slightly arbitrary that the marine realm has been divided into important bird areas and those which haven't been classified as important bird areas. It seems to me that you could classify all of the marine realm as an important bird area.

MS McGARRY: Are there other areas around New Zealand that have been given the same status?

DR THOMPSON: For sure, yes, many.

MS McGARRY: Many?

DR THOMPSON: Many areas, yes.

MS McGARRY: Obviously I wasn't involved in the last application but I'm not sure there was a focus about the penguin last time, and it seems that the penguins popped on to our radar this time, and I suspect it's the study that showed just how far some of these adults can range while foraging. Is that a fair assumption I'm making there?

DR THOMPSON: Well, you're correct that penguins weren't a focus of the previous application. This is probably a question better answered by Dr Cockrem; it is a research interest of his and so I suspect the reason why he has raised them as a particular focus reflects that to a certain extent,
yes. But it's also true to say that fairly recent tracking information is extremely interesting and perhaps slightly unexpected.

MS McGARRY: Yes. Who would have thought a little bird like that would go so far?

DR THOMPSON: Well, penguins are amazing things.

MS McGARRY: I'm looking at paragraph 11 of your evidence when I think about this and you've talked about this relatively coastal distribution. I'm just wondering what sort of a typical range off-shore -- and I know, how long is a piece of string. Who thought the blue penguin would go that far? But what is a typical range off-shore for these birds?

DR THOMPSON: It is a little bit like how long is a piece of string. But to my mind a coastally predominant species will be something that is from the coast out to 20 kilometres, perhaps a little bit further. A pelagic species will be something which is quite the reverse, they would tend to spend most of their time outside that coastal zone and often very, very far from land, apart from when they're breeding.

MS McGARRY: So the coastal species would be going out about as far as the application site?

DR THOMPSON: Yes.

[11.25 am]

MS McGARRY: Thank you. In paragraph 14 of your evidence you've highlighted some coastal estuarine sites for us. Are these all sites that we consider as ecologically sensitive areas in terms of considering some of the oil spill information before us and the risk, these would be ecologically sensitive sites?

DR THOMPSON: I think they would be, on the basis of the shorebirds that they support, yes.

MS McGARRY: Is that a reasonably inclusive list, exhaustive list, probably a better word?

DR THOMPSON: It's not intended to be an exhaustive list. There may well be others. I think that probably captures the main, the most high-profile sites along that stretch of coastline.

MS McGARRY: We've seen some of the plume modelling and some of the results show that suspended sediment concentrations are higher at the sea floor than they are at the surface. I'm just wondering if there's any of those threatened species that that would be more of an issue for, and I guess I'm getting at is what depths do they dive to? And if we're considering
that information, what's more important? Is it the seabed levels or is it the surface levels for this foraging?

DR THOMPSON: If we're talking strictly about threatened species that's classified by --

MS McGARRY: Yes, I'm focusing on those because we're certainly charged under the legislation to look at the habitats of threatened species in particular.

DR THOMPSON: Okay. So the majority of the threatened species that we think occur in the bight are surface to very shallow diving species, so they'd be more responsive to changes in the surface environment. Within that group it's likely that a species of shag, pied shag, occurs within the South Taranaki Bight. That's currently classified in New Zealand as threatened, nationally vulnerable. Shags are diving species: they forage underwater for food in the water column, a bit like a penguin. So they would be more susceptible to changes lower down in the water column. Looking at the list here, that's probably the only one, flesh-footed shearwater. Shearwaters are flying birds of course but they have the ability to dive quite deep as well so that might be another species that would be susceptible to changes at depth.

MS McGARRY: Thank you.

MR SHAW: Mr Thompson.

MR THOMPSON: Dr Thompson, is there any distinction, in terms of risk and impact, between flightless birds and those that fly? So the penguin, etc, have they got more exposure to issues around this site?

DR THOMPSON: Theoretically, yes. Flying birds clearly cover more ground or more sea. Their ranges and their foraging movements tend to be much greater than non-flying birds. Having said that, blue penguins are mobile. They can clearly swim, as we've already heard, relatively large distances from their breeding colony at certain times of the year.

MR THOMPSON: Not very fast though.

DR THOMPSON: They're not too bad. They'd probably outdo you and I in the water if they had to.

MR THOMPSON: That's no real measure.

DR THOMPSON: No. They can travel through the water pretty quickly when they have to.

MR THOMPSON: There's an area of disagreement with respect to penguins and that is the penguins based at Motuara Island in the Marlborough Sounds and whether the STB is a breeding feeding area for that penguin colony.
DR THOMPSON: Yes. So, I think the concern around that particular population or that breeding colony of penguins has been put into focus in the light of the more recent tracking data which shows that during the incubation phase of the breeding cycle some of those birds were travelling up into the bight, hundreds of kilometres away from their breeding site. I think you would be drawing a long bow to go from that set of tracking data to say that somehow the South Taranaki Bight is a critical habitat for the ongoing survival or, the flipside of that, a local extinction for that population. I think we don't have enough information to draw that conclusion at this point.

[11.30 am]

MR THOMPSON: Okay, and could you tell me about the prions and their occupation within the South Taranaki Bight?

DR THOMPSON: I can try. So the largest breeding site for fairy prions is down on Stephens Island at the head of Cook Strait; well over a million breeding pairs we think, so a huge colony of birds and so they're in the same group of birds as albatrosses. They travel large distances. They're a small bird but they're still able to traverse large areas of ocean, and the South Taranaki Bight will form part of that range that they exploit. It won't be the only place. I'll backtrack one step. We don't know the full extent of their foraging distribution or their distribution at sea when they're breeding in New Zealand. It's likely to be much larger than the South Taranaki Bight though.

MR THOMPSON: Thank you.

MR SHAW: Mr Coates.

MR COATES: I'm particularly interested in the fact that the IMV is a working vessel so it would be relatively well lit at night, and you said it will attract, the way a squid boat does, underwater species. So it could be regarded by the blue penguin as, if you like, an easy fishing ground. So blue penguins could be attracted preferentially to that area because of the prevalence of prey?

DR THOMPSON: It's possible. I think overall, I mean, that remains to be seen whether that would be actually the case. I'm not aware of examples of where little penguins or other species of penguins have been attracted to that sort of artificial light source at sea, in terms of enhanced opportunities for foraging.

MR COATES: You said there was a paucity of data particularly about the effect of light.
DR THOMPSON: Yes, it's not been well studied. The thing that has been reasonably well documented is the attraction of ships' lights to nocturnally active seabirds and the consequences of that attraction. I think, going back to your original question, it's entirely possible that the downward-facing lights into the water would attract fish and squid to that source of light, and in turn that may entice consumers of those prey species into the area. Now, whether that includes blue penguins, it seems to me that it would be -- it's a possibility but I think it's probably unlikely. I think the other activities that are happening for the blue penguins -- I guess the major point is that they tend to be active foragers diving into the water column during the day. They're visual foragers so they need light to be able to do that. Now, obviously there's light from the ship at night but they wouldn't naturally, I don't think, unless they're out there for a long period of time, be attracted to a ship at night. They wouldn't naturally be there foraging at night time. It's possible but I think on the balance I would say it's probably unlikely that they'd use it as an enhanced source of food.

MR COATES: Blue penguins do tend to come back to their burrows at dusk, is that right?

DR THOMPSON: Correct.

MR COATES: So what you're saying is that they shouldn't be present in the area at night.

DR THOMPSON: Well, there'd be times during the year when they won't be coming back to their breeding sites on a daily basis or on a nightly basis. There'll be times when they're away from their breeding site for more than a day, more than just the daylight hours, and so there would be times when they're at sea at night, and at those times they could theoretically encounter those pools of light. So it's possible that they could take advantage of that but I'm not aware of any studies showing that actually happening.

MR COATES: So really we don't know if there would be increased mortality because of the mining vessel?

DR THOMPSON: In terms of penguins or seabirds more generally?

MR COATES: I'm just talking about penguins at the moment. The diving seabirds don't operate at night.

DR THOMPSON: Generally not, no. They require light to forage in the water column. I think it would be fair to say that most are primarily visual foragers. So, direct mortality of the mining vessel on blue penguins I think is unlikely.
MR COATES: Unlikely?

MR COATES: You're satisfied that the management plan should also mitigate problems, particularly the measures for lighting?

DR THOMPSON: Yes, I think so. As I mentioned previously there are a fairly standard set of measures now that have been developed over the years. It's also worth noting that that seabird management plan has been through the Department of Conservation. It's my understanding they've approved what's contained in the plan. I've read through the plan as well and it seems reasonable to me.

MR COATES: From your answers to the questions of Ms McGarry, I gather that you think that shorebirds will hardly enter the mining area, it's at the limit of their range.

DR THOMPSON: Highly unlikely that they'd be in the area of active mining. Generally confined to coastal habitats, yes.

MR COATES: Thank you.

MR SHAW: Doctor, I'm interested to get a little bit further inside the discussion that occurred between the only two seabird experts we have during caucusing, and these are matters I will obviously wish to pursue with your colleague as well. It would be fair to say that the gap between you as reported from the caucus is considerable.

DR THOMPSON: We had some points of disagreement, yes.

MR SHAW: I want you, if you would, to try and explain to me the areas of disagreement, and by that I mean were they related to the reliability of assessments made by experts in other fields? For example, let's take the question of primary production and its impact on seabirds generally, penguins in particular, or indeed the question of the optical impacts. Were the disagreements based on one expert accepting these reports by other experts and the other one rejecting those reports or did you have common ground on the accuracy of that other material?

DR THOMPSON: I think it would be fair to say that we didn't discuss the perceived accuracy or otherwise of other experts’ expert reports.

MR SHAW: Were they, for either of you, an assumption, do you think?
DR THOMPSON: For me, I certainly took the view that the information contained in the reports was accurate and I based some of my conclusions around potential effects on seabirds on those for sure, yes. Again, I'm speaking for both of us here but I don't think either of us disagreed with the accuracy, in any shape or form, of what had been written by other experts.

MR SHAW: Well, as I say, I'll be talking to your colleague in the same terms because as I say I find it very difficult to understand how there is such a wide disparity of views when, on the face of it, people were basing their assessments on the same range of evidence.

DR THOMPSON: So I guess to answer that question it comes down to a point of interpretation and whether certain points, facts, conclusions drawn by other experts would have an adverse effect on seabirds in the South Taranaki Bight. That was essentially the --

MR SHAW: I see, so it wasn't the base information, you don't think, and again I will be talking to your colleague about this?

DR THOMPSON: No, I don't think so. There was agreement between us. What we were basing our conclusions on was accurate. I think it would be fair to say that it was more of a difference in interpretation.

[11.40 am]

MR SHAW: That answers the question that I had there. How do we get to the point, then, of trying to get some resolution in terms of the differences between the only two experts we have appearing before us and the question of seabirds? Because what you're saying is that the basis of the disagreement, for you anyway, was certainly not the accuracy or otherwise of the reports and you didn't feel it was the case for Dr Cockrem either. So, how do we resolve some of these things? Because otherwise we are in a "he said, she said" or "he said, he said" situation when it comes to the value of the evidence. You wouldn't dispute the expertise of your colleague?

DR THOMPSON: I would not, no. Not at all, no.

MR SHAW: Or his integrity as a scientist?

DR THOMPSON: No, not at all. Absolutely not, no.

MR SHAW: No, I wanted that on record because I think it's really important because it goes to the very core of what we need to do. So, do we need somebody else to run a ruler over these issues? Does the EPA need to think about pulling somebody into the mix?
DR THOMPSON: Well, I noted that originally the expert conferencing was scheduled to have someone in addition, perhaps from the Department of Conservation. That might be helpful. It's my view that --

MR SHAW: Of course, these things don't come down to a vote between experts. It's in the end our job to assess the information we have and to assess the effects. But this is a wee bit of a logjam with only two logs.

DR THOMPSON: It is. So, I think it would be fair to say that it comes down to this point about whether any effects that seabirds incur is adverse or not, and it's my view that they wouldn't be adverse.

MR SHAW: Yes, I've got that very clearly.

DR THOMPSON: Certainly for all flying birds, as far as I can tell, it's my opinion that any area that's affected by turbidity in particular was the key point. I think, just to side-track slightly and very briefly, the issue around light can be effectively mitigated against. So that's really in terms of managing that potential threat taken care of marginally. Around the effect of turbidity and how that might affect seabirds, it's certainly the case that if sediment is put into the water to make it more turbid, at some point it's going to affect birds that forage in the water column.

MR SHAW: Can you explain to me -- let's start with that question of turbidity. In terms of their foraging and their feeding, where are the penguins most active between the shoreline and the mining site? We understand that they go a long way out. That's clear from the evidence. Where are they most active? Do we know?

DR THOMPSON: We don't know.

MR SHAW: So we've got at the moment no direct evidence as to how they respond to the relative turbidity of the inshore environment?

DR THOMPSON: We do not, but I think it would be safe to conclude that given that it's a relatively turbid environment, a very dynamic environment where levels of turbidity can on occasion be high, they can also be quite low. There are other examples where little penguins nest, breed and forage in similarly turbid environments, Lyttelton Harbour for one, Wellington Harbour another on occasion, perhaps not as turbid as some other places, Port Phillip Bay, Melbourne. So it's not as if they are not exposed to levels of turbidity from time to time. It's not that they don't live in dynamic environments where they're going to encounter patches of high turbidity which move around in space and time.

So, whilst we don't know the fine detail about penguins which may breed along the South Taranaki coastline, how they exploit the marine environment presented to them from when they leave their breeding
site, and how that relates to the sediment plume as it disperses from the mining site, I think it would be safe to say that within that dynamic environment it would be my view that they would be able to navigate through that in such a way that they would not be adversely affected. They would be able to, I think, make decisions about the efficiency of where they're foraging in such a way as to exploit food resources satisfactorily.

MR SHAW: So it would be they would be making their assessment on the basis of both availability in terms of abundance of prey but also on the basis of their ability to pick the prey out?

[11.45 am]

DR THOMPSON: Certainly. If they go out and, in an extreme example, a bird departs from a breeding site into some very turbid water, can't find prey and "decides" to come back because it's not been very successful, that's a road to extinction and clearly that's not what happens. If they encounter a patch of turbid water, decisions will be made either to go somewhere else, to look for food elsewhere.

We don't fully understand how birds locate prey. They don't perceive the environment in the same way that we do. Their eyes are different to ours. There's probably a whole raft of sensory apparatus that they use to locate prey. They're clearly able to do it in the sort of environments where turbidity is common. They're able to do that successfully and they're able to do that over long periods of time. So, even for penguins, which are more constrained in terms of their foraging ranges, the areas over which they can move and find food, I don't think this would be an adverse issue for them.

MR SHAW: We're going to stick with penguins for the simple reason that I think it serves well as a proxy for me to understand the sorts of issues that you and your colleague were taking into account.

So, if we look around the coast of New Zealand, are there any areas that you can think of from which penguins have been excluded as a consequence of an increase in turbidity, a decrease in light availability? You mentioned their presence in Lyttelton Harbour and in Wellington Harbour from time to time and the rest of the south coast, which can be extremely turbid at times.

DR THOMPSON: I'm not aware of anywhere, no.

MR SHAW: So is the separation, do you think, possibly down to a question of an assessment of the adaptability of creatures or of these animals or not?
DR THOMPSON: It's possible and I'm sure Dr Cockrem would agree that they are adaptable and they can respond to their environment and make choices and decisions to maximise their efficiency and their longevity in such environments. So I don't think it's a question of their adaptability. I think it's a question of whether turbidity per se would cause an adverse effect.

MR SHAW: You're saying at the moment we don't know?

DR THOMPSON: Well, we don't know. I'd add a caveat to that that there are very few examples of where blue penguins, little penguins, have been observed in relatively high numbers in relatively turbid water.

MR SHAW: Okay. So, as I say, we've got a pretty pronounced divergence of views expressed in the caucusing. As I say, were we to get a third party in, that means potentially there's a vote breaker, but that's a very bad way to do business. So what do we need to do to resolve the issues reasonably? We go back to the Act, which talks about the best available information. It doesn't mean the best possible information. What do we do that might assist us to resolve the issue? Is there time? Is there the facility for a systematic survey? I'm surprised none has ever been done. That's been suggested by your colleague so that we can understand the reality and the perception of risk to these animals.

DR THOMPSON: To my mind it seems it would be a daunting undertaking, I think, to embark on fieldwork to determine how blue penguins respond to turbid water and areas of non-turbid water and what the flow-on effects of those responses are. That would be non-trivial.

MR SHAW: This is none of it trivial. None of it is trivial.

DR THOMPSON: No, it's not trivial.

MR SHAW: Finally from me, if we look at the population as a whole around the New Zealand coast - and don't get me wrong, I'm not suggesting for one moment that we can afford to sacrifice any population of these animals - what of the total population of these creatures would be potentially affected by this proposal?

DR THOMPSON: Potentially affected would be a very small proportion.

MR SHAW: Like?

DR THOMPSON: Less than 5%.

Westpac Stadium Function Centre, Wellington 22.02.17
MR SHAW: Okay. I'm not going to go through the other species because, as I said, I wanted to talk about the penguins just as an idea as to how we move to those or try to get some understanding around the conclusions you drew. But looking at the other species, are there any populations where the impact of any loss is potentially catastrophic because the numbers are so small - and the prions come to mind, for example - or where the potential effect is much greater in terms of the overall population of the country?

DR THOMPSON: I would say not.

MR SHAW: You'd say not?

DR THOMPSON: I would say not.

MR SHAW: So this is a good example of, for want of a better word, the most critical species for us to be looking at when we look at seabirds, without getting rid of the others?

DR THOMPSON: Blue penguin?

MR SHAW: Yes.

DR THOMPSON: I would say so. It's the species that is potentially likely to come into contact with the operation more than any other, yes.

MR SHAW: Okay, fine. I've got no more questions for you. My colleagues may well have and it may be that when they've finished I will have questions from Ms Haazen, who's appearing for Greenpeace and KASM. It may well be that Mr Holm has some questions to follow up for you as well. Anything more? Mr Coates.

MR COATES: I noticed in the expert witness statement that you talked about an artificial nocturnal life. Just going back further to talk about what you thought, your colleague's view was that a reduction in light intensity and visibility in the water would adversely affect the foraging, and your view was that there would be no such adverse. So you have diametrically opposed views, but you solve that by saying that it was agreed that there is the potential for significant mortality. In other words, you're saying, "We don't agree but there's a potential there". Is that the way you've solved the disagreement problem?

DR THOMPSON: So when you say a potential for a significant mortality, you're referring particularly to paragraph (m) of the joint statement about artificial light?

MR COATES: Yes.
DR THOMPSON: That statement is true, but the key word is "potential".

MR COATES: Yes.

DR THOMPSON: In my mind, large-scale mortality events of seabirds attracted to vessels at night through attraction to artificial light occur more or less exclusively when that vessel is very close to breeding sites, almost exclusively when the weather is appalling so visibility is very bad, and certainly when the lights of vessels aren’t shielded or pointing downwards, are often pointing out to the side of the vessel or up into the sky for various reasons. Those combination of factors will result in large mortality or relatively large mortality of seabirds on vessels.

Now, the vessel in question here isn’t near a large breeding site. It may or may not be operating in bad weather nocturnally and it will be undertaking a series of mitigation measures, management protocols, to reduce the amount of light being emitted from the vessel. I think whilst there is potential for mortality the factors that are pertinent to this particular example mean that the likelihood of that actually being realised is very low.

MR COATES: Is there any data available from the time when we had lots of squid boats operating fairly close into New Zealand shores and they could potentially have a bycatch of blue penguins or whatever?

[11.55 am]

DR THOMPSON: So there’s certainly information from commercial fishing vessels, a proportion of which carry government observers on board. Those observers are tasked with a variety of duties, one of which is to return to land any protected species, marine mammal or seabird, that’s incidentally killed as part of fishing operations. Every year a number of birds are returned which bear all the hallmarks of being killed through deck strike. Now, I’m not aware --

MR SHAW: Through, sorry?

DR THOMPSON: Deck strike, so they’ve collided with the vessel. Now, they make up a very, very small proportion of the overall number of birds that are returned through mortality with fishing vessels. The vast majority of birds are killed on fishing gear behind the vessel, either trawls or long lines, and also in set nets. So, every year a small number of birds are killed on fishing vessels.

It’s not clear, I’m not aware or I’m uncertain as to what sort of protocols fishing vessels have to operate under at night, but it’s always struck me as somewhat surprising that more seabirds aren’t returned as victims of deck strike from commercial fishing vessels. The reasons for that could
be around those factors I've just talked about, that they often operate a
long way from breeding sites and they're often operating in conditions
which can't be described as foggy or really, really misty and claggy.
Those are the sort of conditions where you do get birds attracted to
artificial light.

So, there are certainly birds in the New Zealand sector which are killed
through attraction to vessels at sea at night. The proportion of those
within the commercial fleet operating around New Zealand is very
small.

**MR COATES:** A mitigating action would be to ensure that lights on the mining vessel,
for example, were shielded so that they were targeted at the work area
rather than spill light out towards the sea?

**DR THOMPSON:** That's correct.

**MR COATES:** Thank you.

**MR SHAW:** All right. I'll now move to questions in the first instance from
Ms Haazen. Ms Haazen, to you, the final question that you've given us
I'm going to start with because I'm not going to ask the question. The
question that's posed relates to -- it's a legal question that's being asked
and that is whether or not the SEMMP or SCMP include measures that
are adaptive in nature. With respect, Ms Haazen, you're in a much
better position to express an opinion on that than this witness.

**MS HAAZEN:** I'll save those for the planning experts, yes. Thank you.

**MR SHAW:** But it's important that these things are understood by everybody that
these are matters on people's minds. But of the questions that will be
asked, the first is: is krill an important food source for birds in the area?
If so, what birds in particular?

**DR THOMPSON:** The short answer is we don't know but I suspect that it is to a certain
extent for certain species, and they tend to be the smaller species.

**MR SHAW:** You're not in a position to say which in particular?

**DR THOMPSON:** There's no information to answer that thoroughly.

**MR SHAW:** Did you hear the evidence of Dr Barbara yesterday that the discharge
could, in fact, attract fish and squid to the area, much like a burley?

**DR THOMPSON:** I did hear that.

**MR SHAW:** If this were the case, would this not increase the number of seabirds
attracted to the mining area?
MR SHAW: Would this increase the risk of vessel strike or collision for seabirds, especially at night?

DR THOMPSON: Potentially, yes.

MR SHAW: Do you agree that the loss of one seabird of a threatened species can have a significant effect?

DR THOMPSON: Potentially it would.

MR SHAW: Do you agree that there is still much uncertainty in what we know about the seabirds in the South Taranaki Bight, including their abundance?

DR THOMPSON: That would be true.

MR SHAW: Okay, thank you. Mr Holm, nothing in conclusion from you?

MR HOLM: Nothing.

MR SHAW: Since you're back in the fold, we'll see whether you've got any questions as well. I should have put you forward in front of Mr Holm, in fact, but I just realised you were back with us.

MR DAWSON: Thank you, sir. It did occur to me, sir, that those issues around seabirds striking fishing vessels could probably be answered by some of the witnesses this afternoon.

MR SHAW: These are matters which will be entirely -- if it doesn't occur to us, they'll be matters that will be in your hands to be able to effect to some degree.

MR DAWSON: I'll endeavour to remind you, sir.

MR SHAW: Okay. All right, thank you very much, Dr Thompson, and we'll now see Dr Cockrem.

[12.00 pm]

MR SHAW: Welcome, and I think you've been here long enough to understand how we'd like you to kick off with an introduction and qualify yourself for the status of expert, sir.

DR COCKREM: Certainly. I'm John Cockrem. Thank you for the chance to speak here this morning. I'm Professor of Comparative Endocrinology at Massey University in Palmerston North. I have more than 100 refereed
scientific publications. I've worked in a number of countries overseas, including consultancy work for the United States Navy Office of Naval Research and for a national commission for wildlife conservation in Saudi Arabia.

I have more than 30 years of experience with penguin research. I've made a number of trips to Antarctica, worked with Adelie and emperor penguins. I've worked with yellow-eyed penguins and little penguins in New Zealand, particularly at the Oamaru blue penguin colony where I've worked for three seasons and have experience there in attaching tracking devices to look at foraging behaviour of little penguins.

In 2011 I was elected as an honorary fellow of the American Ornithologists' Union, and I'll note that the membership category for this fellow says they're limited to 100, they shall be chosen for exceptional ornithological eminence and must at the time of their election be residents of a country outside the US or Canada. In 2010 I was elected as a member of the executive committee of the International Ornithologists' Union and the recommendation letter said that the election was based on the recommendation of the past president, the excellence of my scientific work and involvement in promoting ornithology.

So, little penguins and other seabirds in the South Taranaki Bight. I'll give you an overview of the evidence that I have provided. Which way does this go? That way.

MR SHAW: I think you're going to have to rely on just pointing these things out. I'm not sure it's ...

DR COCKREM: I've managed to change the slide. Here we are. There was a question earlier about important bird and biodiversity areas. This is a map from the Forest & Bird document that described the important bird and biodiversity areas. I've drawn the large arrow on the diagram to show the South Taranaki Bight. You can see that some areas of the New Zealand coast have been identified as IBAs and others not. This is an international classification system. An IBA is an area of international significance for the conservation of the world's birds.

This is a bathymetry chart and I've put this up so that we can see Taranaki there. The area of dark blue, that's water out to 30 metres of depth. We can note that the South Taranaki Bight is the largest area of relatively shallow water off the west coast of the North Island. The significance of this includes the fact that for the little penguins, they generally dive down to the bottom of the sea. So this is the largest area of relatively shallow water available for foraging of little penguins along the west coast of the North Island.
This is a picture taken from the New Zealand Government Statistics Department website, and there has been some discussion of primary productivity. This is a figure that shows the average primary productivity based on satellite views of chlorophyll A averaged over a number of years, 1997 to 2016. The darker area is the area of highest primary productivity. This is an average over quite a long time period and we can see that in the South Taranaki Bight, the area off the north coast of the South Island extending over towards Taranaki, this is an area of relatively high primary productivity. It's not a coincidence that this is an important bird and biodiversity area, nor will it be a coincidence that this is an area that we've heard earlier today and yesterday of importance to blue whales.

[12.05 pm]

This is another figure, this time taken from a NASA US Government website. This is a snapshot. The previous picture was an average over quite a number of years and this is a view just on a single day, 13 January 2005. We can see that the chlorophyll concentration, a measure of primary productivity, is variable across different areas of ocean. There has been some discussion of the Kahurangi current coming up the west coast of the South Island, coming over into the South Taranaki Bight, and you can see there the area of bright green into yellow. So, at any one time there are some areas that will contain more food for animals than other areas, so a little bit of background there.

Now we'll turn to little penguins. This is a species that is classified by DOC as at risk and declining. The species is vulnerable to food shortages. We have strong evidence for breeding of little penguins along the South Taranaki coastline. However, the full extent of breeding along the Taranaki and Whanganui coastlines and the use of the South Taranaki Bight for foraging by little penguins is simply not known. There have been no systematic surveys along the coast. There have been no tracking studies of little penguins that nest along the Taranaki and Whanganui coasts.

This is a figure and there was some discussion earlier about foraging of penguins travelling from Motuara Island in the Marlborough Sounds. This is a satellite track showing a foraging trip completed by one of the penguins from the island. This was published in Birds New Zealand in 2016. This was a bird that chose to swim from the Marlborough Sounds up into the area of the Taranaki Bight and back again.

This is another figure. These are raw data for 14 penguins in the studies. This is a study conducted by Poupart, a student working with
Susan Waugh at Te Papa. Their paper has just been accepted for publication in the New Zealand Journal of Zoology. It says:

"Foraging trips completed by 14 little blue penguins tagged at Motuara Island, Marlborough, during the incubation period in spring 2005."

Eleven of the 14 penguins foraged in waters off South Taranaki, and you can see all the coloured dots. Those will be location fixes. I think these were satellite rather than just GPS.

Back in 2000, Thomas Mattern did his Masters studying little penguins on Motuara Island, and he had tracking devices on birds but he was using radio tracking. So he could see the birds going north and then they went out of his radio tracking range and then a few days later they came back again. So, this isn't a one-off piece of evidence. There was evidence from 17 years ago of the penguins swimming north and coming back again.

We know then that little penguins swim from the Marlborough Sounds to forage in the South Taranaki Bight. We also know from studies by Thomas Mattern and others on Motuara Island that the little penguins that breed in the Sounds experience food shortages and in some years the chicks die due to starvation. So, the penguins are swimming -- these long treks were recorded during the incubation period shortly before the eggs hatched, shortly before chick rearing. So we can conclude that the South Taranaki Bight may be - we don't know but it may be - an important if not crucial feeding area for the survival of these populations of penguins. We know that chicks die in some years due to food shortages. We know that the birds swim a long way and they wouldn't be swimming a long way away if there was food available close by. So, the South Taranaki Bight may be an important or crucial feeding area for those birds.

We've had some mention earlier from Dr Thompson about the birds that are present in the area. I note in the first of these points that there were two trips done by Peter Frost and other ornithologists in 2009. Two-thirds of the species of birds that they saw on those trips are classified as threatened or at risk.

There was a mention earlier of ten species of, I think, threatened birds. We don't know how many are there. The number of threatened and at risk species that use the South Taranaki Bight is unknown because there have been no systematic surveys. So, we have the evidence from those trips in 2009 of the species that were seen, but that was two trips on two days. There'll be others there. We don't know how many birds are there, what species are there.

[12.10 pm]
There has been mention of fairy prions. This is a photograph showing on the left a fairy prion and on the right this was a picture taken in the South Taranaki Bight on one of the trips done by Peter Frost, part of a flock of 5,000 or more fairy prions. Fairy prions, as Dr Thompson noted, breed in particular on Stephens Island and very large numbers of fairy prions occur in the South Taranaki Bight. I'll show you a diagram in a moment, but there was a sighting of at least 100,000 prions less than 10 kilometres from the proposed mining area. On Peter Frost's trip he was seeing flocks of 5,000 or more prions. Phil Battley one day some years ago stood with his telescope on a headland over Waverly Beach and he recorded more than 10,000 prions per hour flying past. He also saw more than 10,000 fluttering shearwaters - I think that was the species per hour.

The area of the South Taranaki Bight that would be affected by sand mining is within the likely daily foraging range of fairy prions breeding on Stephens Island. I'll show you a picture now to illustrate that. This first one, so this is a figure showing the proposed project location, the dark green area, and the "P" that I have put beside it, the published report of a sighting of 100,000 prions was by a very experienced observer and he gave the exact latitude and longitude location. Right there, within 10 kilometres of the mining site, more than 100,000 prions were seen on one occasion. He reported he could see 20 flocks, each of 5,000 or more birds.

This is a figure -- so I've shown down the bottom Stephens Island. It's at the base of the arrow, and I've just drawn a line 100 kilometres long. The evidence that I could find in the literature suggested that the daily foraging range, and this is important during the chick-rearing period, was up to about 100 kilometres. If you imagine that line going round to the right, it covers basically virtually all of the South Taranaki Bight to the east of that line and similarly over to Farewell Spit. So, during the chick-rearing period, which is the crucial period for any bird, then the daily foraging range of these 1.4 million pairs, more than 2.8 million prions, they're foraging in the South Taranaki Bight. At other times of the year they may be going much further, but at this time during chick-rearing they are dependent on the food available in this area.

Food shortages are reported to be an important contributing cause of large mortalities of fairy prions that occur along the west coast of the North Island. Sometimes thousands if not tens of thousands of dead prions are found washed up on the beach. The primary food source of the fairy prion is krill, and there was a question about that earlier. New Zealand Birds Online, which is the accepted reference for information about New Zealand birds, notes that the primary food is small crustaceans, in particular krill.
So, food shortages are reported to be a contributing cause of mortalities. The estimated population of 2.8 million prions breeding on Stephens Island are very likely to depend on the availability of food in the South Taranaki Bight. That's where they can get within their 100-kilometre foraging range during chick rearing.

**MR SHAW:** Could I just interrupt with one question there specific to this? The 2.8 million prions on Stephens Island, has that population changed to any great degree over recent years?

**DR COCKREM:** We don't know. In terms of --

**MR SHAW:** Okay, that's fine, I don't need any more. That answers the question I have. Others may pursue it later, but I just wanted to understand where it was.

[12.15 pm]

**DR COCKREM:** Your question actually leads us into my third point, which is the amount of variation from year to year and the breeding success of the prions on Stephens Island is not known, nor is the population size. It's been estimated.

Turning now to adverse effects of sand mining on seabirds, I'll be doing my best here to be helpful to you in this regard. There's the question of reduced foraging opportunities due to reduced water visibility. I'll do my best to step you through my reasoning, my logic here.

We've noted that sand mining would produce dirty water, in effect, and it would be the plume -- there would be a reduction in visibility and in water column light intensity. Little penguins and other seabirds are visual foragers. Therefore, if a bird was going to forage in an area where the turbidity was increased as a consequence of sand mining and it was not able to forage in that area, it would have to go somewhere else. Hence my statement sand mining would reduce foraging opportunities for little penguins and other seabirds.

There's a question in here about, well, if you've got the plume in one place and so the birds have to go somewhere else, is that a problem? Well, it depends and at the time of the breeding season and chick rearing in particular, that's when the seabirds will be most vulnerable. The penguins and the prions for that matter swimming and flying, they have to go out and back each day to provide food. So if the area that is within their normal foraging range is affected by reduced turbidity, then for the penguins they can't travel another 50 kilometres and get back in time.
There was some discussion earlier about information about effects of turbidity on little penguins. At Oamaru, so the Oamaru blue penguin colony, Dr Philippa Agnew is the scientist there. She's employed full-time. We have far more information about little penguins at Oamaru than anywhere else in New Zealand. Philippa has seen how when the water offshore becomes dirty naturally due to a storm event, then instead of the penguins going out each day and coming back and being in their nest boxes during the day, almost the whole colony, hundreds of birds, they just disappear and they don't come back until the water clears. So, we do have evidence from Oamaru that little penguins, when faced with turbid water, they go away.

Sand mining would reduce foraging opportunities for little penguins. I'll show a couple of figures shortly that will help us with this. I note that the availability of prey fish for little penguins and other seabirds could be reduced due to adverse effects of reduced water visibility on fish that are visual foragers. The importance of this we cannot determine.

Some data, a figure. This is a figure taken from the report by Pinkerton and Gall of 2015, Optical Effects of Proposed Sand Mining. I'll show this figure and then a couple of others to emphasise the difference between an average and what happens day to day. So this was a figure showing the reduction in light at the seabed from the model, from a modelling event, the average over two years. You can see that in both cases the reduction in light at the seabed was extending to the east and then around the coast. This is an average over two years.

At the time of the previous application there were a number of animations available on the EPA website. I've taken some screenshots from one of these. The purpose here is not to discuss the accuracy of a model at all. The purpose is to illustrate the difference between an average and what can happen from day to day. So this is, "Modelled reduction light seabird", so in the top panel you can see that the area of reduced light is extending from the mining site to the north, to the east and over to the coast at Whanganui.

Then in the lower panel the wind direction in this modelling simulation was from a different direction and now the area of reduced light is extending to the south-west. The third one on another day, the model shows here there's a wind blowing from the south-east and now you can see the reduction in light intensity extending all the way along the coast. So, if there was a situation where for a number of days, let's say, the wind was blowing in this direction and this was a representation of an area of reduced light intensity due to turbidity, then if this was occurring during the chick-rearing period for little penguins breeding...
along the coast, then their feeding opportunities would be markedly reduced at that time.

So, I’ve said sand mining could cause a reduction in populations of little penguins that breed along the coast of the South Taranaki Bight and in the Marlborough Sounds. I’m not saying that it would cause, I’m not saying that it would not cause, I’m saying that it could. We just don’t know. Similarly, the extent to which sand mining would adversely affect fairy prions in the South Taranaki Bight cannot be determined, but any reduction in food availability due to sand mining could affect very large numbers because there are very large numbers of birds there.

If they’re feeding on krill, krill aggregate in patches and there are data from the 1980s, so published data, where there were surveys done of krill distribution across the South Taranaki Bight showing areas of high density, areas of low density. So, if during the chick-rearing period an area of high density of krill coincided with an area of turbid water and fairy prions were unable to feed, then they wouldn’t have equal opportunity to feed somewhere else. We don’t know what would happen, but there could be an effect.

There’s been some discussion about seabird deaths due to collision with a sand mining vessel. I’ve shown you the evidence of at least 100,000 prions seen less than 10 kilometres from the proposed mining site and Dr Thompson and I agree that large numbers of seabirds may be present at night at the sites of the proposed sand mining, so there is potential for significant mortality. Clearly, seabird deaths due to collision with a vessel would be an adverse effect of mining on seabirds.

We have the New Zealand Coastal Policy Statement 2010. This is a national policy statement of the Government of New Zealand published in the Gazette. Policy 11, "Indigenous Biological Diversity (Biodiversity)", reads:

"To protect indigenous biological diversity in the coastal environment: (a) avoid adverse effects of activities on: (i) indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists."

So, the policy of the government says avoid adverse effects of activities on threatened or at risk species. Sand mining would have adverse effects on little penguins and other threatened and at risk species. We do not know the extent of those effects, but there would be adverse effects, and hence logically that would contravene the New Zealand Coastal Policy Statement 2010.
In conclusion, the South Taranaki Bight is an important area for little penguins and other threatened and at risk seabirds. Sand mining would have adverse effects on birds in the South Taranaki Bight. We've just noted that those adverse effects would contravene the New Zealand Coastal Policy Statement and the full extent of the adverse effects cannot be accurately predicted. We don't know what birds are there. We don't know the extent to which they would be affected. Thank you.

MR SHAW: Dr Cockrem, thank you very much. When we return from lunch, because we're going to break now, I will ask you to respond to the same range of questions that I put to your colleague.

DR COCKREM: Certainly.

MR SHAW: Just because I think it's very important to get responses there, and then turn also to the question that I pursued with him around the resolution of difference, whether it's possible, what's needed. But in the meantime we will break for lunch and we'll be back in 45 minutes. Thank you all very much.

ADJOURNED [12.25 pm]

RESUMED [1.12 pm]

MR SHAW: ... recommence and, Dr Cockrem, if you could join us again at the witness table and we'll move to questions initially from members of the Committee and then to questions from parties.

Dr Cockrem, I'm going to start with the issues that I canvassed with your colleague. I think you were here when I said the divergence of views appears to be extreme in terms of the report of the caucusing. I just want to be clear from you: are there any questions in your mind about Dr Thompson's expertise and ability to comment on these matters?

DR COCKREM: No, not at all.

MR SHAW: Not at all, and no questions in your mind around his integrity as a scientist around these matters?

DR COCKREM: No.

MR SHAW: No. I didn't anticipate any other answer, but it's wise when you do have such an extremely divergent expression of views that we get it out of the way.

DR COCKREM: Can I make a point here?
MR SHAW: Just in a moment. I do want then to go to this question of how we break the deadlock. I did canvass this question of a substantial study. It's been raised. I know that you're interested in it because you've said so. I don't propose to ask you that question because you've already told us the answer.

We will need to think about just exactly what we do do because we're in a difficult situation in terms of weighing evidence from two people who are acknowledged by each other to be both scientists of integrity but also of expertise. We need to think our way through how we're going to get there.

It's important to understand that even if another expert came in, it's not a matter of votes cast. It's a matter of what weight we apply to the evidence and whose evidence we wind up finally preferring and that's on issues of weight.

[1.15 pm]

Anyway, you wanted to say something, Dr Cockrem?

DR COCKREM: Yes. My understanding of the differing opinions is that at the end of the day Dr Thompson has said that adverse effects of mining will be negligible.

MR SHAW: That's right.

DR COCKREM: I've said that we cannot determine the extent of the adverse effects. That's my understanding of the distinction. I'm not sure that that's a massive divergence.

MR SHAW: We maybe can get to that and that's a way to perhaps you two getting together and identifying the detail of those disagreements. The basis of that may be one of the ways that we make some progress. It's not a question of - how should I put this - party politics or religious conviction that's causing the problem here from our point of view. I use those as surrogates.

DR COCKREM: Indeed.

MR SHAW: Okay?

DR COCKREM: Yes.

MR SHAW: So with that out of the way, we will turn to questions from the Committee. Counsel, none of you have got any questions around that?

MS HAAZEN: No, sir.
MR SHAW: I acknowledge that it's something we do want to get greater clarity on, I'm sure, from everyone. Mr Holm?

MR HOLM: Sir, I think the key to it is probably the last remark the professor made and we should drill down into that.

MR SHAW: Yes, I think that's right.

MR HOLM: (overspeaking)

MR SHAW: Whether or not we do that today satisfactorily or whether that's best done in a context of the experts talking to each other as well is something we're going to have to think about.

MR HOLM: Perhaps it would be a good idea for them to get together, sir, if we can arrange that.

MR SHAW: Yes (overspeaking) Okay. Anyway, I think it's Mr Thompson's chance to start.

MR THOMPSON: Thank you, Mr Shaw. Dr Cockrem, I've just got a couple of questions. What features do bird colonies look for when they establish a place to live and breed? What are the features they will need to choose and consider?

DR COCKREM: For all species of animals, food availability is a key. Then there's suitable breeding habitat. Those would be two key features that determine the distribution in our area of interest today, breeding seabirds. Primarily with respect to seabirds, it would be food availability, although today in the 21st century the breeding habitat is limited by predation, for example. The present distribution of colonies is not what it would have been 200 years ago, especially for little penguins because little penguins are declining due to human activities, predation by dogs, disturbance of nesting areas.

MR THOMPSON: So one of safety. I suppose safety is a factor from predation and --

DR COCKREM: In 2017, yes, safety plus food availability.

MR THOMPSON: Okay. The first picture you showed there - and maybe it's because the data is not complete, I don't know - there's no colonies. This is from a database, isn't it, the colonies of birdlife around the coast of New Zealand?

DR COCKREM: I think they were yellow.
MR THOMPSON: Yes, yellow. There's none on the South Taranaki coastline. Is that because they're not there or because they have not been plotted?

DR COCKREM: The plots are identified, particularly large colonies, in different species. Little penguins: they are found along the entire New Zealand coastline.

MR THOMPSON: They are?

DR COCKREM: They were in the past but --

MR THOMPSON: Even though they're not shown here. So I can't take absence of a yellow dot to mean absence of breeding presence?

DR COCKREM: With respect, this is not a picture of the distribution of breeding little penguins.

MR THOMPSON: That's fine. I know, but it's significant seabird colonies, significant, I guess, is it?

DR COCKREM: Yes.

MR THOMPSON: Okay.

DR COCKREM: For little penguins, the largest numbers of breeding little penguins today are at locations such as Oamaru where nest boxes have been placed for them. The natural distribution is smaller numbers of birds all the way along the coast.

MR THOMPSON: Okay. So I'm wrong then in my assumption from that graph that a lot of seabirds are breeding on the top of the South Island and from there they feed in the South Taranaki Basin? That's too simplistic a conclusion to make?

[1.20 pm]

DR COCKREM: There are very large numbers of seabirds like the fairy prions, indeed, breeding in the top of the South Island and feeding in the South Taranaki Bight. There are breeding seabirds on an island right next to Port Taranaki within close proximity to downtown New Plymouth. Some of those birds would feed in the South Taranaki Bight.

MR THOMPSON: All right. Now I come to the picture on page 3, this picture here.

DR COCKREM: Right.

MR THOMPSON: My eyesight is not as good as it used to be. Does that tend to suggest that there is more of a density of food source closer to the South Island than into the Taranaki coast? Is that biased?
DR COCKREM: That's a chlorophyll-a satellite picture on a single day. The picture changes from day to day, week to week, month to month, year to year.

5 MR THOMPSON: Okay. From that, I'm just trying to see if there's any bias in the distribution of krill.

DR COCKREM: That's a picture for chlorophyll-a, which is phytoplankton, the little plants.

10 MR THOMPSON: Yes, but you'd better give us a hint as to what else is ...

DR COCKREM: That was the picture on that day. There is published data from the 1980s where people went and surveyed the trawl. They surveyed for krill and other little zooplankton creatures. So there are some data from the 1980s showing on a particular occasion there was a high density here and a low density there.

15 The chlorophyll picture: it's striking when there are data and another report showing the average chlorophyll intensity around the New Zealand coast each year. In some years, it's really high in the whole Taranaki Bight; in other years, it's relatively low. So there's quite a variation from year to year and, indeed, Dr Torres mentioned earlier this morning, I think, that, did she say, from last year to this year there was a difference in the food availability?

20 MR THOMPSON: Yes. So there's nothing I can draw about the skewing towards the South Island or towards the Taranaki coast? I can't draw any inference from that?

25 MR SHAW: Not particularly.

MR THOMPSON: No.

30 DR COCKREM: There was one year, for example, where the average had a big, bright chlorophyll-a basically across the whole of the South Taranaki Bight from the North Island down to the South Island; another year, hardly any.

35 MR THOMPSON: Okay, all right, thank you. My next question relates to your depiction of light production, this picture here on page 10.

DR COCKREM: Right, yes.

40 MR THOMPSON: That, in fact, is a suspended solids concentration plot and I think it is as a consequence of mining-only. Is that right? That's just the mining-only?
DR COCKREM: It is. Actually, you're quite right. Sorry, I put that variation in model, reduction of light, at the second seabirds. So you're quite right, sorry about that. This is a suspended sediment figure. I was using it to illustrate variation from the --

MR THOMPSON: That's, all right. That's fine. So it's a surrogate, I guess.

DR COCKREM: Yes.

MR THOMPSON: That's without any background?

DR COCKREM: That's the additional ... Yes, the increment from mining but on top of quite a high number. The background would mean birds couldn't forage in that zone anyway. Is that correct? The background suspended solids would be much higher than the increment?

DR COCKREM: The increment would be constantly changing and the scale shows different degrees of suspended sediment and hence difference degrees of reduction in light intensity. That would be changing all the time.

MR THOMPSON: No, the point I'm trying to make is that the turquoise colour - the most extensive colour, I'm calling turquoise - that is 1 milligram per litre or less in terms of suspended solids concentration. That's on top of a number of 100 or 200 or higher as the baseline.

[1.25 pm]

DR COCKREM: I'm not an expert in sediments, but the point that I would make here is that for the birds what counts is visibility.

MR THOMPSON: No, I agree. I'm not disagreeing with you there. It's going into a surf zone and more.

DR COCKREM: The two key points here are one is the additional sediment over and above background. How much there is will change all the time.

MR THOMPSON: Correct.

DR COCKREM: Secondly, that more sediment will mean reduced visibility. Thirdly, we can't at any point say exactly how that would affect the birds. I think we can be sure that if the sediment was, for example, being blown onshore from a southerly wind over a number of days and the penguins had to go and forage or try to get much further out than they would otherwise, that would be an effect. I'm not sure if I'm answering your question.
MR THOMPSON: Not really. I'm trying to suggest that even without the mining they couldn't go and forage in that zone.

DR COCKREM: Little penguins are seen out at sea in the South Taranaki Bight. There are --

MR SHAW: We'll just pause for a second because I've got a distinct feeling that we're going at cross purposes.

MR THOMPSON: Yes, I haven't quite -- sorry.

MR SHAW: Ms McGarry is going to have a crack first and if that doesn't work, I'm going to have a more simple-minded crack.

MS McGARRY: I wonder if this diagram is actually a bit out of context because your heading says, "Variation in modelled reduction in light at seabed".

DR COCKREM: That is wrong.

MS McGARRY: Yes, because what you've got here are suspended sediment concentrations which then need to be transposed into the optical model before you would know the effect of that.

DR COCKREM: I was using this merely to illustrate changes from day to day without any comment on the magnitude of those changes.

MS McGARRY: Yes. I don't want to make you do it, but I think the way you've presented this to us, you just about need to withdraw that. The way it's labelled, it's very --

DR COCKREM: The label is wrong and I apologise for that. We could take that out, for sure.

MS McGARRY: If we just put a line through that table, you'd be happy with that because I think we're going to be here a while otherwise?

DR COCKREM: Yes.

MS McGARRY: Thank you.

MR SHAW: In fact it may be helpful to add because there were sequences for background-only, mining-derived only and mining-derived as an increment on top of the background. In our heads and our eyes, we're going to add those things because we've got that full suite of diagrams available. I think it'd be a good idea if you ensure that those are in the hands of Dr Cockrem so that he can make any comments he wishes to make.
DR COCKREM: I'm familiar with all of those.

MR SHAW: Good, that's fine.

DR COCKREM: The key one then is this one that I presented. I have labelled it correctly, "Reduction in light at seabed: average of modelling over two years".

MR SHAW: Yes, ones above. Yes, okay.

MR THOMPSON: Yes, it really does need to be in the context of the three. That's the background, the increment and the resulting.

DR COCKREM: That's what this reduction shows. It is the changes as a proportion of background.

MR SHAW: This is a matter of just ensuring completeness in terms of the point you're making.

DR COCKREM: Yes, quite.

MR SHAW: It doesn't alter --

DR COCKREM: I'm terribly embarrassed about that mislabelling. I'm sorry. It's not my normal style.

MR SHAW: Most of us will have suffered worse during this hearing, Dr Cockrem.

MR THOMPSON: What limit in terms of turbidity or in terms of suspended solids concentration would make it difficult for prions or penguins to forage?

DR COCKREM: There are no published observations that could enable us to answer that question.

MR THOMPSON: All right.

DR COCKREM: There was reference to a Port of Melbourne study. When I looked at the Port of Melbourne study, I could not find any information. The reference said that a Port of Melbourne study had used a particular number for gannets, cormorants and gulls or terns. None of those are the seabirds in the South Taranaki Bight. There's no published evidence to support it. There are no publications available that can enable us to answer your question.

MR THOMPSON: Okay, thank you. Finally, the South Taranaki Bight is host to some large colonies of seabirds but also visited by some threatened species.
Is there anything about the South Taranaki Bight that suggests that those threatened species are not able to grow and prosper? I’m trying to frame the question. Is there anything about the environment there that is fragile? Or is it quite robust, hence the prions and penguins being able to eke out a pretty good existence?

**DR COCKREM:** It’s a good question and if we put it in the bigger picture then we don’t know what’s there now but we do know there are many breeding prions, for example, on Stephens Island. There’s been some talk earlier this morning, mention of climate change. Across the world as a whole, it is projected that consequences of climate change will lead to, in many cases, reductions in seabird numbers. There’ll be changes in primary productivity, all sorts of things.

**MR SHAW:** It’s really the observation of numbers of birds that are part of a threatened species. What does that tell us about the environment? Is there no correlation between threatened species being around and the South Taranaki Bight as a good or a bad environment?

**DR COCKREM:** The fairy prion is classified as at risk, even though there are large numbers of them.

**MR THOMPSON:** At risk nationally/globally but not locally?

**DR COCKREM:** That’s the New Zealand threat classification scheme. There are species that we consider to be fine. There are species that are considered to be at risk and the little penguin and the fairy prion are both in that category. Then there are species that are threatened and then there are species that are endangered. So we have different levels of concern, if you like. Even though there are large numbers of fairy prions, DOC’s threat classification scheme considers them to be at risk.

With regard to a species that is threatened that uses the South Taranaki Bight, maybe it’s a species that breeds somewhere quite some distance away and the reasons that it is threatened are not related to what’s happening in the South Taranaki Bight. Whereas the prions, that’s their primary home. Some species of shearwaters: I’ve heard they’re remarkable. The sooty shearwaters fly all the way round the Pacific up to Alaska and back again. Fairy prions don’t do that; they live here all year round.

**MR THOMPSON:** Right, thank you.

**MR SHAW:** Mr Coates?

**MR COATES:** Good afternoon. You mentioned the New Zealand Coastal Policy Statement and cited policy 11, which is quite unequivocal. It says "avoid adverse effects of activities". There isn't any "as much as"
possible" or any other modifying words. Yet in your joint witness collaboration with Dr Thompson - in fact in his presentation he gave this morning - he says:

"For seabirds - these potential effects [that is, of the mining] are negligible due to high mobility and large ranges."

He's saying "negligible"; you're saying, "We don't know"; the Coastal Policy Statement is saying "avoid". There's some irreconcilable language here, is there not?

[1.35 pm]

DR COCKREM: I'm not a lawyer so this is beyond my area of expertise. I have just presented the statement and what to me logically follows from it. The question about foraging area and range: we've been talking about how for little penguins, particularly during the chick rearing stage, they can only go a certain distance in time to be able to come back and feed the chicks that day. If the area within that distance up to maybe 20 kilometres from the coast that foraging was reduced due to the turbidity in the water, then logically that might in fact lead to a reduction in breeding success which, to me, would be an adverse effect.

Similarly for the fairy prions, if the pattern of krill distribution, the density of krill is high in an area where there is high turbidity and the seabirds have to go somewhere else, if that happened at a particular time in the breeding season maybe that would have an impact.

To me - and this is the basis for me saying - we cannot predict the extent of the adverse effects. We just don't know, is my view.

MR COATES: No. For birds such as the blue penguin, do they normally forage straight out to sea or do they forage along the coast?

DR COCKREM: Down in Oamaru, we've done a lot of tracking of birds there. Little penguins have been tracked from some other New Zealand locations. They forage in water generally down to 20 or 30 metres deep because they often swim to the bottom. If they're at a location where the water becomes deep very quickly, they won't be going straight out to sea. They'll be following the area of relatively shallow water.

MR COATES: Blue penguins: what speed can they swim at and does that determine the range?

DR COCKREM: Several kilometres per hour. We have records from birds that are marked with a metal band, a flipper band, individually marked. Then when birds are found dead on beaches, the bands are sent back to DOC and so are collated. I got from the DOC banding office the records of
all the banding recoveries. So a bird was banded and we know it was banded in Auckland. The longest distance between banding and recovery was more than 900 kilometres for a little penguin in New Zealand.

We have no tracking data for little penguins in New Zealand during the winter, a little bit of data in Australia, tracking data in the winter, some birds travelling 500, 600, 700 kilometres during the winter. So they can range quite a long way in the winter. Their most limited foraging range is during chick rearing.

MR COATES: Finally, you talk about in your conclusion again the contravening of the Coastal Policy Statement but there are no sanctions if you contravene the Coastal Policy Statement, as I understand it.

DR COCKREM: I can't comment. That's not my area of expertise.

MR COATES: No. Thank you.

MR SHAW: Dr Cockrem, thinking about all the threats that you have identified to seabirds generally, but let's stick with penguins for the time being, if you were asked to calibrate the severity of those threats, those perils, what order would they run in? If we take deck strike and we take lights and we take all these other bits and bobs, for you what's the single biggest issue?

DR COCKREM: With respect to the matter under discussion with the mining proposal?

MR SHAW: Yes, which are seabirds. Yes.

DR COCKREM: The two key areas are the possibility of vessel strike and because so many thousands of birds have been seen in that area, we just don't know how many might be killed. I think the most important area of consideration is the reduction in foraging.

MR SHAW: That's the top of your list?

DR COCKREM: In my view, yes.

MR SHAW: Yes. No, that's fine. That's what I want to understand. I want to go from there, knowing what you know about the causes of mortality to this population. I accept the fact that you've said it's uncertain as to what these effects are going to be. What's the principal single impact, most important impact on the mortality of these animals?

[1.40 pm]

DR COCKREM: I think the key stage for --
MR SHAW: I'm talking about across the whole board, not just in terms of this proposal, but outside this proposal. What's the most important threat?

5 DR COCKREM: The most important threat to --

MR SHAW: You talk, for example, about dogs going into the nests and so on and so forth.

10 DR COCKREM: The most important threat to seabirds in New Zealand?

MR SHAW: Yes. Let's stick with the penguins for the minute, just as an example.

DR COCKREM: The most important threat to penguins in New Zealand right now are effects of human activities.

15 MR SHAW: Right. Yes, but that's a big range.

DR COCKREM: Yes. That is with regard to predation by dogs, disturbance at nesting sites.

20 MR SHAW: Yes. Fishing?

DR COCKREM: We have very little evidence for effects of fishing on little penguins.

25 MR SHAW: Okay.

DR COCKREM: Indeed, over in Australia where they have a lot of little penguins - they call them fairy penguins there - there also they consider that fishing does not have a significant (overspeaking)

30 MR SHAW: Okay, that's cool. What I'm trying to do is just understand because when we're talking about negligible threats or unknown threats, I'm trying, if you like, to explore with you the extent of the unknown. If we look at this proposal and we compare it with all the other threats to these creatures, how does the individual and the total of those threats compare with other threats such as dogs and so on?

35 DR COCKREM: If you take the South Taranaki down the Whanganui coast for discussion purposes, the locations where little penguins are presently found now will be locations that are hanging on, if you like. They must be okay because if there were dogs there, the birds wouldn't be there. For those birds, the potential reduction in foraging then that would be of much greater relative importance as a threat than what is happening on land.

40 MR SHAW: Okay. If we go to this question of the impact on foraging - and this is something I'm really keen to explore with you a little further - one of
the things that Dr Thompson said that stuck in my mind when he was talking about foraging and birds having to travel further or go somewhere else, whether it's further or closer, in order to find food, and he said something that amounted to be the failure to persist in the hunt for food is a recipe for extinction.

I think he was making a general point about animals and birds generally. You'd agree with that; that the whole thing about resilience and the ability to survive is this question of persistence? We don't give up.

DR COCKREM: Birds, like other animals, they have to feed. Yes, that's what they do (overspeaking)

MR SHAW: Yes (overspeaking). So when you look at the examples you've given around, for example, when there's food shortages in the Marlborough Sounds and these birds travel very long distances - and I accept the fact that it would be greatly elevated - would that have been the case before there were manmade impacts on these creatures and the supply of food?

DR COCKREM: We can only speculate as to what would have been the case 50 or 100 years ago with regard to food availability.

MR SHAW: There would be no data, no information at all on that?

DR COCKREM: That's the case, yes. I'm hesitant to speculate on what might have been the situation 50 years ago.

MR SHAW: Okay, that's fine. In terms of those occasions when they do leave in very large numbers and you talked to us about that. You were talking about the work of your colleague who was working with one colleague and they all went away.

DR COCKREM: Right, yes.

MR SHAW: Every now and again, there'd be something in terms of the turbidity in terms of the food supply and they all went away. How many come back?

DR COCKREM: That's happening during the winter, not during the breeding season. There were a couple of occasions in Oamaru actually just last year when quite a proportion never made it back again.

MR SHAW: Okay, and that's what I'm wanting to understand, is how these events over time are going to affect the population at large.

[1.45 pm]
DR COCKREM: There are some years at Oamaru where we have such wonderful data when the survival from year to year is quite high. There are other years when it's relatively low and that's in our best colony at Oamaru.

MR SHAW: Okay, and if you look at the South Taranaki Bight back there for a moment, some of the issues that you identify as being threats to these animals are here to a lesser degree in the bight already. I'm talking about if not vessels then platforms and so forth for oil and so on. Do the records tell you what the impact of those structures, both during the construction phase and during the operational phase, have had on those overall populations in the bight and more broadly?

DR COCKREM: I'm not aware of any such information.

MR SHAW: Okay, that's cool. Thank you. No more questions from me at the moment. Ms McGarry?

MS McGARRY: Thank you, Dr Cockrem. I'm looking at your evidence here for a couple and then I'll do some more general ones. In paragraph 7.2 of your evidence, you talked about the ecosystem goods and services value of New Zealand's EEZ zone. I just want to understand behind those figures that you've quoted there. Would that include a fisheries value, for example?

DR COCKREM: This concept of ecosystem, goods and services, it includes a very wide range of variables, yes, both relatively tangible - such as fisheries - and others that are more intangible.

MS McGARRY: So it includes things like recreational value? We're at now EEZ so there's probably not a lot out there, but when you mean intangibles, give us an example.

DR COCKREM: This notion - and it's an international concept - puts monetary numbers on some of those intangible values, yes. This is not my area of expertise but that's the approach that is taken so that it would include value of the fisheries. It's trying to note that for fisheries, for example, then the fish that are caught, there's a value to it going all the way back to the primary production that leads into that.

MS McGARRY: Thank you. In paragraph 7.3, you talk about the ecotourism for penguins, for example, at Oamaru. The question is: are there any sites along the Taranaki Bight that would be comparable to that that potentially have ecotourism potential in the future like Oamaru?

DR COCKREM: Very much so. It happens to be an area that I'm exploring at the moment, development of site a site perhaps at Port Taranaki.
MS McGARRY: Thank you. In your summary on page 4, you've got there the data from the penguins foraging and there's a shaded area underneath the foraging trips. I just wonder if that represents anything.

5 DR COCKREM: Sorry, which pages?

MS McGARRY: Page 4, the bottom diagram of the foraging trips of the blue penguins and there's an underlying shaded area across to Taranaki Bight.

10 DR COCKREM: Is that this one?

MS McGARRY: Yes.

DR COCKREM: Around the Marlborough Sound and to the north there's a shaded triangle and then there's another shaded, roughly, triangle off the coast of Hawera. Is that the shading you're referring to?

MS McGARRY: Yes, and then there's a wider shading, isn't there?

20 DR COCKREM: Then there's a wider shading. The two degrees of shading, they represent a modelling function for the extent to which the birds use different areas. It's a representation of there was a relatively high degree of use in the triangle north of the Sounds and then another relatively high degree of use in that approximately triangular area off the coast of Hawera. So there was some mathematical modelling that is in that publication.

[1.50 pm]

30 MS McGARRY: Thank you. To try and get an idea - and I think you've been asked a question already - about the ship strike, the kind of magnitude of what you're thinking there, are you talking about mass events? So in other words you're talking about seeing large flocks of 20,000 birds. Is there a potential there for mass mortality?

35 DR COCKREM: I think there is a potential, given that there was a sighting of so many tens of thousands of birds there on one occasion. Dr Thompson mentioned conditions of a misty night. It would be impossible to have no lights whatsoever on a vessel; that just couldn't happen. If you've got a large number of birds even with a relatively small amount of light, there is a possibility, we just don't know, for considerable numbers of birds to impact the vessel.

40 If this was off a different area of coast where there are far fewer seabirds, then that potential would be less. But this is an area where we know there have been sightings of many birds.
MS McGARRY: Thank you. In terms of the risk to penguins from being attracted to OMV at night - a similar question was posed to Dr Thompson - is it something that can be mitigated?

5 DR COCKREM: That possibility of penguins being attracted to the mining vessel is not one that I had considered and I think it would be quite unlikely actually. We've heard about how much noise there would be. A bird flies at considerable speed. I can't imagine a penguin swimming towards an extremely noisy vessel so I don't think that would be an issue at all.

10 MS McGARRY: What is your opinion of the standard measures, as agreed to by DOC and referred to by Dr Thompson before? Have you had a look at what those standard measures are?

15 DR COCKREM: In relation to the EMP, the Environment Monitoring Plan or Programme? Is that what you're referring to?

MS McGARRY: Yes, I think those are the standard measures.

20 DR COCKREM: When I looked at it, I could find no mention of seabirds. That is my recollection. I could not see anything about seabirds but maybe I missed it.

25 MS McGARRY: In terms of the effects on visibility in foraging, is there a certain set of environmental conditions that you think are a higher risk than others? For example, when environmental conditions are taking the plume offshore as opposed to perhaps onshore. Is there a particular set of conditions that you think are higher risk for birds?

30 DR COCKREM: For the birds, little penguins, nesting along the South Taranaki/the Whanganui coast, when the plume was in their vicinity then they would be at most risk. For the fairy prions that feed across the whole area, it's not a particular area for the prions in particular. It would be when the plume coincides with an area of relatively high food availability. If you have a plume here and there's a lot of krill here, then the birds would be fine. When those two coincide and there's hardly any krill anywhere else, when they coincide then it would not be fine for the birds. I can't say anything absolute in answer to your question.

35 MS McGARRY: Thank you. You've talked about starvation events and that they've been documented through your studies. Am I right in assuming those would be linked to those climatic factors as described by Dr Torres this morning?

40 DR COCKREM: Yes, the starvation, that's when there'd be periods of insufficient food availability.
MS McGARRY: She talked about climatic factors. I think she talked about when sea temperatures are higher and we're not getting the same nutrients coming up from down deep and that has knock-on effects for the whole primary production. That would be a similar cycle you'd see between the blue whales and I'm just thinking they all rely on krill.

[1.55 pm]

DR COCKREM: I would imagine so. There'll be some times when a reduction in food availability would not have a significant impact on birds and other times when it would. The times when it would have the most impact would be when the birds were challenged to find food anyway. The effect on the birds would be potentially greater in bad years for the birds than in good years. Over time, then this - we don't know - could lead to a decline in the population in essence if the average breeding success over a number of years is decreased.

MS McGARRY: I was looking for areas of agreement with Dr Thompson and I see there were ten potentially threatened species that were agreed upon. Then I went back to your evidence and you said 12.

DR COCKREM: We didn't talk about a particular number and Dr Thompson said here, number 6(b):

"The experts agreed that a number of 'threatened' and 'at risk' taxa ... occur ..."

MS McGARRY: Okay, so we'll say 10 - 12. My question to you though is: you think there's more threatened species that could potentially be in the area?

DR COCKREM: My understanding from Dr Thompson is that he also considers that to be the case.

MS McGARRY: What kind of number are we talking about here? I'm not saying an exact number, but are you talking about two or three additional threatened species or are you talking a significant number of other species?

DR COCKREM: My recollection from Dr Thompson is that he has a table with 40 or more species of birds that might occur in the area. I don't recall, I'm sorry, how many on that list were threatened and how many were at risk.

MS McGARRY: At risk, yes, okay. You said your difference in view really related to the level of uncertainty here. I guess what you're saying to us is that you don't have enough information to be confident in coming to a conclusion that any potential effect would be minor or negligible. Is that right?
DR COCKREM: That is correct. I'm not saying there'll be a major effect. I'm not saying there'll be a minor effect. I'm saying we cannot --

5  MS McGARRY: Just don't know.

DR COCKREM: Yes.

10 MS McGARRY: Would you agree with Dr Thompson when he said that the penguin population at risk from the application would be less than 5%?

DR COCKREM: I would not agree with that statement because we do not know how many little penguins there are in New Zealand and we do not know how many little penguins live along the South Taranaki coast. We don't know how many little penguins live in the Marlborough Sounds. I don't think we can say because of lack of evidence what proportion might be living in the area.

15 MS McGARRY: Do you agree with Dr Thompson that a systematic survey of the South Taranaki Bight would be no trivial exercise? I think that's what his words were.

DR COCKREM: In terms of information about the birds in the South Taranaki Bight then, yes, for us to have a good understanding of the birds in the area you would need regular surveys right through the year over a number of years. The picture in one year may be different to the picture in another year.

20 Also I mention this somewhere in one of my documents, maybe in our expert witness; that in order to understand the situation there, we would also need to understand the pattern of breeding success over a number of years of the prions on Stephens Island; penguins, the Marlborough Sounds; penguins living along the South Taranaki coast. The number of birds seen in one year or in a couple of years doesn't tell you about breeding success and doesn't tell you the medium-term picture.

25 MS McGARRY: Yes. My final question: we're charged on this side of the table to consider whether we've got the best available information. In considering that, we've got to consider the reasonableness and the cost of seeking further information. Do you think that the kind of systematic survey that you're suggesting is unreasonable?

30 [2.00 pm]

35 DR COCKREM: Is this a question from my personal view? I'm here to provide my professional view but not my personal one.
MS McGARRY: This is a professional question because you know what's involved in a systematic survey.

DR COCKREM: Right.

MS McGARRY: We don't, and you probably have an idea of the cost as well.

DR COCKREM: Okay. My professional view is that I believe this is an important matter. I believe that if the sand mining were to proceed, we don't know what the consequences would be for seabirds. My understanding is that this would be an activity in which large sums of money were involved. My answer to your question then is that, given the importance of it, then the spending of a significant sum on seabird surveys would be justified.

MS McGARRY: I think Mr Holm would probably say that the information you're seeking could be gathered in the baseline survey in the BMP phase before the activity began. Your view: is that the right timing or the right order of things?

DR COCKREM: What has been proposed as a two-year period: my view - and I'll tell you why - is that that would be much too short. Because there are such differences from year to year in the productivity of the South Taranaki Bight, you may have two good years and then the next year would be a bad year. You may have two bad years and then a good year. Two years would not be sufficient to give you a reliable baseline upon which to determine whether there were any subsequent changes.

MS McGARRY: I think Professor Slooten in answer some of the questions with regard to marine mammals said three years because then at least you get to see if you've got an outlier year. Is three years a more reasonable timeframe?

DR COCKREM: Three years is more than two; three years is less than five. "Reasonable" is, I think, subjective and so I can't comment on that.

MS McGARRY: In your view - this is your opinion - three years is still not enough. Is that what you're saying?

DR COCKREM: It is based on looking at the average chlorophyll concentration around the New Zealand coast from year to year. Then three years is not sufficient to give a representation of good years and bad years.

MS McGARRY: Okay, thank you.

MR SHAW: Professor Cockrem, we'll now just move to questions from other parties and that will be followed by re-examination, for want of a better term, by Ms Haazen on behalf of Greenpeace and KASM.
We'll start with questions from Mr Dawson, who's representing Fisheries' interests: the 2009 recorded foraging trips by little penguins appear to support the proposition the South Taranaki Bight is a productive source of food. Do you know what species they target for food?

DR COCKREM: Little penguins, they do feed to some extent on krill. They feed primarily on small fishes.

MR SHAW: Okay, and the second question from Mr Dawson: do you have any information on seabird mortality through bird strikes on the Kupe platform?

It was a question I think I put to you as well.

DR COCKREM: I have wondered about that myself and I do not have any such information and I'm not aware of any. I'm very familiar with New Zealand bird literature. There are no publications that I'm aware of on seabird mortality at offshore structures. That's not to say that the information isn't available but I haven't seen any published (overspeaking)

MR SHAW: This is not a question. I'm pretty sure that there are some protocols in place in respect of reporting to DOC incidences of mortality associated with endangered or threatened species. That's something I think we can follow up and just see whether they have received anything from the operators of wellhead platforms.

From Mr Holm, representing the applicant: with reference to the "Cook Strait Bird and Biodiversity Area (the IBA)" on page 1 of your statement, can you confirm that the area or IBA is produced by the Royal Forest and Bird Society?

DR COCKREM: I can.

[2.05 pm]

MR SHAW: Yes. Can you confirm that it has no legal or other form of government decision-making status for conservation of birds?

DR COCKREM: No, I'm not sure of that.

MR SHAW: Okay. At what level of suspended sediment in the waters of the South Taranaki Bight would penguins avoid the area?

DR COCKREM: There is no published information that would allow us to answer that question.
MR SHAW: You're not going to make a best guess either?

DR COCKREM: No.

MR SHAW: No, okay. Have you read proposed condition 10 which is proffered by the applicant, Seabird Effects Mitigation and Management Plan, the SEMMP - God save us from acronyms in this business - prepared in consultation with DOC? And if so, what is your view of the safeguards proposed for seabirds?

So let's start. Have you read the proposed condition?

DR COCKREM: I have read that plan, yes.

MR SHAW: Yes, and your view of the safeguards that are proposed in that condition?

DR COCKREM: I don't have it with me. I don't know what number 10 said. My view of that was that the first important point in there was that in essence it appeared to be making provision to record seabird deaths due to bird strike on the vessel. There was no mention in there that I recall of consideration of any threshold, so how many seabird deaths would be acceptable and acceptable to whom.

Sorry, can you repeat the question?

MR SHAW: The question is: what is your view of the safeguards proposed?

DR COCKREM: My view is that they would not be adequate and there was no mention in there of effects on breeding success, effects of the plume and how one would determine whether or not there were any such effects.

MR SHAW: Okay. I'm going to just ask a question of my own here, leading on from that. If you were invited to draft a condition, bearing in mind that conditions are not intended ever to prohibit an activity but to manage effects, would you be able to write a condition that you think would provide adequate safeguards?

DR COCKREM: You said a moment ago that a condition would not prohibit an activity.

MR SHAW: That's one of the things. You can't impose conditions that have the effect of prohibiting an activity.

DR COCKREM: This is not my area of expertise. Does that mean regardless of how many dead seabirds occurred that there would be no cut-off point at which --
MR SHAW: No, it doesn't mean that at all. What it means is really you can't -- look, it doesn't matter. I just wondered if you did have an idea as to how to frame a condition that would provide adequate safeguards.

DR COCKREM: I do not believe that adequate safeguards could be provided.

MR SHAW: That's what I was wanting to understand, was your attitude towards that.

All right, I think that is it from me. We have Ms Haazen who's going to follow up with any questions arising from these.

MS HAAZEN: No, there's no follow-up.

MR SHAW: No follow-up. Thank you. Thank you, Dr Cockrem. That was a very good session with you, very interesting. Thank you.

Mr Dawson, you've provided us with the written responses of your witnesses to questions that were posed by others.

MR DAWSON: Yes, sir.

MR SHAW: I presume that it's not your intention that we deal with those orally?

MR DAWSON: No, unless you wish to, sir.

MR SHAW: No.

MR DAWSON: But there may be some questions that arise.

MR SHAW: That's fine and that's absolutely the best way to deal with it, I think. Mr Dawson --

MS McGARRY: Have we all got that?

MR SHAW: I hope so. I think that we certainly got one. Can you check? Gen, can you check that everybody has had access to this memorandum from Mr Dawson? I think that Ms McGarry has not and I've got one which is incomplete, which otherwise I would pass to ...

MS McGARRY: Did they get left on the (overspeaking)

MR SHAW: No? You've not got it?

MS McGARRY: (overspeaking)
MR SHAW: We'll just take five minutes so that they can be distributed because I think we'll be better to start when everybody has that in their hands, Mr Dawson.

5 MR DAWSON: No, that's fine, sir.

MR SHAW: Okay.

[2.10 pm]

10 MR DAWSON: There are couple of housekeeping matters that I'd like to address in the meantime.

MR SHAW: Go, yes.

15 MR DAWSON: Sir, I would ask if we can just change the batting order of the Fisheries submitters' witnesses. Dr Helson who's billed to speak late in the day has got commitments in Auckland tomorrow and if we run over, that might place him in a difficulty. Would you have any objection to him speaking first?

MR SHAW: I haven't and I doubt whether members of the Committee have. Is there any issues around evidence being adduced before other experts are here? There is no answer. No problem, Mr Dawson, so yes, you can order things as you wish.

20 MR DAWSON: Thank you, sir. The second issue that I thought I'd raise is regarding the proposal that plume modelling be redone. I'm at a disadvantage here in that I wasn't here this morning when the DMC dealt with that.

25 Could you perhaps update me as to where you've got to with it and then (overspeaking)

MR SHAW: Certainly, yes. Where we've got to is this. I don't think you were here at the time that this question was pursued.

30 MR DAWSON: No.

35 MR SHAW: A number of submitters essentially said, "Well, you're dealing with averages. That's not good enough. What happens in the worst possible case or the worst-case scenario?" In the absence of sensitivity analysis having been done, we raised with the witness who was then on the stand who I think in memory was Mr Dearnaley, I think, Dr Dearnaley, and we raised with him the question as to how practical the modelling of a worst-case scenario might be. He said he didn't think it was a major issue. Obviously, there'll be expense attached to it but that it would be possible to do that within sufficient time for it to be value to the Committee.
There was then a discussion as to whether or not Drs James and MacDiarmid could join a reconvened caucus of experts on the sediment plume modelling. The DMC considered that overnight and the answer was no. The answer was that that remodelling would be attended to or developed by the people who had originally been assigned to the sediment plume and had signed the earlier joint witness statement in that area. Clearly, there would be both from the applicant and from submitters people who’ve had a considerable interest in exploring the implications of any remodelling that dealt with the worst-case scenario. We don't have a timeframe for that at the moment but I think that's a fair summary of where we're at, Mr Holm.

MR HOLM: That's correct, sir, and we're going to get those parameters to everybody, including the panel --

MR SHAW: That's right, yes.

MR HOLM: -- and then move on to the modelling.

MR SHAW: Yes, so you'll get that, Mr Dawson. Ms Haazen, have I missed anything out from your perspective?

MS HAAZEN: Only that submitters have an opportunity to feed in to those parameters.

MR SHAW: Okay, after the event.

MR DAWSON: Sir, at the risk of exhuming this particular corpse, could I just raise an issue that occurred to me on behalf of the Fisheries submitters? That is that it's quite important for us to determine what those parameters would look like because it could be --

MR SHAW: Mr Dawson, it's really simple here. If you had an expert at the sediment plume conferencing, the answer is yes, you can; if you didn't, you don't because we're looking for consistency in terms of the people who are involved in the first exercise. The same minds are applied to the same problems and that the question of effects that follows from that can be addressed by whomsoever.

MR DAWSON: Sir, we did have an expert at that conferencing.

MR SHAW: Then if you had an expert at that conferencing, he or she, and I can't remember who it was --

MR DAWSON: It's Dr Jorissen.

MR SHAW: He, who we have not yet made contact with incidentally --

MR DAWSON: No.
MR SHAW: -- he will be involved.

MR DAWSON: Yes, sir. The concern that I'd raise is that whether this isn't something that the applicant should have attended to right at the outset.

MR SHAW: Okay, I'm going to answer that very, very quickly. We are charged with getting the best possible information. We are not charged with, as you might in many other proceedings, deciding a matter on the facts as they are presented at the beginning. That's not the situation.

[2.15 pm]

We will be asking parties to develop arguments and provide further information as we require it. That's not only what we're allowed to do; it's what we are expected to do and it's what we're going to do. So don't expect it to be the last occasion, Mr Dawson. It'll be one of many.

MR DAWSON: No, sir, I understand and appreciate that and I'm not trying to circumscribe your discretion in any way. The point that I would just raise is the fact that this will possibly have a cascade effect through the other experts that are giving evidence in that they rely in many cases on the findings of that particular --

MR SHAW: It may very well have that effect and that's why they will be invited as they see fit and as their principals see fit to comment on the implications of that remodelling. Bear in mind that that question of modelling a worst-case scenario arose not from the applicant, not from the Committee. In the first instance, the impetus came from submitters in opposition.

MR DAWSON: Yes, sir. No, that clarifies it. Thank you very much, sir.

MR SHAW: It was about a deficit in information. Ms Haazen?

MS HAAZEN: Sorry, just your comment before, "after the event", with regard to parameters. I'm wary though those parameters shouldn't necessarily be driven by counsel but more by the caucusing of the experts. Is that correct?

MR SHAW: It will be.

MS HAAZEN: Yes.

MR SHAW: You can have an input. You can have a crack at advising them, but they're going to be making those decisions, doing the design.

MS HAAZEN: Yes.
MR SHAW: There are some parameters in place just simply because of the realities of the operation.

MS HAAZEN: Yes, I understand that component. Yes.

MR SHAW: So for example, the operational and profit condition. Those remain static because they were part of the original assumptions. Okay?

MR DAWSON: Yes, sir.

MR SHAW: Ms Haazen, you're on board with what I've just stated?

MS HAAZEN: Yes, sir. I understand.

MR SHAW: Mr Dawson, you're okay?

MR DAWSON: Understand.

MR SHAW: Understand where we are?

MR DAWSON: I do.

MR SHAW: Excellent and there will be a minute issued very, very shortly which will be in people's hands. The point really is to make sure that we want information consistent in terms of the assumptions and presentations by the people, the same brains that did the initial modelling. Otherwise, there'll be variations that may be problematic. But where everybody has a chance to comment on the implications of that remodelling. That's the purpose of the exercise.

MR DAWSON: Understood, sir.

MR SHAW: It is very much an open book process. Okay? Mr Dawson, I think it is your turn.

MR DAWSON: I have my day in the sun.

MR SHAW: You should feel refreshed, having been away from here for so long, Mr Dawson, that you -- sorry? There is a memo coming, yes.

MR DAWSON: Yes, sir.

MR SHAW: I don't think it's quite ready yet but I can't imagine it is very far away. Yes, Mr Dawson.
MR DAWSON: One further housekeeping matter. We received the expert evidence of Don Robertson this morning. I don't think it's been posted on the website but we picked it up at the back of the room.

MR SHAW: Yes.

MR DAWSON: Dr Helson has had a chance to read that so if you think it's appropriate, he will comment orally on some of the aspects that are raised.

MR SHAW: That's fine. We'll be putting things to him, I imagine, as well arising from other briefs of evidence we've received. So that's fine.

MR DAWSON: Thank you, sir.

MR SHAW: All right. We're in your hands, Mr Dawson. Who are we seeing first?

MR DAWSON: Dr Helson, if you could come up.

MR SHAW: Dr Helson, thank you.

[2.20 pm]

MR DAWSON: He has prepared a PowerPoint presentation and I think copies have already been provided to the staff. So if they could just hand that out.

MR SHAW: Dr Helson, I would like you to begin by introducing yourself, qualifying yourself. Away you go.

DR HELSON: My name is Jeremy Helson. I have a Bachelor of Science with Honours and a PhD in zoology, specialising in marine ecology. I also have a degree in law and I've been a postdoctoral fellow at Tokyo University of Fisheries. I've spent a small amount of time as a lecturer in marine ecology and also as a consultant marine biologist.

Quite apart from my academic qualifications, I think what also qualifies me to speak on this matter is that I spent ten years working for the Ministry of Fisheries and the Ministry for Primary Industries as an active fisheries manager. Most recently for the government, I was the grounds manager of deep-water fisheries. That involved providing advice to various ministers on setting catch limits, setting values, regulatory and legislative changes to various legislation and also working with other senior government officials on a variety of aspects of marine management. So it's that practical experience as well that I bring to this.

MR SHAW: Dr Helson, I'm going to ask you some questions before you start around this question. You know that there was some debate earlier in the
process around the eligibility for people who were employees of parties being recognised as experts for the purposes of conferencing.

DR HELSON: Yes.

MR SHAW: I want to ask you a quite serious question. No one's doubting your experience, no one's doubting your history as a scholar, but there's two things I do want to ask you about.

The first one, I think, is the easier issue and that is how current in terms of the question of your science is. Are you still engaged in that activity?

DR HELSON: Not actively. So I'm not an active scientist. My previous roles have been as a fisheries manager and whilst that has a science component, as much as a science component there is a component around economics and about the regulatory environment and about the operational activity of fisheries. Fisheries isn't in my view a scientific pursuit; it's a multidisciplinary pursuit.

MR SHAW: You've made that point repeatedly in, I think, most of the things you've had to say to the Committee at various stages.

I want to go to the question of your current employment. I don't think anyone doubts, as I say, your expertise historically and no one doubts your experience. What I want to understand is the extent to which you are able to step out of your role as a chief executive officer. I sit, as have others on this side of the table, on boards. The chief executive speaks for an organisation, not for him or herself. You've talked about you recognise that there are issues of weighting will be given to your evidence.

DR HELSON: I do appreciate that there is a tension there. Clearly, I have made a submission on behalf of Fisheries Inshore New Zealand in opposition to this application. So that is out there and it's something that you obviously should be cognisant of. I do believe that I am able to bring an objective viewpoint to the evidence that has been proffered by myself and others.

MR SHAW: Yes and I must say, Dr Helson, none of these questions go to issues of integrity. That's not the question. The question that simply was at stake in the first instance was what forum that evidence is best given because certainly you're in a better position than many to give evidence on matters of fact. We've had the conversation, you've made the choice as to where you're going to appear, and that's fine. So on that basis, we'll invite you to begin, but I think I owed you the courtesy of explaining some of the issues that were on the mind of the Committee.

DR HELSON: No. Very good. Thank you.
MR SHAW: Dr Helson, over to you.

DR HELSON: Thank you. As Mr Dawson said, I've just prepared a short presentation just to guide yourselves and myself through the evidence that I'll give today. The structure of that is in three parts. Primarily, I want to give a very short summary of my primary evidence. I want to touch upon some of the salient points that came out of the expert conferencing last week and also touch upon some other matters that I've addressed both in my brief of evidence and also as a consequence of the expert caucusing and other evidence that's been led.

[2.25 pm]

The first section of my evidence is contextual. I'll take it as read but I just think it's important to provide some scene setting about the New Zealand seafood industry. It is an important revenue earner, from exports primarily. It's a large employer, particularly in the regions. Specifically with respect to this matter, inshore finfish is a reasonably important component of the seafood industry.

You'll have also had evidence from legal counsel about the quota management system. It's a complicated beast and some of the complexities of that have become apparent in some of the debate among the experts that we'll probably touch upon later on. In the most simple terms, the quota management system sets sustainable catch limits for all stocks that are in the QMS. There's catching rights that are established. These are established in perpetuity. They're fully transferable, very secure rights, and it's generally accepted internationally that the quota management system is a very good management tool.

It's also very useful to touch upon the Treaty settlement as well and no doubt you'll be hearing more evidence about this from other submitters so I'll step through it very quickly. That settlement was between the Crown and all iwi and quota shares are the currency of that settlement. Anything that undermines the value of a quota undermines the value of that settlement as well. That just provides a little bit of context.

Really, the key issue at hand here is the impact assessment that has been provided by the applicant. The references in brackets are to the paragraph numbers in my brief of evidence. It's important to note that the seafood sector is made up of a number of entities, both quota owners, vessel owners and licensed fish receivers. There's oftentimes quite complex contractual arrangements between all these players and that really goes to the core of what a fishery is.
My view is that TTR's assessment of the impacts on fishing is a little simplistic. What it does is adopts what I have called a "numerator/denominator" approach. They've tried to establish a numerator by looking at the distribution of fish and where that might overlap with the sediment plume and then they've used that as a numerator. Then they've had a look at the denominator, saying, "Well, out of the fish distribution, is this a bigger percentage or a smaller percentage?" That in a nutshell is a summary of their approach to looking at the assessment of impacts on fisheries.

I personally have a number of concerns about that, actually not personally; professionally. I want to talk a little bit about my concerns about the numerator that they've used and also the denominator that they've used.

My overriding view when looking at the reports, particularly report 18 from NIWA, it's based on the distribution of fish. It talks about fish almost exclusively. It doesn't talk about fisheries and I think that whilst that is quite a subtle difference linguistically, it's actually an incredibly important distinction when we're talking about the effects on fisheries.

NIWA analysis looked at primarily biological considerations. It looked at the distribution of fish and tried to make a judgement as to whether that was a significant effect or not. My concern is that the nature of fisheries themselves haven't been considered in report 18 or the other evidence that's been provided. That's because fisheries are an economic activity. They're an activity that happens in the water pursuant to a whole lot of different constraints. Of course, the availability of fish is an actual precursor to a fishery, but it's certainly not the only component of a fishery. We'll come back to that particular point when we look at the expert conferencing.

[2.30 pm]

The analysis used an avoidance threshold of 2 milligrams per litre. That's been discussed a number of times during the course of the last few days. I'd make the point that that is caveated by the view that it's likely to be species-specific. Whilst 2 milligrams might be a sensible limit for some species, there will be other species that can tolerate higher suspended sediment concentrations and others that can withstand only fractions of that.

That again goes to the effect on fisheries when we delve in a little deeper, primarily because the changes in fish distribution have different changes on the activity of fishing. Catching costs might increase if fish distribution changes and Dr Robertson made some points about that in his brief of evidence that I think we'll return to later on. That's the numerator, if you like.
I also had some concerns about the nature of the study area that was used in report 18 and that's the figure on the left that I provided in my evidence. The study area is somewhat arbitrary. From a fisheries management point of view, it doesn't make sense to use a denominator that crosses over a QMA or an FMA boundary. What that is essentially doing is not taking into account the legal and administrative boundaries that are in place, and those boundaries are the important boundaries from a fisheries management point of view.

That's just illustrative of a lack of consideration of fisheries management effects in the assessment as opposed to consideration of biological effects. It's actually unlawful if you've got quota to fish in one area and report it from another. From a fisheries management point of view, that should have been taken into account when thinking about the range of a fishery.

Naturally enough, Mr Dawson talked about cascading effects and I think this is an example.

MR SHAW: Could I just interrupt you there with one question, Dr Helson?

DR HELSON: Yes.

MR SHAW: Your point is well made and accepted. It's an impact on existing interests rather than anything else, isn't it?

DR HELSON: Precisely what's an impact on existing interests?

MR SHAW: The consequence that follows from having the broader fishery spread over the two fishing management areas.

DR HELSON: It overestimates the impact if you're using a simple --

MR SHAW: That's what I meant, but the impact is the impact on existing interests?

DR HELSON: That's right in a global sense.

MR SHAW: In a global sense. No, I understand that. That's fine. I wanted to be clear what bucket, if you like, it was being put in.

DR HELSON: Yes, it might also be useful to clarify the difference between FMAs and QMAs. I think sometimes the --

MR SHAW: We, I think, are pretty clear about that.

DR HELSON: Okay, good. As a consequence of the NIWA report 18 that said there would be a negligible impact on fisheries, the economic analysis was
conducted. It simply didn't occur. The assumption was that there was a negligible impact so as a consequence there doesn't need to be any economic analysis conducted. There was a brief description of the fishery in that economic analysis but that, I think, is quite insufficient for current purposes.

Those are just the salient points I wanted to touch on from my brief of evidence. I'm obviously happy to take questions on any other aspects of it.

MR SHAW: All right. Keep going.

DR HELSON: Yes, I want to turn now to the expert conferencing because the key things that were discussed in that expert conferencing relate to the matters here.

MR SHAW: Do you think it'd be best to get that out of the way before we ask you questions on your brief of evidence as well?

DR HELSON: I think so, yes.

MR SHAW: Okay, that's cool. You're the ...

DR HELSON: With respect to those key findings from the expert conferencing, obviously we didn't have the opportunity or the expertise to look at effects on recreational or customary fisheries. I don't know if that's going to be provided to you through some other avenue.

[2.35 pm]

MR SHAW: I will interrupt there. Most of the iwi submitters will be seen in New Plymouth. We will be seeing the collective views of the organisations, the Māori fisheries people here. That was to have been yesterday; I think they've now been bumped. The recreational fishing effort and the assessment of consequences of that is largely in the hands of submitters who, again, I think we're going to be seeing in New Plymouth. Certainly, most of them are located in New Plymouth so that's the point at which those are most likely to be addressed in depth.

DR HELSON: Okay. I'm mindful that the expert conferencing was billed as effects on commercial, recreational and customary and we only considered commercial.

MR SHAW: If we have to, we'll have to get you to talk to each other again.

DR HELSON: Okay. Two points that I'd just like to draw out from the agreement that was reached with the other experts in the conferencing. That was that we all agree that:

Westpac Stadium Function Centre, Wellington 22.02.17
"A fishery is a combination of a biological resources to exploit economic investment, fishing technology and knowledge, rules, regulations ..."

We all acknowledge that a fishery is a multidisciplinary pursuit as opposed to simply a biological one.

It was agreed that NIWA wasn't commissioned by TTR to explore things other than the biological effects. They weren't asked to, nor did they, identify persons or groups with an interest or the potential effects on those persons. That just illustrates the point that it was primarily or almost exclusively a biological exercise.

We've probably traversed the next point enough about the distinction between quota management areas 7 and 8. As you'll see, that was an agreed position around that piece of analysis; that it should more appropriately have considered a different area.

The key point that remained of disagreement was whether assessing biological impacts alone is sufficient to determine the impact of the proposed mining operation on fisheries in the area. A number of the experts considered that looking solely at fish was sufficient if one determined that the effect was small and then you did not have to go on and consider the other components of the fishery.

My view is that looking at the effects on fish is the right place to start or a place to start, an appropriate place to start, but that needs to be taken further. You need to understand the nature of the fisheries in that area and how any reductions on the availability of fish would have an impact on the fishery. That needs more detailed analysis and that wasn't done. So that remains the key point of disagreement among the experts at the present time.

Another component of the evidence I've provided is around uncertainty, and I think you've dealt with this in the last couple of days with experts in those fields. I don't intend to dwell on it, but certainly there's some uncertainty about the plume. There is some uncertainty about the effects of primary productivity and those, of course, flow on to potential effects on fisheries.

I think Mr Dawson made the point in his opening remarks that should there be an agreement from experts that the plume modelling is different, then obviously there might be different effects on the fishery that we would have to consider.

A related point is the averaging of effects over the SMD. Again, you've touched on this and a number of experts on Monday and Tuesday said
that they thought that was okay from a biological or ecosystem point of view. I don't challenge that, but what we're dealing with here is not a biological and ecosystem process. It's an economic process that may operate on much smaller scales. The effects at local scales might be important from a fisheries point of view, even if they're not from a largescale ecosystem point of view. Again, those sorts of considerations haven't been taken into account in the analysis that's been conducted.

[2.40 pm]

MR SHAW: I'm just going to pop in with an opportunist question here if I may, Dr Helson. Midwater trawling for jack mackerel has been the most important area for both effort and total catch. Is that also true of value?

DR HELSON: Probably, yes.

MR SHAW: So it's all three?

DR HELSON: Yes. A reservation might be rock lobster.

MR SHAW: But for finfish?

DR HELSON: For finfish, certainly the jack mackerel fishery is very large, very consistent and, yes, most valuable probably.

You have pre-empted my journey to the next slide. The uncertainty, I think, is one of the things that you're grappling with. We heard about report 17 in the discussion of eagle ray and the view from NIWA on the basis of report 17 that, looking at distribution of fish species, eagle ray was the species with the largest potential overlap with the area in question.

I've had a look at those reports and I've just provided two figures side by side. The one on the left is from report 17 and that is a modelled estimate of the probability of catching jack mackerel in the South Taranaki Bight. It's this analysis that's used to come to the conclusions around how various fish species may or may not be affected.

If you look at the figure on the right, that is the actual catch of jack mackerel in the South Taranaki Bight. The NIWA report says that's something in the order of 90,000 tonnes within the study area. I look at those two figures and say there's 100% chance of catching jack mackerel and a very, very large amount of jack mackerel just to the south-west of the proposed mining site. If I have a look at the area that I have eyeballed in the figure on the left, the yellow suggests that there's a 30% to 40% chance of catching jack mackerel and the lighter green suggests there's a 40% to 50% chance of catching jack mackerel.
That to me says that the modelling that has been used to arrive at those conclusions is suspect and not particularly reliable. As a consequence of that, I think that it's difficult to rely on the other conclusions that have been put in report 17 about the potential impact on fish.

I did touch on reputational risk. I think this is a minor point but an important one. New Zealand does trade on its reputation as a supplier of premium seafood and I've heard evidence in the last couple of days about various metals in suspension, cadmium, chromium, those sorts of things. Whilst they may be at very small concentrations and the ANZAC guidelines suggest that there might not be significant effects on the ecosystem, that's a biological consideration, not a fisheries or a market consideration.

I'm just a little nervous about what might be market responses to concerns around metals. Clearly, it's speculation that there would be any, but it's just a concern I raise. We've seen from the Fonterra issue a number of years ago around botulism in baby powder; there doesn't have to be an effect to raise concerns in the market. That's a minor point that I'd just like to put on the table as well.

That's all I have from my document.

MR SHAW: I want to go first on this and I'm going to start at the very, very end around issues of reputation and quality. I had a very considerable professional interest in this question as a chef and restauranteur specialising in fish for many, many years. One of the things that as a middle man, for want of a better word, for consumers that I was interested in was how the fish I was cooking was caught. If I wanted to be clear with my customers as to the quality of the fish they were going to eat, I was interested in day boats, I was interested in line-caught and I was interested in the method of trawling if that was where we were.

[2.45 pm]

These are matters which are in the hands of the industry as a whole and which I would have thought would have more impact. If we went to the Sydney fish market, which I have, it tells you in a sense exactly the gradation of quality and the impact of that quality on price. It's closely associated with the method of catch. Would you agree with that?

DR HELSON: Yes, I would.

MR SHAW: Yes, so --

DR HELSON: It's quality of fish which is a --
MR SHAW: Because it follows, doesn't it?

DR HELSON: Yes.

MR SHAW: There's an absolute relationship.

DR HELSON: Yes.

MR SHAW: I make the point because you say it's a minor issue. But that question of reputation if we look at what you're talking about here and compare that reputational issue with things that are entirely within the ambit of the industry and the decisions they make, the way they see their future/their vision for a sustainable fishery in New Zealand, this is small fry by comparison, isn't it?

DR HELSON: You're probably right and those are things that are within the control of the industry. Where we can improve our practices and consequently improve our reputation for sustainable seafood, we're moving in that direction. But there's nothing (overspeaking)

MR SHAW: As a New Zealander, I hope so. As a New Zealander who eats a lot of fish, I particularly hope so.

DR HELSON: Glad to hear it.

MR SHAW: Yes. All right. I used to say that with line-caught snapper, if it was any good you could just about wash your hair in it, but you could never say that about something that came out of a trawl net.

DR HELSON: Perhaps not.

MR SHAW: Anyway, I digress and it's digression down memory lane and I'm not going to do it for any longer. I'll hand over to my colleagues to begin to address any questions they may have to you and we'll start with Ms McGarry.

MS McGARRY: Thank you, Dr Helson. I've just got a couple. I don't actually have any from the body of your evidence itself. I wanted to reassure you that obviously we have drawn the distinction between fisheries and fish, which is why we separated those out into those groups. Yes, you're right that that was labelled as a wider group, but I think the focus has very much been on commercial, as you've pointed out. We've been very cognisant of that right from the beginning of this process to make sure that those two things don't overlap. I hope that gives you some level of confidence.
I wondered if you can offer me any insight into why we have this extreme divergence of views between your group and other fishers such as Sanford and whether you've got any insight into that.

DR HELSON: No, I don't. I think the reasons for our company opposing the application are clearer, been put in evidence in front of you. If there are other fishing companies that have a different view, then I'm sure they'll be happy to explain that to you when they provide evidence.

MS McGARRY: Do you think it centres on the perception of risk?

DR HELSON: It may do. It may be that a larger fishing company, for example, has more flexibility and a more diversified quota portfolio so that the consequences of something like this may be relatively small for them. There may be all sorts of reasons why a company might take a different view.

MS McGARRY: You've suggested that the focus has very much been on biological effects and that makes me think about what you would do if you're wanting to assess the effects. As you said, you'd start with the biological effects as opposed to economic or social or any other effects because you can't, without getting an assessment of the biological effects, follow on.

In taking that approach, I go back to the statements from the fish joint conferencing. Overall, there was agreement there that the effects would be minor and I'm not going to use word "indiscernible" or anything, but minor, we could agree.

DR HELSON: Yes.

MS McGARRY: Then we go to the primary production group and the same conclusion has been reached. To me, that's the two main biological components. If the answer is minor, then you don't go on then to try to assess the impact of what is minor.

DR HELSON: Yes, the distinction is that those assessments have almost certainly been made from a biological or ecological point of view. Almost certainly everyone in those expert conferences were scientists and they were considering the impacts of fish from a scientific perspective in the same way that NIWA has done from the effect on fisheries. They looked at the effects on fish and said, "Well, these are minor or negligible".

As I've said in the evidence and as was drawn out in the expert conferencing, a fishery is based on the biological resource, but it's so
much more. I would suggest that to do an expert analysis on the effects on fisheries you need to characterise the fisheries. You need to understand who's taking part in the fishery, what they catch, what component of the catch might be affected. That gives you an idea about the nature of the fishery as opposed to the nature of the fish distribution.

MS McGARRY: The only thing when I'm trying to come with grips with what you're saying: it brings me back to a localised scale of effects.

DR HELSON: That could be part of it.

MS McGARRY: Is that the nub of your --

DR HELSON: I think that’s a component of it, but it's more than just the scale. I'll just make up a hypothetical example to illustrate the point. If I live in Hawera and I am a set net fisherman. I've got a fleet of three vehicles, I go out every day, I fish school shark, I might catch x tonnes and come home. I employ some people and there's a factory. The analysis that's been offered would say the effect is only small because there's lots of school shark and it's only 1% of this big area.

You haven't understood that there's a guy there that employs a number of people and goes out and catches school shark in that area and that's the fishery. The fishery isn't the biomass of fish that's floating around that's available in theory. The fishery is the economic pursuit of the man in Hawera and his factory. It's a simple example and it's a small example that illustrates the difference between fisheries and fish.

MS McGARRY: When you use that example, it sounds like the fishery is a static thing that's sitting there waiting to be exploited and in fact it's a dynamic thing, isn't it?

DR HELSON: It is, yes.

MS McGARRY: On any given day, a fisher has a range of different parameters that they face. It might be on one day they travel 5 nautical miles; on another day they travel 7. So there's a natural variability and dynamic side to the whole fishery.

DR HELSON: That's right. Yes, there is, but fishermen are very good at catching fish. A good fisherman will know different times of year where to fish, different weather conditions where to fish, different depth contours, where to find varies species, tow times, the way they set their gear. Whilst there's variability, good fishers can understand that variability over time. When you introduce a stressor like a plume of sediment and it has variable impacts on the distribution of fish, that's upset and then the predictive capacity of that fisherman to go and catch that fish is of lesser use to that person.
Yes, while there is variability there, it's far from random about where people fish, the time of day, what they use, where they put their nets, how fast they tow in what direction and all those things. They'll be targeting specific fish in a specific area at a specific time because that's the ACE portfolio or the quota package they have. That again is part of the fishery.

[2.55 pm]

When that changes, it can make a fishery economically unviable. A simple example would be if you had to steam twice as far to find the fish or search twice as long to find the fish. That's going to impact the economic viability of a fishery.

MS McGARRY: Dr Robertson had some suggestions as to how that fisheries boundary between FMA 8 and FMA 7 could be dealt with by some flexibility from MPI in terms of addressing the situation. I've got some questions for him as to how realistic that is, but I just wonder if there's any comment from you on that.

DR HELSON: I don't think it's realistic at all. Dr Robertson suggests the MPI could pass a regulation and change the boundary. There is a statutory process in section 25 and 25(a) and 25(b) of the Fisheries Act. The Minister can make a suggestion to Cabinet to change the regulations. There's a number of statutory requirements that the Minister has to step through, for example being satisfied that changing the boundary would better meet the purpose of the Act, not to accommodate a mining operation. There's also a requirement for 75% of quota owners to agree to it. There are provisions in place if there's agreement or if there's not that 75% agreement.

This is not something in my knowledge that's ever been done in New Zealand fisheries. I think those provisions have been in place, 25 since 1996 and 25(a) and (b) since 2001. In the last 16 years, there's never been an amalgamation of two quota management areas. I can think of one example where there's been one quota management area split into two. To suggest that it's a quick regulatory fix, I strongly disagree with that.

MS McGARRY: Thank you.

DR HELSON: There are quite considerable complications.

MS McGARRY: I've got two more and they're sort of outside of what you've given evidence on, but I think you've probably got more knowledge than any other witness so I'm going to ask you.
One of the things we're charged with under the Act is to consider the environmental effects of existing activities. I'm wondering if you or whether we as a whole, as a country, have a good understanding of the adverse effects of fishing methods. I'm thinking particularly trawling on the ecology and how comparable some of those effects would be in terms of effects on the ecology.

DR HELSON: Yes, it's a big question. I think it varies among fisheries. I think in deep-water fisheries, we've got a reasonably good understanding.

There's only about 9% of the EEZ that's ever been trawled. There's the vast majority that's untouched.

We certainly know that trawling can have effects on the seabed, but it's variable, depending on the nature of the substrate. Some substrates can stand quite considerable perturbation, sandy bottom substrates and high-energy environments such as South Taranaki Bight. Certainly in deeper environments that are less disturbed, clearly they can't withstand significant impacts or any impacts at all. It's a complicated question.

MS McGARRY: Let's focus on the application side, for example.

DR HELSON: Sure.

I'm aware that over the years things have changed as to what areas you can and can't go to and things. What we're seeing in terms of the benthos in the application site, it would have already been quite significantly affected by fishing, would it not?

It will have been fished and I think --

Trawled?

Most likely, yes.

In the same respect, I think it's been raised in terms of marine mammals. I'm just wondering, do we have a good understanding of the adverse effects of fishing or commercial fishing on marine mammals?

Some more than others. The Ministry for Primary Industries has currently nearly finished a fairly comprehensive risk assessment on marine mammals. Preliminary information isn't yet available so it's difficult for me to comment. We certainly have a reasonable amount of information about the risks to marine mammals from fisheries. It's very dependent on the species.

[3.00 pm]
MS McGARRY: It's been suggested to us - and even by opponents of the application - that the adverse effects of fishing on marine mammals far outweigh any potential adverse effect of this activity. Would you agree with that?

DR HELSON: On a global, whole of New Zealand basis, certainly fishing is a much more ubiquitous activity that happens all over the country. I would probably agree with that, yes.

MS McGARRY: Yes, thank you.

MR COATES: Dr Helson, I'm finding it quite a large issue to get to grips with. On the face of it, you talk in one of your slides, page 8, about the expert witnesses saying that they:

"All agreed that a fishery is a combination of a biological resource, economic investment, fishing technology and knowledge, and rules."

What you seem to be saying is that if there is a difference in the available fish catch because of the mining and the expertise about where to catch fish has been built up with a history, it's no different really from starting to fish at the time of the quota management system being introduced. You really had to build up a history based on your local knowledge.

I'm just not sure how traumatic that's going to be for fishers in terms of finding their catches in the mining area, for example, are not available or have decreased by 5% - 10%. I'm not quite sure whether I've got a total quantification figure from your evidence.

DR HELSON: I'm not sure of the impact either and I would have expected the impact assessment to provide that estimate. In my view, it hasn't.

MR COATES: Is that an unrealistic expectation for the impact assessment to have told you as a result of a new technology that the catch limits will go down?

DR HELSON: I don't think it would tell us that the catch limits may or may not go down. But I think an impact assessment properly conducted would give us an idea about the impact on fisheries and the economic consequences of those impacts, as opposed to simply saying there's a small percentage overlap between the plume and where fishing has occurred.

MR COATES: When you see the diagrams that show pixels where you've got to put more effort into catching than another area which you have to put less effort - the jack mackerel is a case where there's a lot of fish there at certain times of year - isn't it just a fact of life for fisheries that you will have to go elsewhere sometimes? You will have to put more effort into finding the fish and you have to use more technology to do so?
DR HELSON: Yes, that's right and I think the point that I made in response to Ms McGarry was that understanding is what makes a good fisherman. Disturbance to that undermines the capacity for a fisherman to fish in an economic way.

MR COATES: You're saying that a disturbance to the status quo is in fact a quantifiable loss factor?

DR HELSON: I think it can be quantified and estimated and I think that should have been done as part of the impact assessment.

MR COATES: Which would again still be contestable by yourselves because you would presumably have disagreed with the methodology or whatever?

[3.05 pm]

DR HELSON: We certainly would have had a close look at it, but it simply hasn't been done.

MR COATES: You're saying that the initial information should have been in the impact assessment?

DR HELSON: Can you rephrase that, sorry?

MR COATES: The initial figures which you would think you might have to deal with should have been done by the applicant?

DR HELSON: I think it would have been useful for the applicant to describe the nature of the existing fisheries as part of that. It would have been useful for the applicant to identify who's fishing and what their interests might be. That gives you the capacity to assess what the effects might be on those fisheries.

I think the applicant's approach was simply to look at the distribution of fish, look at the overlap from the plume just on the medians as well, and then come to the conclusion that there's not much to see here. I don't think that was an appropriate approach.

MR COATES: You said quite clearly in your evidence that it's more complicated than that.

DR HELSON: Yes, it is. It's not something that can't be done. It's not complex like some of the other issues that have been spoken about in the last two days about sediment plume modelling and phytoplankton, all those other things. That easily is complicated if not more.

MR COATES: Yes, thank you.
DR HELSON: There's a great deal of information available and it's readily accessible. The Ministry for Primary Industries has a record of every fishing event that's happened in this area going back to the early 1990s. All of that information is available.

MR COATES: Thank you, Dr Helson.

MR SHAW: Dr Thompson.

DR THOMPSON: Dr Helson, thanks very much for your presentation. I think we have a much clearer understanding of the impact on a fishery of an external force. I'm empathetic to the view you expressed that it does make the task a little more complex and variable if you've got something intervening. That's an outside influence coming in and changing the status quo. How does the distribution of fish and the success of fishing vary from year to year without an external influence? What's the variability?

DR HELSON: Yes, that'll be species-specific. Some fisheries naturally go through quite significant fluctuations in biomass and distribution; other fisheries are much more predictable. That's a very difficult question to answer in general terms, but certainly good fishermen understand that. They might get signals, for example, that if one species doesn't show up at a particular time of year when they think it should then it probably means that other things are going to be happening. They understand those changes pretty well, but of course there's natural variability.

MR THOMPSON: There is some variability?

DR HELSON: Yes.

MR THOMPSON: How are the annual quotas fixed? Fixed annually? Is there some survey on what's been caught, therefore, what's there and managed that way?

DR HELSON: Quotas are set annually and if they're not changed they simply resume the value from the previous year. There is limited research done, particularly in inshore fisheries, to support changing quotas. It's expensive. There is a lot of information, as I said, about what's caught and where and when and by whom and by what method. That's a whole complicated back end of the fisheries management system where fishery scientists are beavering away with models and trying to understand the biomass of fish.

MR THOMPSON: Theoretically, it's about maintaining a sustainable population of fish?
DR HELSON: Yes, that's right, maintaining extractions from the fishery that are sustainable.

MR THOMPSON: Yes, okay, and that's only done in the event that there's an event that triggers? You say the monitoring is not done on a consistent basis? The quota's not changed on a consistent basis?

DR HELSON: Some fisheries have very consistent annual monitoring for hoki, for example, our biggest fishery, biennial surveys, all those sorts of things, annual stock assessments. Quotas aren't necessarily changed in response to some event. If there is a signal from the fishery - for example, if catch per unit effort starts to track down over a number of years and we can't explain why that might be - it might be a signal that biomass is declining and an intervention such as a reduction might occur. The converse of course is true.

[3.10 pm]

DR HELSON: The fishing industry would support that approach?

MR THOMPSON: Absolutely, yes. We're on record as supporting quota reductions where they're required and we don't have any issue with rising/falling on the tide of sustainability.

DR HELSON: Thanks, Dr Helson.

MR SHAW: Dr Helson, I want you to talk to me about the stance that your organisation takes on a number of issues. Presumably, one of your tasks as chief executive is to resist any initiative that would reduce access of your members to the fish, the quota that they own, and the fishing effort that they're entitled to as a consequence of others owning?

DR HELSON: I don't think that's a statement that's necessarily true on all occasions.

MR SHAW: Okay, not on all occasions. Tell me about what your attitude is in respect of these things that may impede access.

DR HELSON: If there are activities that may impede access, certainly we're interested to know what the ramifications of that impediment might be. It might be that those impediments are negligible.

MR SHAW: Okay.

DR HELSON: Where they are significant, then we would want to engage in a discussion about how --

MR SHAW: Yes, the question of consultation and negotiation even, shall we say, I think is an inevitable follow-on from that and that's a given. If we look
at something which is far, far away from the proposal that we're thinking of now - and I don't know the answer to this - talk to me, for example, about the establishment of reserves, the Kermadec proposal for starters. What was the position of your organisation on that?

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DR HELSON: We didn't support the establishment of the Kermadec reserve. Rather than speaking in specifics about that application --

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MR SHAW: No, I'm interested because what I'm trying to understand is the perfectly reasonable position that a trade organisation such as this takes in respect of exercising its responsibility to members who pay your salary, who cover the costs of running of the organisation as a whole. They wouldn't be paying their subscriptions unless they saw a value coming from it. So I am going to explore with you a number of various issues where I would have thought the expected resistance is demonstrated.

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DR HELSON: Okay, on the Kermadec issue we didn't support that particular proposal and that is primarily based on our general approach to marine protection or marine protected areas. This is a policy position that we have made plain on a number of occasions. The seafood industry generally speaking is very supportive of marine protection so we want to ensure that the marine environment is protected. We want to ensure that it's healthy, it's functional. When it comes to marine protected areas, we don't, as a consequence of our support for marine protection, necessarily support marine protected areas because MPAs are simply a tool; they are not an end in themselves. So we take a risk-based approach to marine protection. Where any area is identified and a risk is identified, we support managing that risk. If a marine protected area is the best mechanism to manage that risk, then we will support that.

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MR SHAW: Can you recall any such areas which have been supported by your organisation?

DR HELSON: Well, very few have come up in the last few years but we were involved in a process in the Southeast/South Otago region at the moment. We are supporting five marine reserves and other MPAs in that area.

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MR SHAW: So you do think that there are some areas in which the approach of either maintaining or returning a piece of ocean to pristine - as best as possible pristine - conditions is a good thing to do?

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DR HELSON: On occasions, absolutely.

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MR SHAW: On occasions?

DR HELSON: Yes, the seafood industry established and built their protection areas. There are 17 areas. 30% of the EEZ is protected from trawling and dredging and that was an initiative of the seafood industry.
MR SHAW: Okay. So your attitude, then, towards the sort of thing that we are confronting here? Do you oppose seabed mining?

DR HELSON: No.

MR SHAW: So tell us what your policy position, as an organisation, on seabed mining is?

[3.15 pm]

DR HELSON: Well, we want to understand the nature of the effects on fisheries.

MR SHAW: So you don't have an opposition to, quote, "Large-scale seabed mining, whatever that might mean"?

DR HELSON: No. "Whatever that might mean" is the key part of that phrase. If it happened somewhere there was no fishery then I can imagine we wouldn't have an issue with it. In an area where there is a fishery, such as South Taranaki Bight, we want to understand what the effect is going to be on the fishery, the extent to which it can be mitigated or avoided and whether we can coexist with that activity. We are interested in coexistence but we need to know the facts first and understand the impact.

MR SHAW: You can understand why I'm asking these questions?

DR HELSON: Yes, absolutely. I'm not approaching this because I or my organisation is philosophically or religiously opposed to marine extraction from -- we are an extractive industry as well.

MR SHAW: You bet.

DR HELSON: Our extraction happens to be sustainable for decades, from generations. We are very mindful that we need to take care of the resource but philosophically we do not have other problems with other extractive industries also using the resources that are resident in the EEZ. We just want to make sure that our existing interests are accommodated and at least understood.

MR SHAW: So if we take that position and we take this current proposal and we accept what you have to say about the multidisciplinary nature of your industry, and we accept also that the -- I think it would be fair to say that largely the consensus and respect of the regard of the impact on fish was that the impact on fish at a biological level was pretty modest at most, wasn't it?
DR HELSON: That was the view in the NIWA report --

MR SHAW: And the view on most issues in conferencing?

DR HELSON: I don't know that we touched on that specifically. Do you have a reference in the …?

MR SHAW: Yes, I do. I can go through them with you. I think it would be worth, and I am quite happy to hear, if you come back to us on these things …

(off mic conversation) No, I am talking about fish and I want you then to try to relate that to the impact on fisheries because it is common ground that the impact on fisheries begins with the biological impact.

DR HELSON: Yes.

MR SHAW: Yes, and that those questions of access, fishability, boundaries created by regulation and not by nature, are subsequent considerations.

DR HELSON: Yes. So in the context of the fishery?

MR SHAW: Yes, absolutely. I am wanting you to think of a circumstance, because you do talk about sharing the seabed and I think that's made very early in this submission, your initial submission on the proposal, what are the sorts of things that would make a proposal such as this where you accept in principle that exploitation of other resources on the seabed is something that is okay, what sort of proposal would meet, or what sort of amendments to this proposal, might meet your objections as an organisation?

[3.20 pm]

DR HELSON: I think first we would want to have a better understanding of the effects of the proposal and the subsequent impacts on fisheries and the economics of those fisheries, so for me that is the starting point. Before that work was done in a robust way it might be that we would seek quite minor amendments to the proposal. The issue we have is that that work simply hasn't been done. Clearly it comes back to conditions of monitoring and the other aspects of the proposal.

MR SHAW: Could I suggest to you, Dr Helson, and this is really important, that you have a look at the joint statement in respect of the impact on fish? Don't do it now because I think you probably reasonably should digest it. That gives us a starting point and I think focusses the attention of the Committee and I think inevitably of submitters and experts on the subsequent questions that you've identified and which I think everybody agrees that you are dead right. These are matters of economics and business practice and laws and regulatory environments and so forth. Then take the next step and say, well, okay in these areas
what makes it possible for another economically viable activity - and I am talking in the narrow economic sense - financially viable activity to take place on the seabed. Would that be a useful thing to do? I can you tell you from my point of view it would be very useful.

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DR HELSON: We can certainly have a go.

MR SHAW: Have a crack. Jolly good. That's the spirit of fishing, isn't it?

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DR HELSON: That's right.

MR SHAW: All right? I think I'm probably done there, Dr Helson. I will see if other submitters have questions for you, or their counsel. Are you going to have any questions, Ben? No. Mr Holm?

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MR HOLM: No, sir.

MR SHAW: Nothing from you? Which then falls to you, Mr Dawson, for any re-examination that you may wish to direct at Dr Helson.

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MR DAWSON: Yes, sir. A question was put to Dr Helson around the possible reputational risk to New Zealand and I think the comment was made, I think by you, sir --

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MR SHAW: Almost certainly.

MR DAWSON: -- that it was largely focussed on, in a sense, how the fish was caught, whether it was line-caught, longline, trawled or otherwise. The question I would like to put to Dr Helson is: could you comment on other reputational risk factors such as possibly heavy metals or mercury or others and the impact that that might have on New Zealand's reputation?

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DR HELSON: I think I did address that in my evidence. Reputation is a fairly nebulous sort of concept and it can be eroded quite easily for all sorts of reasons so --

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MR SHAW: Some of them spurious.

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DR HELSON: Indeed. Generally speaking New Zealand has a very good reputation, internationally, for the way its fisheries are managed. We are just very mindful that preserving that reputation and the ability for us to get market access into premium markets is quite important generally for the seafood industry.

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MR SHAW: Anything further, Mr Dawson?

MR DAWSON: No, nothing.
MR SHAW: I have one more thing I do want to ask you. I think the industry owes it to itself to give some thought to a really crucial question. In the event that consent is granted - and we are a long, long way away from being able to have any view one way or the other on that at the moment - your view and the view of your experts on conditions that you would like to see imposed in the event that that were to be case? I emphasise you should not take this as any indication of what the decision is going to be but I think some thought to that, and I am not asking for on-the-hoof responses, I am asking for some thought to be given to it.

DR HELSON: Sure.

MR SHAW: If the unthinkable should happen, from your point of view. I am sure, Mr Dawson, you can be of assistance there as well.

MR DAWSON: Yes, sir.

MR SHAW: Okay. Dr Helson, thank you very much.

DR HELSON: Would you like me to respond to anything in Dr Robertson's …?

MR SHAW: If you want to. By all means go for it.

DR HELSON: Okay. Some of these points have probably already been raised but I thought I'd just go through and address some of the specific comments that Dr Robertson made starting at paragraph 50.

MR SHAW: Just incidentally, Dr Robertson will be appearing. When is that likely to happen? What day? (off mic conversation) To be confirmed but he will be appearing and so by all means we will take your comments now but you also might want to bank the fact that you will be advised when that appearance is going to be and you may want to hear (overspeaking)

DR HELSON: Okay, I might just talk to counsel.

MR DAWSON: Sir, can I suggest that we follow this line either in writing by Dr Helson, he could respond in writing and then we could attend when Dr Robertson gives his evidence?

MR SHAW: Yes, that's not two cracks, that's fair enough. I'm quite happy for that to be the case. We don't want to be playing table tennis with this, back and forth, but I think that the course that you are suggesting is entirely reasonable. No difficulty with that, Mr Holm? Okay, so that is what is what we will do, Dr Helson.

DR HELSON: Okay.
MR SHAW: It makes sense and I think gives the opportunity for a more considered and complete response. Did you want to say something, Ms McGarry?

MS McGARRY: No.

MR SHAW: Happy to do so? Okay, happy to do that?

DR HELSON: Yes.

MR SHAW: He was going to be today but in fact the needs of the industry took precedence.

DR HELSON: All right.

MR SHAW: Very good. Thank you. We are going to break now for a cup of coffee and return. Who are we seeing next, Mr Dawson?

MR DAWSON: Sir, we are going to be seeing Mr Piper and after him Captain Smith but I think we are optimistic if we are going to see Mr Loder. I am just trying to anticipate travel schedules and other things for tomorrow.

MR SHAW: Talk to Gen.

MR DAWSON: I will do that.

MR SHAW: Where it is appropriate and where people are available we are pushing. If we can't see them on the day they are being pushed to the next day and early on the next day as a rule so that we can maintain some continuity of subject matter which helps us.

MR DAWSON: Yes, sir. I do know that accommodation and flights are at a premium at the moment in Wellington but I will discuss that with the PA staff.

MR SHAW: You ought to see -- I have been living in a shoebox in the middle of the drive, I tell you. (off mic conversation) We will accommodate what we have to accommodate. That is just simply the case, Mr Dawson. We will do what we have to do in order to make sure that people are seen.

MR DAWSON: Yes, sir. I would say that we were quoted $680 for a night at the Intercontinental which might be a little beyond our budget.

MR SHAW: That comes as no surprise. I can tell you something and that is that the government certainly doesn't extend its largesse to that degree for people who are travelling on public business, that's for sure.

MR DAWSON: Thank you, sir.
MR SHAW: Okay. All right, 15 minutes.

ADJOURNED [3.28 pm]

RESUMED [3.51 pm]

MR SHAW: Right. Just before we begin, any procedural matters now that we've got some people back in the room that we didn't have before? Ms Haazen, no procedural issues from you?

MS HAAZEN: No, sir.

MR SHAW: Mr Dawson?

MR DAWSON: Sir, we've shuffled the batting order again.

MR SHAW: Are you sure you're not an Australian as opposed to a South African? You jokers don't seem to have to worry about the batting order. It just all goes swimmingly.

MR DAWSON: Sir, I'm fortunate that I'm a lawyer with a thick skin, otherwise I might have been insulted by that (overspeaking)

MR SHAW: Heaven forfend.

MR DAWSON: Sir, I discussed with the EPA staff as to when one of our witnesses will tip over into tomorrow and it seems that the best solution is that Captain Smith, who was due to come in behind Mr Piper, will come up next Thursday and then appear after Mr Robertson. Is it Robinson or Robertson?

MR SHAW: Robertson.

MR DAWSON: Robertson. I was hoping we could get through Mr Piper, who's sitting next to me, and Mr Saunders-Loder this afternoon.

MR SHAW: Every prospect of doing so, depending on all our best efforts.

MR DAWSON: Thank you, sir.

MR SHAW: We'll start with Mr Piper, then. Mr Piper?

MR DAWSON: Can I introduce --

MR SHAW: Yes.

MR DAWSON: -- Mr Anthony Piper to you? He's a shareholder and the founder of Cloudy Bay Clams Limited, surf clam harvester. Sir, again, as with Dr
Helson, he has submitted written responses to the questions so I’m assuming we can take those as read, unless you want to tease those out any further.

MR SHAW: Have I got written responses from Mr Piper?

MR DAWSON: They were attached to our memorandum.

MR SHAW: Sorry, they are included in, yes, the material you gave us. Thank you, yes.

MR DAWSON: Sir, Mr Piper will just give a summary of his evidence and then be at your mercy.

MR SHAW: Welcome, Mr Piper.

MR PIPER: Thank you. Thank you for the opportunity to speak.

My name is Anthony Piper. Together with my son, we have founded Cloudy Bay Clams Limited and been historically involved in fishing within the New Zealand commercial and aquaculture industry over the past 45 years. The purpose of my statement of evidence was to provide an overview of surf clams and the surf clam fishery, discuss the development of the surf clam fishery and Fishing Management Area 8, and outline my concerns with the current application by Trans-Tasman Resources.

[3.55 pm]

My background: I’m a qualified diesel trawler engineer. I hold a New Zealand Certificate of Civil Engineering and I hold an Inshore Launch Master's Certificate allowing me to skipper a commercial vessel under 20 metres. I also, a little tongue in cheek, have a PhD in the school of hard knocks, just as a pioneer of a fishery. I have significant work experience in soils engineering, both with soil compaction and permeability for structural earthworks. This has given me experience and practical insight into the properties of soils. However, my passion for the sea generated a career change in my younger life. I have been at the surf clam fishery for 26 years and actively involved in developing it.

I understand you have probably seen a copy of this or that you have a copy of my submission. In an endeavour to save a little bit of time, perhaps rather than just working through it, we could just proceed if you want to talk about the questions, or I just go into my primary concerns.
MR SHAW: Look, I think you should set out your primary concerns. We've read your written brief --

MR PIPER: Thank you.

-- but I think it is appropriate for you to say the things that are on your mind, and we will get to questions after that.

MR PIPER: I appreciate that. I believe that the surf clam fishery in Area 8 is significant, both spatially and economically, and has had virtually no consideration by Trans-Tasman Resources in their application. Some basic assumptive information about the spatial distribution of surf clams has come from the Ministry of Fisheries.

Just to try to give a better understanding of how that has come about, our investigative work has been dependent on equipment that we've developed that won't operate in depths greater than 10 metres. There is a variation in benthic properties as you get out in deeper water. Effectively, our gear ceases to work effectively or stay in the substrate once you get over about 8 or 9 metres if you've got any swell activity, so we have restricted our activity into that region and there seems to be an assumption that that's the extent of the fishery. However, there's been anecdotal information made available to us from trawlermen and also from divers and some of our own earlier trials that we find fish in greater depths.

[4.00 pm] I did a lot of work in the earlier developmental time in drying to develop what we call a dry dredge, where we don't pump water down, so we're reliant singly on a tow rope. Obviously we can extend it further out the back of the boat and we have caught our species of surf clam at greater depths, out to -- we have trialled out to about 14 or 15 metres. I would suggest the densities are reduced and that the depth in which they bury is also reduced, and that can be seen by the anaerobic stains on the shell and growth on the part of the shell that's extending above the substrate.

The failure of TTR to firstly identify our species in the region at all and secondly to consult with us at all has raised major concerns for us and our concerns are probably a two-tier position: firstly that it affects what we are developing as a business and income, but secondly that potentially it may have a larger impact on the environment and we are sensitive to that.

I think if you have a look at the comments on the last page of my submission, TTR have said that they entered into consultation with all stakeholders. There has never been any consultation with us or with
any party that we are directly involved with, so there's not been any
direct or indirect consultation. We are not a direct member of the
Fishing Industry New Zealand.

As an engineer with experience in soils, engineering soils, and as a
fisherman-cum-engineer, or the other way around, that has developed
equipment in that environment, I have put a lot of effort into
understanding the dynamics of the seabed. Under the Technology for
Business Growth grants from the government we were able to work
with Lincoln University and I spent significant time with the scientific
staff through Lincoln Ventures studying and understanding the
substrate and finding very specific properties that we've been able to
capitalise on for the extraction of surf clams.

When I first started I was certainly very proficient at killing
these creatures and, as robust as they are to live in that harsh environment,
they're incredibly fragile to changes. My knowledge of the seabed, the
particle size distribution and the physiology of the shellfish to survive
in that area has led me to significant concerns. We have observed
during storm events when there's been a lot of material transported
down the rivers that we do get zones of increased mortality and
vulnerability of the shellfish.

Because we wet-store our fish live -- our premium market is the live
market, primarily at the moment in Asia but also in Europe. We export
live shellfish, so in order to export them we need to hold them in wet
storage. The process allows them to discard the sand but it has also
given me the opportunity to learn a huge amount about their survival
in low-oxygen density water, with low levels of dissolved oxygen, and
it has taught us how to read stress in shellfish. During times when
we've harvested fish from those areas that have been blanketed by
plumes coming down the rivers, we observe that there is significant
stress as a result of that mud build-up.

We can identify areas where mud settles because of the anaerobic tell-
tale of the blackening of the shell, the smell of the substrate as we
extract the fish -- so we've had the privilege of learning that it's not just
a simple surf beach. It's very complex. The currents are often
rotational, that you end up with vortexes where organic matter
accumulates and all of these things do affect the habitat.

I understand that during a storm event, we normally have -- when the
outflow from rivers is increased and turbidity is increased, a lot of that
turbidity is held within that fresh water and a lot of it, just by the sheer
velocity of the river spewing into the sea, is transported out deep. But
it remains, a lot of the time, on the surface. One of the problems that
we have had to overcome with our smaller vessel is that when we're
fishing that region we get a lot of fresh water on the surface that we're
pumping onto the boat and into the tanks to keep the fish alive and it - - with fatal consequences. We've killed a lot of fish and had to learn that we need to extract our water deeper, and we observe that there is often less turbidity in the deeper water than there is in the surface water.

[4.05 pm]

So, the shellfish appear to survive very well in -- let me say anything bigger than mud particles in suspension, but put them in mud and their filtration mechanism on the end of their siphons clogs and they suffocate. When we observe fish that are low in oxygen they extend their siphons and our conclusion is that on the seabed during calm conditions, you get a build-up right on the seabed itself of light organic matter that's depleting the oxygen levels and they can extend their siphons in cases in excess of 50 millimetres to get above that. They are fascinating critters. They certainly have captured my attention. They are dynamic in their ability to survive during storm events.

It is my understanding that we get liquification through the pumping of the wave action into the seabed that may extend down to as much of a metre -- as much as a metre. During that process, that becomes a super-saturated liquid, if you like, of very dense properties. The shellfish become buoyant if they are not anchored, so they need to dig down and maintain a good strong hold during a storm event. If they don't do that, they become buoyant and get washed out. That's why we have seasonal mortalities. It's a fishery that has a fairly high natural mortality rate but they are prolific breeders.

So, with that background of understanding, there are some concerns that I have about the way in which material is being returned to the seabed. At least at the beginning of the excavation, we are shown that there are mounds that could be up to 9 metres high. The process of returning the material and the water to the bottom, I am unsure of what the diameter of the pipe that's returning the material but we've got a fairly reasonably velocity. We are going to get some hydraulic winnowing effect from that material so that the larger, heavier particles are going to settle first and then the muddy, lighter particles are going to stay in suspension longer. That could end up giving a stratification in that material.

Because of the increase and decrease of water depth as a result of the humps and hollows, we are going to get different hydraulic pressures from one side to the other, much as you do with a hydrofoil or an aerofoil. That is going to push water into those sandier bands. My concern is that although I have to acknowledge that my PhD is in the school of hard knocks, my experience is that that could liquefy some of that material, make it more transportable, and I have a major concern that that could move under a horrific storm event, which may be a one-
in-50-year event, could be transported and suffocate that benthic environment both adjacent to and perhaps further away from.

Certainly the plume modelling - which is just that, it's a model - shows that that material can transport significant distances down the coast and I believe that there is a very good probability that there are parent stock in those deeper waters that could well be suffocated. Right now, it's a virgin fishery. The magnitude of impact may be reduced in terms of the overall available population but in time that may become a more critical component and I believe it's an indicator of concern that should not be taken lightly.

When you get the finer particles, you get a smothering effect and you get an anaerobic layer that may become more stable than the humps and mounds, and if that's the case it becomes a hostile environment for a lot of the critters that inhabit that benthic environment.

[4.10 pm]

So, our concerns are twofold: that firstly it is going to affect our specific fishery but secondly that we're only part of a very large ecosystem that it could have ramifications that spread further afield should some untoward event take place.

25 MR DAWSON: Are you done?

MR SHAW: Could I just ask you, Mr Piper, these things change their names or people change the names of various shellfish. So, are you talking about a single species of surf clam?

30 MR PIPER: Under the quota management system, we have quota in seven species.

MR SHAW: Okay, and so you're using a collective for all of those.

35 MR PIPER: For surf clams I am, yes.

MR SHAW: So that would include the diamond shell and --

MR PIPER: The storm shell, the tuatua, the moon shell, correct.

40 MR SHAW: Okay.

MR PIPER: They are the four main streams of shellfish.

45 MR SHAW: Yes, and they're taken at different depths?

MR PIPER: If you'd asked me that ten years ago, I would have said yes. Today, I'm not going to say yes because I believe there are two main factors as to
their habitat. Firstly, I believe that particle size distribution has an impact and often that distribution aligns with current movements which may impact food, and secondly, depth.

MR SHAW: Yes. So, in your experience -- and I, as an amateur gatherer of all sorts of shellfish, it's my very narrow experience compared with your vast experience that in fact entire beds shift. They go into deeper water, they come into shallow water. There'll be a storm event such as you described and a beach in Kapiti or right through to the Horowhenua may be covered in diamond shell clams following the storm and if you're there at the right time it's the easiest shellfish to gather in the world.

MR PIPER: As long as you can beat the seagulls.

MR SHAW: That's right, but it's all doable. That's why dogs were invented. But it's not just a dynamic environment in which they live, is it, but their responses? They move much more than we would give them credit for doing if we --

MR PIPER: I'd have to say unbelievably so.

MR SHAW: Yes.

MR PIPER: The biggest difficulty I have is the more I learn about these fish, the less I understand; the more I know I don't know.

MR SHAW: The biggest decision for me is whether or not my vongole is going to be bianco or rosso when it comes to putting them on spaghetti. That's the most important issue. Whereabouts are you based, sir?

MR PIPER: Marlborough.

MR SHAW: Marlborough.

MR PIPER: We are called Cloudy Bay Clams because that's where we started.

MR SHAW: Yes, I saw that but you were talking about Foxton, for example. So, your fishery extends -- the place that you're licensed for fishing?

MR PIPER: When we first started there was no quota management system.

MR SHAW: Yes. You had experimental licenses, did you?

MR PIPER: We applied for licenses originally. Then it became special permits and then we were allocated some quota, and subsequently as the species were brought into the quota management system it was tendered by the
Crown after 20% was given to Māori and we did everything we could to buy as much quota as we could.

MR SHAW: Did you ever hold geoduck entitlements, incidentally?

MR PIPER: No. I put my money into surf clams.

MR SHAW: The other, right.

MR PIPER: Very simply, harvesting geoducks is in a depth and benthic environment that I'm concerned about, the resuspension of entrapped whatever -- whatever is in that muddier substrate that's not being pumped through like the surf zone is --

MR SHAW: Okay, so the surf zone is critical.

MR PIPER: To me it is, yes.

MR SHAW: Constant disturbance is one of the things that provides for the enduring expectation of quality around the product, is that right?

MR PIPER: Correct, yes.

MR SHAW: And puts it in a different situation than the cockle or indeed the pipi that comes out of a more estuarine environment.

MR PIPER: Yes, both visually and taste-wise, absolutely.

[4.15 pm]

MR SHAW: So, Mr Piper, have you read any of the expert advice that we've received as a consequence of the conferencing around the potential impact assessed by experts with PhDs in something other than hard knocks in terms of the level of sedimentation that may be expected, both on the inshore resource that you are interested in harvesting and those that are in deeper water?

MR PIPER: I have.

MR SHAW: And?

MR PIPER: I have endeavoured to read them.

MR SHAW: Yes.

MR PIPER: Not always is it in a language that I fully understand, but I have read through that. I think there are some gaps, personally. I think that --
MR SHAW: Can I say to you, Mr Piper, what's really important here is identifying the gaps in fact because that's somewhere your experience is very relevant to us, but my advice to you would be to avoid opinion and get into experience. Get into things that you've directly observed yourself over the period that you've been involved in the fishery. That's going to be the thing that helps us form a balanced assessment or form an accurate assessment around the risks that you see associated with the fishery. So, talk to us about what you think are the gaps in the expert evidence that we've seen on the potential effect on the resource.

MR PIPER: Our IP is based on understanding the environment that these shellfish live in. As a result of that, I believe I have a better understanding of how particles settle and the potential impact of interstitial pressure changes within that band of material. I touched on it when I spoke about the way in which the material is being discharged back into the bottom, that a lot of the TTR evidence said that it goes back into the excavated site. However, for the first 900 metres, it's going onto an existing seabed.

What I was saying was that as the material is returned, there is velocity of discharge from the pipe. To try and get your head around the magnitude of it, if you take a garden hose, for instance, on a wet garden, and you hold it there, it will displace material. It's got energy. Just the material being returned, without the water, alone, is in the vicinity of about 20,000 garden hoses. There's a lot of energy dissipation. As a result of that, you are going to get a winnowing effect. You are going to get the heavier particles settling first, then by gradation they'll extend out. Now, as you migrate forward that layer of sand or gravel is going to be maintained at that depth and you're going to be putting stratification in that stack. Does that make sense?

MR SHAW: It's consistent with what, largely, we've been told by experts in respect of their position.

MR PIPER: So, if you have wave action go past that, the moisture that -- the water that's between those particles, the interstitial water, is going to be changing in pressure, and that wave action does exactly that in the environment or the habitat of the surf clam, and it pushes the particles apart and therefore there is an increase in mobility. My concern is that the potential for re-suspending that material is real, that you have a horrific storm event. That material could be washed into the beach. I don't know the full extent of the surf clam population because we don't have the resource to go find it but I do know that it extends past -- or between Whanganui and where the site is, and that I am concerned that there could be the movement of that material.

MR SHAW: Okay. Thank you. I've got no more questions for you, Mr Piper, but I expect that colleagues do.
MR PIPER: Thank you, Mr Shaw.

MR SHAW: Ms McGarry?

MS McGARRY: Thank you, Mr Piper. You hit the high points of your evidence very well, so thank you for that. Like Mr Shaw, rather than asking you whether you're engaged with some of the very technical information that I know we too have had to wade our way through, I just wanted to ask you whether you've seen the joint statement from the conferencing which has come out in the last few days from the benthic ecology session.

[4.20 pm]

MR PIPER: No.

MS McGARRY: No. I just might encourage you to have a read of that. That's just the matters that were agreed upon, and in fact there weren't that many areas of disagreement but it specifically addresses surf clams and there's five to six responses there in terms of risk and other things. I just encourage you to have a look at that before the hearing closes, just to see what the response was, but in fact there was unanimous agreement between the experts that the -- I'll just read you the last bit perhaps, seeing as you're on the hoof. Just in terms of the distribution and the biology of the surf clam, they all agreed that there was sufficient information to understand the risks and that there was a very low likelihood of the clams being exposed to any stresses as a result of the project operations.

So, I just encourage you to have a look at that. And that's not going back to all the original technical stuff. This is really just a direct response to issues that have been raised in submissions. Obviously we've got quite a lot of the hearing to go and there will be opportunities not for new evidence but for further comment on all these sort of things as they go through. So, please do that.

In terms of the location of your operation, you've said Marlborough. It's in Cloudy Bay itself where you've focused your activities and your attentions?

MR PIPER: That's where we did all our development work. We currently have a boat working out of Whanganui. We've only just started fishing this region recently. It's not an easy environment to work in. We also have a vessel based in Lyttelton that works in Pegasus Bay and we're currently fishing there as well. It may be worth adding that I am working towards the completion of a purpose-built vessel for this area, the Area 8.
MS McGARRY: You sound like you've got quite a focus on the particle size distribution pre- and post-mining, and just in the last couple of days we've also had some extra information from the applicant in terms of all of the sampling that they've undertaken and what that range of particle size distribution -- and there's also a table showing the pre- and the post-mining and how that looks in terms of the difference. So again, that's information that might assist you in looking to try and see just how that risk is for you, for your position. So, thank you for your evidence today.

MR PIPER: Thank you. I would just like to add that in the initial application some two years ago there were some test results where it showed that there was 4% of sand at the surface and "at depth" - it didn't give the depth - there was 80% mud. So, with that knowledge I am concerned that we are mixing up material that may be more mobile.

MS McGARRY: Thank you.

MR PIPER: Thank you.

MR SHAW: Mr Coates?

MR COATES: Yes, good afternoon. Mr Piper, thanks for your submission. I just reiterate what my colleague Ms McGarry said, that the joint witness statements about benthic communities would be very relevant to what you're talking about. You've seen the maps that were in the application of the sediment distribution, the background which extends almost right down the South Taranaki Bight coast, beyond Foxton, and then you can see the additions of the mining sediment, which are in the region of 10 milligrams per litre of sediment, and the background is also in the region of 10, so it's a small increment.

[4.25 pm]

MR PIPER: Except that that's a doubling. If you add ten to ten, that's --

MR COATES: Yes, absolutely. But one of the things which I wanted to explore with you was the risk of ballast water bringing toxic algal bloom cysts in because that would effectively provide a bigger hazard, wouldn't it, for surf clams?

MR PIPER: Indeed. I'm not sure what your question is, specifically. Am I concerned?

MR COATES: Well, are you aware in the evidence that's been provided that that is one of the risks which is faced by this project? There's large vessels coming in and exchanging their ballast water too close to the coast, and so
therefore cysts which are already in the ballast water may end up on
the New Zealand coast. Was that a risk you had appreciated?

MR PIPER: I had. It's perhaps not an area of my greater expertise but I believe it's
been covered by my colleagues that it has been raised, so perhaps by
my own neglect I haven't included it but very aware and very
concerned. I had assumed that Aquaculture New Zealand were
probably the people to deal with that, more than myself.

MR COATES: Yes. Well, it becomes part of the biosecurity regime as well for New
Zealand, so --

MR PIPER: Having just completed a biotox event in Pegasus Bay, it's devastating.

MR COATES: Yes, absolutely. In terms of the discharge from the integrated mining
vessel, where they're discharging up to 8,000 tonnes per hour, it's very
true that initially it would go back onto the surface of the seabed and,
depending on the wave action that was happening, there may well be
resuspension, so your engineering abilities are quite correct.

You talked about the sheer volume of information being
overwhelming. Was this trying to read the application online, or --

MR PIPER: I have to confess, amidst -- I have a full-time job as well and finding
the time to read that stuff, to understand it and to be really objective in
trying to get my head around it was overwhelming for me,
unfortunately. I'm in the midst of building the biggest boat we've ever
put together. We're making significant changes to how we set it up and
it's a huge task, so I apologise if I'm not doing the thing justice but I've
given it my best shot.

MR COATES: No, you have all my sympathy and thank you for your appearance.

MR PIPER: Thank you.

MR SHAW: Dr Thompson?

DR THOMPSON: Mr Piper, what quota do you hold for clams?

MR PIPER: What quota?

DR THOMPSON: Quota. How much quota have you got?

MR PIPER: You mean in Area 8 or nationally?

DR THOMPSON: I'm just interested to know that you have sufficient to build a business,
given its in its infancy. So, you've got sufficient quota to secure -- you
have a business ahead of you?

Westpac Stadium Function Centre, Wellington 22.02.17
MR PIPER: I have actually handed the business to my eldest son, but Cloudy Bay Clams or Cloudy Bay Holdings is the single largest surf clam quota holder in New Zealand by a significant magnitude. Of the most significant species, probably in -- because it's a developing fishery and the TAC allocations are not necessarily representative of the species in the quantities in those areas, but it would be in excess of a third of the national -- it's significant. It's a big fishery.

[4.30 pm]

DR THOMPSON: So you have secured your future? Because the only figure I could see about quota was a little bit about prawns, I think, a prawn quota.

MR PIPER: No, I think --

MR SHAW: KP8.

DR THOMPSON: It's all right, it's only a matter of interest. I won't rise and fall on that one.

MR PIPER: In this area at the moment, I think you'll find it's more than a third.

DR THOMPSON: It's sufficient. Yes, okay. All right.

MR PIPER: Yes, and if the fishery were -- and it's easy to identify, it'll be in excess of 10,000 tonnes. It's significant.

DR THOMPSON: Okay. All right. Good, good. You mentioned that mud from estuarine or down from the river can settle to a depth of 50 millimetres?

MR PIPER: On the seabed?

DR THOMPSON: On the seabed.

MR PIPER: I have not done particle size distribution on that material. What I actually think is that there is -- somewhere between the resident substrate, if you like, particle size right down to the really fine suspended mud, somewhere in that range, some of that does get washed around in the eddies with the river flowing out, accumulates and settles. It's my persuasion that the majority of those finds are transported offshore by just the sheer velocity of the river.

However, we have experienced occasions when onshore breezes hold that on and we have high mortality rates, and I can't sit here and tell you that it's just because of the plume. It may also be because of diluted salinity, although if you do the math on dilution it's not massive, but it
could be. All I can tell you is that after those kind of events, we've seen high mortality rates.

The point that I was trying to get to was, adjacent to the discharge from the river where you get a small elevation in settlement, the fish are significantly stressed. That's the observation that we've made. So, what I'm saying is when you talk about background and then double it, my hand goes up and I say, "Well, hang on, if we double the background, is that enough to now stress the ability for the fish to both respiration and to feed?" Because they use the same gill membrane for both functions.

DR THOMPSON: One thing I'm not clear on from what you said, you mentioned, I think, that they have the ability to extend somewhat to the surface to breathe.

MR PIPER: Yes.

DR THOMPSON: That was on one hand, and I think it might have been 50 millimetres. That might have been the dimension you mentioned. Then also to ensure they don't get washed away, they burrow into the sand --

MR PIPER: Correct.

DR THOMPSON: -- to some depth, to hold on.

MR PIPER: They do, and the relevance of those two points that I make is that on the end of their siphon they have like a flower that is a mechanical filtration mechanism. They can tolerate up to or down to a certain size but you get below that and they start to suffocate, and it would appear from my experience that you cannot get them to recover.

DR THOMPSON: To what depth do they go into the sand?

MR PIPER: I can't give you an absolute but my understanding, having worked with scientists on that, is up to 1 metre to 1.5 metres. They are fascinating critters.

DR THOMPSON: A bit like toheroa. I mean, you start digging and they start digging too.

MR PIPER: They sure do, and the tuatua of our species is very similar to toheroa.

DR THOMPSON: So, is that a mechanism that they can adopt to escape the mud?

MR PIPER: The problem is, if you seal the surface off they can no longer draw the water down through it.

DR THOMPSON: To help them with the -- yes.
MR PIPER: So now you're -- what you're doing is you're reducing the available oxygen in the water that's pumped into that interstitial space, so they're now going to suffocate.

DR THOMPSON: So, if they escape the mud they can't access anything because it's sealed off at the surface anyway?

MR PIPER: Potentially. That's the suffocation process that concerns me, not just in the surf zone itself but where -- I believe there is also parent stock at greater depth.

DR THOMPSON: You mentioned that, yes.

MR PIPER: Yes.

DR THOMPSON: One final question about consultations. You've said that you were a submitter in the last application --

MR PIPER: Correct.

DR THOMPSON: -- and a submitter in this application, but you have not been consulted.

[4.35 pm]

MR PIPER: No contact whatsoever.

DR THOMPSON: Have you made any efforts yourself to contact the applicant?

MR PIPER: My understanding was that their application had been rejected and I didn't know that we needed to put submissions in until very close to the shut-off date, and so no, I have not made any endeavour to approach TTR. I would have thought that as an act of decency they would have approached us, given our stance in the earlier application.

DR THOMPSON: Okay.

MR PIPER: So perhaps my attitude has got in the way a little bit but I think you can understand that.

DR THOMPSON: Thanks, Mr Piper.

MR PIPER: Thank you.

MR SHAW: Okay, Mr Piper. Thank you. We'll just see whether in fact there's any follow-up from counsel for other parties. We'll start with you, Ms Haazen.

MS HAazen: No follow-up for Mr Piper.
MR SHAW: No? And no re-examination from you, sir? Okay, thank you.

MR PIPER: Thank you very much.

MR DAWSON: The next witness is Mr Loder, Doug Loder. Sir, once again you have a copy of the sole question that was put to him and his response, so he'll take you through a summary of his evidence and we'll go on from there.

MR SAUNDERS-LODER: So, to the Committee, thank you very much for hearing me today. I appreciate the opportunity. As you've heard, my name is Doug Saunders-Loder. I'm currently employed as the resource manager of Talley's Group. I just think that it's probably appropriate, following every other submitter, that I'll just take my evidence as read, provide a bit of a summary of exactly where I feel we are and give any background in respect of the finer details of fishing if that's appropriate.

So, that being the case, I am Doug Saunders-Loder, currently employed as resource manager for Talley's Group. I've been employed by TGL for the past 30 years and have been involved during that time and have been involved in that time in all aspects of the management and operation of fisheries, from processing the fish and fish products on land to the management and operation of vessels at sea and the collaborative management of fisheries, primarily throughout the South Island but also in certain areas around the North Island.

I am also the current president of the New Zealand Federation of Commercial Fishermen. The New Zealand Federation of Commercial Fishermen is a national organisation, a trade association for inshore owner-operators that -- effectively we've got a membership of about 350 members nationally and 27 individual port associations that I represent in that respect.

I'm also chairman of a commercial stakeholder organisation, the Southern Inshore Finfish Management Company. It's a finfish management company that was rationalised from two companies we had in the South Island over the last five years -- well, much longer than that but in terms of the rationalisation, that occurred in 2013. So that was a culmination of the South East Finfish Management Company and the Challenger Finfish Management Company. Both companies are representative quota-owners in that area, specifically the South Island, and it's really just a stakeholder group that looks after the interests of quota management in that context.

So, in my summary I'd just like to highlight our concerns with the application through giving a bit of an overview of Fisheries Management Area 8 in the context that I understand it, identifying the effect on Talley's business because primarily that's who I have got a
good history with, and identify some effects on inshore fishermen within that context.

I'm familiar with the general site of this application and the surrounding environment because of my longstanding relationship and continued discussions with fishermen, quota owners, fish receivers and fisheries managers that operate within this region. It's appropriate for me to probably tell you that I have never fished, I have never been a fisherman and I have never operated in the area, so I do know the area through the obvious relationships that I have but I've never been in it to physically operate.

[4.40 pm]

But FMA 8, to us, and particularly the South Taranaki Bight is a productive fishery frequented by fishermen that travel from New Plymouth, Wellington, Picton, Nelson, Motueka and elsewhere. In Mrs MacDiarmid's comments yesterday it was pleasing to me in some respects that she made the point there is not much effort within the area because it is actually quite true, but it unfortunately provides an inference here that because of that the impacts of this application are negligible. I cannot subscribe to that view.

The NIWA report for November 2015 authored by Mrs MacDiarmid supports my view that the area is very productive. And I quote:

"Species that were predicted to be particularly abundant - greater than 50 kilograms per trawl - in the areas of mining interest included barracuda, red gurnard, leatherjacket, school shark, snapper, spiny dogfish, rig, terakihi and trevally."

And she makes the reference that this is kilograms per trawl. She highlights the stock that are relative to 50 kilograms per trawl right through to 10,000 or 10 tonnes per trawl, and I have to support her view that in the context of that the South Taranaki Bight is a particularly productive area for us. It's supported by that view.

It's a unique fishery, the South Taranaki Bight, in the fact that fishermen go there for a number of reasons, not the least of which is to catch their ACE, but there is not a significantly huge volume of ACE in Area 8. It's an area that is relatively low-key in the context of stocks, although the difficult with FMA 8, of course, is that you're talking about a much larger area than the area we're talking about in the context of the South Taranaki Bight.

But if I use the South Taranaki Bight as an example, which is where the majority of boats that I associate with fish, then they will travel there on the basis that they have availability of ACE, they will travel
there in a seasonal context and they will also travel there, very importantly, depending on weather. So, boats that will fish for Talley's, for argument's sake, will not be there continuously but when they do go there, they go there because they know they're going to catch fish. It's an area of production that they feel very comfortable about and we've got good catch records to prove that, hence the document that I've noted, and obviously there's more information to support that.

Identifying the effect on Talley's business, I really just want to start by being quite specific about the fact that the company's a privately owned fishing company. It's a food-producing company with an extensive seafood division established in 1936. Talley's operates three seafood processing factories on land and a fleet of six deep-water vessels, two large tuna purse-seiners that operate in New Zealand and in the Pacific and an autoliner which operates in the Southern Ocean.

In addition to this, we have 80 inshore vessels fishing to us, 80 individually owned and operated inshore fishing vessels. We do not own the vessels, we provide them with access to ACE. The seafood division also owns significant fishing quota, mussel farms and associated infrastructure. Either directly or through the lease of quota and catch entitlement, we've had a long-established presence in FMA 8 and also the South Taranaki Bight. Talley's own mussel farms in both the Tasman and Golden Bays and Marlborough Sounds areas and has a significant capital investment in the top of the South fishery.

Talley's views the proposed application for mining in the South Taranaki Bight with much concern given the uncertain effects that the proposed mining may have on Talley's capital base and its ability to generate income from its assets in these areas going forward. We are concerned about the potential impact on our aquaculture facilities at the top of the South Island, noting that there is uncertainty in respect of any sediment plume created during the mining operation.

I do note with respect there's been some discussion over the last number of days that may change our thinking on that and I would be very welcome to participate in further conversations about that. I notice Dr Helson and also the conversation with Anthony before indicated some of the conferencing that's occurred and I'm not familiar with that myself, so I'm very happy to participate in further discussion about that.

In that case, I make the point that we acknowledge that TTR has taken steps to try and reduce the impact of this operation by creating a so-called 'environmentally viable solution', extracting and returning sediment, although I'm deeply concerned that sediment transfer at any level has the potential to impact negatively on Marlborough Sounds marine farming operations, which include green-lipped mussels and salmon, and wild fisheries that include various finfish, pāua, rock
lobster and also scallops. Talley's maintains the view that there is still a significant level of uncertainty in respect of any plume and the evidence presented does not yet provide us sufficient comfort.

[4.45 pm]

I want to make the point that Dr Michael Dearnaley in his evidence delivered on 20 February states that the sediment plume modelling shows fines released disperse through the South Taranaki Bight, eastward through Cook Strait. Now, I know that the modelling shows the transfer of sedimentation on a south-easterly direction along the coast of the North Island and I would indicate that it falls well short of that. This is the type of concern that we have and we just need to make sure that we've got some clarification on it. I don't know what effect fines have on fish stocks or further down the track. I guess that just amplifies how concerned we are about the potential effects.

I outlined within my evidence a schematic that showed the quota that we own and I want to make the point that I'm embarrassed that I missed a couple of key stocks within that, for the benefit of the Committee. There are two stocks, school shark and dogfish, within Area 8. Talley's own 129.8 tonnes of school shark and 92 tonnes of dogfish. The summary that I provided indicated that our capital value in the context of the fish we owned in Area 8 and the South Taranaki Bight equated to $7,177,000. Having overlooked those two stocks inadvertently and having added those to the context now at costs of $25,000 and $20,000 per tonne respectively, the capital value of our quota in that area is currently about $12,000,277. I would be prepared to provide you with an updated summary if that would--

MR SHAW: While you're at it, I think if you provided the other information that would make those two species -- the information consistent with that provided for the others, which included the percentage of TAC.

MR SAUNDERS-LODER: If you're happy for me to do that, I'd be delighted.

MR SHAW: That would be fine, yes. Absolutely.


In addition to this, Talley's owns two purse-seiners and a vested interest in New Zealand's international allocation of skipjack tuna. The STB is accessed by TGL's purse-seiners to catch skipjack tuna. The skipjack tuna fishery is important, not just to Talley's but to all participants within the New Zealand fishing industry. As Skipjack Tuna are highly migratory around the Pacific, the fishery is open-access and provides New Zealand companies with an investment opportunity outside the Quota Management System.
Catches of skipjack tuna in New Zealand waters over the past two years amount to 12,411 tonnes and 4,959 tonnes respectively across all of the vessels in the skipjack tuna fishery. The export receipts generated for this species amount to approximately $23.5 million and $9.4 million respectively and can vary significantly based on variables like temperature and access overseas. So, we send our boats into the Pacific. If we had a far more prolific season in the Pacific, the likelihood of us coming down into New Zealand might be rare. Those variables have to be considered in the context of whatever volumes and income we get from that fish.

Talley's also deploys a deep-sea stern trawler to target jack mackerel and blue mackerel in FMA 8. These species typically migrate through the STB in December to May each year. Talley's has only been actively involved in this fishery over the past few years but continues to develop its knowledge and expertise in that respect. Once more, I provide a table that outlines the catch rates of those stocks. I make the very important point that this is nationally, this is not our catch. So, I just gave an overall of what the total jack mackerel catches were and obviously, attached to those, export receipts of $53 million for 2014/15 and $33 million for 2015/16, which I think answers your question, Mr Shaw, in respect of your question of Dr Helson.

It's obvious that we would regard these economics as extremely important to both our company and to other fishermen and all companies that might fish the area. We are yet to see any analysis of how highly migratory pelagic stocks may be affected by increased noise and light, increased salinity or toxic load in the water or the effect of sediment on the migration and spawning patterns of these fast-moving fish from the proposed mining operation. So, that's something that we would obviously want to engage on and try to ensure we had a better handle on as we move forward.

So, moving on to giving some effects on inshore fishermen, of obvious interest to the inshore fisherman is the fishing area known as the "Rolling Grounds", an area of high ridges and dunes. The Rolling Grounds covers all of TTR's proposed site and surrounding areas both north and south and on an easterly part. Part of the Rolling Grounds, although inaccessible to inshore trawlers because of the rocky, undulating surface or foul ground is regarded as a nursery ground and therefore avoided. This is not an uncommon voluntary approach adopted by fishermen throughout various New Zealand fisheries to protect fish spawning areas.

By way of example, I give you an example in Tasman Bay where the fishing industry voluntarily closed inshore areas right throughout the bay to protect what we perceive, I might add, to be nursery grounds for
juvenile snapper. That has proven to be somewhat useful in the context of an increased abundance within that snapper fishery. It has certainly been seen to be a very proactive approach to business.

On the Canterbury Bight area, an elephant fish fishery, the fishery in Area 3 that runs between Banks Peninsula and Timaru, many years ago the fishermen concluded that they were trawling within the surf zone and they were killing elephant fish eggs. So, they decided and drew the conclusion that that was doing the fishery no good, they placed a voluntary arrangement in place whereby they closed 1 nautical mile of the beach to all fishing, and that fishery too has seen nothing but a blossom in abundance. So these relatively discreet but very effective approaches by the fishermen, in the best interests of their business are pretty good examples.

In the STB, I’ve got to be honest, it's not as effective. We haven't had as specific an approach to that, but anecdotal information from fishermen indicates how they feel about that area. It's an area that they might necessarily avoid because of those rocky areas, noting of course that that might be doing something productive or beneficial to the production of the fishery.

I've heard from fishermen who regularly fish in the Rolling Grounds that this area can be subject to storm events which cause discolouration of the water. At these times, higher value species, and particularly schooling species like snapper and trevally, disappear. Given that these anecdotal reports are based on existing natural events and personal observations it's entirely probable that the proposal to return 45 million tonnes of sediment annually is going to potentially result in the displacement of fish.

Should that effort be displaced from FMA 8 to other areas, this quota and its associated lease revenue or ACE will be devalued. Any sufficient significant variation in supply caused by the relocation of effort through the sediment plume, noting that relocation provides no guarantee of catching the same fish, will cause a significant reduction of revenue for both Talley's, and all associated fishers.

By way of example, I provide the fact that if 1 tonne of snapper was displaced from FMA 8, this could result in the loss to Talley's, for argument's sake, of $60,000 capital value. If Talley's were unable to catch any of its snapper at FMA 8, the corresponding loss would amount to $3 million.

These are quite specific figures based around undesirable outcomes, but they just quite accurately provide you with some overview of
exactly what impact that would have on the quota ownership, and also
the fishing activity.

An inshore fishing operator as an individual could lose $5,000 to
$10,000 per year, in fact, of revenue in this area for the species that
would have to be replaced by securing access to similar or other fish
stocks, in different FMAs with the corresponding increase in cost to
access these areas. Noting again that relocation provides no guarantee
of catching the same fish or associated income or value.

Any fish that this fisherman’s unable to catch through relocation, fish
mortality, or habitat degradation has a direct impact on income.
Fishermen just cannot move to another FMA and assume that the fish
and subsequent income will be replaced. It is lost outright. Fisheries
dynamics are such that a fish species that may be targeted
commercially in one area, may not necessarily aggregate in another,
and the added complication of course is that if you’ve got access to the
quota, then you’ve got no access to the fish.

So in conclusion I’m concerned that the effects of the mining, noise,
turbidity, light, increased vessel activity, visible plume, and visible
toxic elements, will have a much larger footprint and impact than is
expressed by TTR and its experts, and may alter fish aggregation and
abundance, both in FMA 8 and adjacent areas, with consequent
negative effects upon Talley’s, South Island Finfish Management
Company, and the Federation of Commercial Fishermen.

These issues of course present a significant concern to quota owners
and fishermen alike. Any disturbance to the natural environment that
is likely to affect fish stocks at any level has a potential to significantly
undermine the existing property rights and capital value of all quota
owners, but also the livelihoods of all fishermen that fish in the area.

Given the magnitude of the proposed operation, this is likely to be
significant.

New Zealand’s fish stocks are not segregated, and are part of a larger
integrated and related ecosystem that relies on many elements to
remain healthy and abundant. It seems to me that the introduction into
this complex and sensitive environment of an enterprise the size and
scale of the proposed mining operation needs to provide absolute
comfort to all existing users that the operation is not going to be
detrimental.

TTR has not, in my view, yet considered the full potential impact on
the fisheries sector, either in terms of flow-on effects, or financially.
Thank you.
MR SHAW: Thank you very much. I've really got only one area that I want to discuss with you, Mr Saunders-Loder. When you were talking about joining conferencing, you were referring to the conversation that Dr Helson and I had around the development of conditions in the event that consent was granted. Is that right?

MR SAUNDERS-LODER: No, actually, I was referring to Ms McGarry's comments, and the last speaker's, about the conferencing between sediment conversations.

MR SHAW: Plume experts, I think those --

MR SAUNDERS-LODER: Which I hadn't seen myself.

MR SHAW: Yes. Well, certainly you're very welcome to the material, and that can be given you.


MR SHAW: That the conferencing process is open to people who are experts (overspeaking)

MR SAUNDERS-LODER: No, no, I get all that. I get all that.

MR SHAW: Yes, cool. Yes.

MR SAUNDERS-LODER: And I guess I'm just conscious of the fact that there's been some development subsequent to what I've (overspeaking)

MR SHAW: That you haven't got.

MR SAUNDERS-LODER: Correct.

MR SHAW: Well, see the staff, and they'll make sure that you get it.

MR SAUNDERS-LODER: That's fine.

MR SHAW: Mr Saunders-Loder, I do want to go back to the question I asked around the development of conditions, though. There's two things there that I want to discuss with you. Firstly, to ask you that in the event that consent is granted, whether or not you would be prepared to contribute Talley's advice and participation in developing conditions that may address your areas of concern. And don't take this as meaning anything around the likelihood or otherwise of consent being granted, but just that if it does happen, whether or not you're prepared to work on the development of conditions?

MR SHAW: Absolutely, good. And just a comment, Mr Saunders-Loder, you make comment about Sanford's interaction with the applicant. And you say that Sanford have no right to develop conditions on behalf of the industry as a whole. I think it's important that it's understood that they are, however, perfectly entitled to work with the applicant in the development of conditions as they see fit. They too have an interest in this area. Were they to claim to speak for people they don't represent, that would obviously be entirely improper. But it doesn't mean they can't go as an individual entity to discuss matters that are on their minds, or of concern to them.

MR SAUNDERS-LODER: I didn't suggest that. Yes.

MR SHAW: Goo. I just wanted to just understand what it was that you were saying there.

MR SAUNDERS-LODER: No, no, no, I agree 100% with you. Their commercial imperative is entirely theirs --

MR SHAW: That's right.

MR SAUNDERS-LODER: -- and they should do whatever they feel fit in the context of their business.

MR SHAW: Yes. That's it.

MR SAUNDERS-LODER: It wasn't my intention to suggest that they couldn't, it was just that they couldn't do it on behalf of everyone else.

MR SHAW: And they certainly can't.

MR SAUNDERS-LODER: That's right.

MR SHAW: Yes. I think that's crystal clear. And I don't think anyone's claimed that they have done so. Certainly the applicant has not. I've got no more questions for you, Mr Saunders-Loder. My colleagues may have, and so may other parties. Dr Thompson?

MR THOMPSON: Mr Saunders-Loder, I've just got an academic question, academic interest --

MR SAUNDERS-LODER: You may not be asking the right person.
MR THOMPSON: Well, it's academic in the sense that it's your chart on page 7, item 19 of your evidence, and it struck me as I read that, that snapper stands out above all other species, and I can't really get my head around it.

MR SAUNDERS-LODER: You're talking about in terms of capital cost?

MR THOMPSON: Yes. Yes.

MR SAUNDERS-LODER: We can't get our heads around it, either.

MR THOMPSON: Is it an historic thing? It's on the books for that? Is it something like that?

MR SAUNDERS-LODER: Well, with respect, it's a moving target, I guess. It's like any market commodity that you're dealing with. It will be relative to the market value, and what's going on. So in the context of that, these fish -- to be clear, they're not figures that I have just plucked out of the air. They're from FishServe, which is an ASDO-approved service delivery organisation for the industry, that collects and collaborates all of the information in terms of quota trades.

MR THOMPSON: Yes.

[5.00 pm]

MR SAUNDERS-LODER: So it's as accurate a figure that I can come up with that's generic. So it's not a figure that I've dreamed up or tried to identify as being more than it is.

MR THOMPSON: Yes, it's in no way representative of the retail cost of fish.

MR SAUNDERS-LODER: No, but unfortunately --

MR THOMPSON: So that's why I'm -- yes.

MR SAUNDERS-LODER: No, no, I understand that. I understand that, and the reality is, in the context of all those stocks, the retail fish probably comes secondary in the context of trying to set those values. Because you're really dealing with something that you're basing around harvest. So for us, particularly as a company, well, I don't mind telling you, we'd struggle to pay $60,000 a tonne because we would be struggling to see if we can get a return out of it.

MR THOMPSON: You'd be very lucky.

MR SAUNDERS-LODER: Yes.

MR THOMPSON: Yes. Yes.
MR SAUNDERS-LODER: So those are accurate figures, based on common industry measures, and you've picked up on that very well.

MR SHAW: However, $2,500 for red cod is $2,500 too much.

MR THOMPSON: It's too much.

MR SAUNDERS-LODER: Yes, well, I don't make them up.

MR THOMPSON: That gets rebranded as Akaroa cod.

MR SAUNDERS-LODER: Yes, yes.

MR THOMPSON: I think we have a clear understanding of your concerns, from the effect on the fish and on the fishery. A question: do fishing companies hedge their bets in terms of having a foot in every quota area? Is that a means of --

MR SAUNDERS-LODER: No. No, most, no --

MR THOMPSON: You don't? No?

MR SAUNDERS-LODER: Most fishing companies in my experience operate pretty much on a geographic basis. So Talley's by way of example have a relatively strong position in the South Island. We've got good quota holdings right throughout the South Island, but we're clearly not the only one. There's United Fisheries, Independent Fisheries, all of these guys have quota in the same areas. So Sanford, by way of example, have significant quota holdings in the North Island, and probably more predominantly in the northern part of the North Island, the East Coast of the North Island. So it's more geographic than just having a foot in each camp.

And when you consider quotas, and where we stand with quotas, they were historically allocated on catch history. So, a large number of these quotas still exist, based on the fact that they were provided to either individual fishermen or to companies based on that history.

MR THOMPSON: Of what they did in the past.

MR SAUNDERS-LODER: Correct.

MR THOMPSON: The way they operated.

MR THOMPSON: Okay. All right. And I was interested to see that you have identified in the Rolling Grounds a nursery fishery, and the fact that many fishing companies, or -- I guess you've got to co-operate with your competitors to set aside areas for non-exploitation.

MR SAUNDERS-LODER: Well, yes, but I don't want to be disingenuous about that. Like I outlined in terms of snapper and elephant, we've got two very real specific cases, where guys have actually put a line around it and -- the Rolling Ground conversation that I've presented there is not spurious, but it's relative to the same sort of feeling. Fishermen in their own minds will say to themselves it's an area that we should probably protect, or keep away from, because we know that we've got good quantities of terakihi or snapper or trevally in the adjacent areas. I've said it within my evidence, and I stand by it based on what they've told me, but it's not an area that they've put a ring around and decided they're just going to turn into a nursery ground. It's probably more anecdotal than anything, to be upfront and transparent about it.

MR THOMPSON: No, thanks very much.

MS McGARRY: Thank you very much. My microphone. I'm interested in some of your comments about the migration of tuna and that you're concerned that they might not migrate through the application site and the plume area. So what is it you think may happen?

MR SAUNDERS-LODER: Well, I guess, in the context of migratory stocks, it's relatively hit and miss. It's highly likely they could find themselves heading through the South Taranaki Bight. It's not inconceivable that they don't; you just don't know. And the trouble with that type of thing is that with highly migratory stocks, particularly, you tend to follow them. And highly migratory stocks are typically pelagic or tuna stocks. And they are very -- what do you call it? Temperature driven. So you'll find, depending on the water temperature, the fish will congregate, depending on what suits them best. And it's within those water columns and those higher temperature columns that they probably find their feed, and that's what they're following.

[5.05 pm]

MS McGARRY: So it would be fair to say that their migratory patterns are quite variable anyway?


MS McGARRY: Your evidence very much talks about the South Taranaki Bight as a whole.
MR SAUNDERS-LODER: Yes.

MS McGARRY: And I guess when we look at the assessments that have been done, there's been criticism about averaging things out sort of over, well, half of the areas, what sort of the sediment modal domain is, about half of that.

And the only criticism there is that it can take the magnitude of the localised effects away. So if we accept that as an overall opposition of the STB, that it appears to be coming out of the conferencing that there's general agreement that the effect on both primary production and fish is likely to be minor, then to me that brings us back to looking more at localised effects. So my question really to you is, as I say, reading your evidence, it seems to be as a whole. What are the real values of the application site itself, in terms of the fishery?

MR SAUNDERS-LODER: I'm not sure that I truly get you. I'm not sure that I understand.

MS McGARRY: You've suggested, for example, that the catch and effort maps be overlain over the plume area, and I think Dr Robertson has come back and said that's actually been done and pointed to the report where it's been done, and Dr MacDiarmid showed us that. It showed that there's not a lot of effort, and there's not a lot of catch in the actual application zone itself. So I'm trying to hone in, you've sort of talked in a very general sense about the South Taranaki Bight, I'm --

MR SAUNDERS-LODER: Okay, well, I think I get you now. The reality is --

MS McGARRY: Yes. I'm asking you about the localised impact.

MR SAUNDERS-LODER: If I was totally honest, I've got to consider the localised impact in the area, I think, is probably quite negligible. But it's the downstream effects of the sediment plume that concern us most of all because it's within that area that we'd do most of our fishing.

MS McGARRY: Okay.

MR SAUNDERS-LODER: So it's about those downstream effects, and knowing and having comfort in the fact that it's not going to have any negligible effect. See, the comment I made about the discoloration of the water, by fishermen, is an anecdotal assessment of what they've seen happen on occasions. You touched on the skipjack fishery. When we're harvesting skipjack, we use a multitude of methods to corral them. One of those methods is using a biodegradable dye. You can move fish, depending on what you do with the colouration and the difference in water.

So I guess I'm just likening it to that type of approach. We're in a situation where we're really dealing with a relative unknown, even
though a number of experts tell us it's just not going to be at that level. I struggle to get my little mind around the fact that it can't be, when I know that we've got these situations occurring in a natural sense. So it's about truly understanding and having confidence in the fact that the plume is not so significant that it's going to have an effect on those fishery, in a downstream effect.

MS McGARRY: So you're looking for confidence, and we are going back to look at getting the sediment plume modelling redone in terms of looking at a worst-case scenario. And our focus there really is on the percentage of fines, and other environmental conditions like wave height and period of the wave that could -- and also putting the sediment on to the seabed and not into a pit. Because I think, on this side of the table, we see that as sort of the worst-case scenario.

MR SAUNDERS-LODER: Right.

MS McGARRY: So I hope when we get that information that that might give you a greater level of confidence in seeing what the worst extent of that might be.

MR SAUNDERS-LODER: So if I thought of myself, if I thought like a fish, I would want to think quite seriously about any level of sedimentation in the water. I'd be wondering to myself whether that's more like a fog, or whether it's more like smoke. If you understand --

MS McGARRY: Or whether it's you hunting me.

MR SAUNDERS-LODER: Yes, well, that's right.

MS McGARRY: Using dye.

MR SAUNDERS-LODER: All of that. All of the above. But my point -- you know what I mean? I don't have enough knowledge, I don't stand qualified to know whether those effects are as dramatic. At the moment I provide my evidence based on what I understand, but I'm not going to die in the ditch on that. If I hear something else that proves to me that I can carry on in my existing business without any detrimental effect, and there's protocols put in place to ensure that that happens, why else would I be worried?

[5.10 pm]

MS McGARRY: Yes, well, I think the conditions put forward by the applicant at the moment require that once a certain threshold is met, that the operation, if they can't meet that threshold, they will need to cease. So very much on this side of the table, that's what we're looking at, and I think where
Mr Shaw has encouraged you as an industry to look at those conditions --

MR SAUNDERS-LODER: Yes, taken on board.

MS McGARRY: -- and as I say, there's certainly no predetermination on this side of the table in that regard.

MR SAUNDERS-LODER: No, no, we respect that.

MS McGARRY: You probably heard my question to Dr Helson. And it's really just we're trying to weigh up that we've got fishers, as a group, and you've made comments talking about all fishers being worried. But we actually have divergent views on this application. To Dr Helson I said, "Is it really just a perception of risk issue?" I'm just wondering if you've got any insight as to why we've got this divergence of views.

MR SAUNDERS-LODER: Well, I think it comes back to the question about geography. You've got a divergence of views because you're dealing with a multitude of different dynamics, depending on the fishery you're dealing with. There will be some people that will not be affected by this decision. There will be some people that will not be affected by iron sands mining in the context of the South Taranaki Bight because they may not fish there. But there's a whole lot of people that both own quota, and I'm talking about little owner/operators that don't have any significant representation, that won't even contemplate not being able to catch their terakihi, trevally, snapper, because I didn't do my job. So in simple answer to your question, I think it's about that. It's about the fact that dynamically, people are dealing with fisheries differently on a geographic basis. And I think it's as simple as that.

MS McGARRY: Thank you. You've talked about this nursery area in the Rolling Grounds. I wonder if you could identify that area for us? I'm not saying to do it on the hoof, but would it be possible for you to provide us a map showing the general area of this nursery area that you're particular referring to?

MR SAUNDERS-LODER: I would happy to explore that and get something to you.

MS McGARRY: That would be great. Just one final thing, and that's really whether you've had the chance to read Dr Don Robertson's statement?


MS McGARRY: It's a shame that you haven't because I think you would have liked the opportunity, probably, to respond to some of these things. I guess what he's saying here is that he thinks that the effects of the sediment would be very difficult to distinguish from any short-term impact from spatial
displacement from normal background variability. Any response to that?

MR SAUNDERS-LODER: No, I can't provide a qualified response.

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MS McGARRY: No. I'm really just trying to give you an opportunity here, rather than putting you on the spot. Because this is it for you, and I had hoped that you would have seen this.

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He's pulled out some of your statements and, in concern about the damage to the benthos, he's said that the statements you've made seem to overlook the fact that large-scale bottom-trawling is a major disturbance of the natural environment, that is likely to affect fish stocks, implying there that a far greater effect than the seabed mining activity.

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MR SAUNDERS-LODER: That's a pretty emotional response, pretty emotional attack. The reality, you're not talking about large-scale trawling, and you're not talking about areas of fish that are under stress. You're talking about fish -- trawling, by way of example, and by its very nature, the boats that are fishing this area would be less than 20 metres in length. They would normally be typically 40 - 50-footers that would be looking for a mixture of flatfish, red cod, gurnard, and the snapper, trevally, etc. Those boats would fish, as I explained earlier, on relatively infrequent occasions based on weather events and their availability. So, they are not having a hugely detrimental impact, and it's typically -- well, it'd be interesting to look at the catch records in terms of exactly where they're fishing, but you will find typically, with that type of activity nowadays, trawl technology has just improved ten-fold on what it was ten years ago, by way of example.

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Fishermen tow less time on the bottom. They've got electronics that give them far greater indication of what they've got in their nets. They tow the same areas. In Tasman Bay I have fishermen that refer to the "in-peaks line", or "the corridor", and the reason they do that is because that's the productive areas that they go to fish. They don't steam out through the cut at Nelson and then tow aimlessly into the distance, hoping they're going to catch fish. They steam for three hours, four hours, or wherever, to those areas that they've established, and the historic fishing patterns, and they will fish them on a continuous basis. That's not dissimilar to any trawling operation within the country.

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[5.15 pm]

So I do take a little bit of -- not offence, but certainly a bit of -- I'd certainly take a little bit of offence that he refers to it as "large-scale trawling", and in areas where fisheries are under stress, because that's just simply not the case.
MS McGARRY: I think he's referring to the fact we've certainly see maps showing where trawling effort's been and showing the exact trawls, and it's quite hard to see any areas where they haven't been that they're allowed to go. So I guess he's saying that probably trawling over many years has been over much of the seabed before.

MR SAUNDERS-LODER: Which is a modified environment, and will continue to be so, as long as they continue fishing in that way. So I guess the point I'm making in response to Dr Robertson's position is that it is a modified environment, it's been modified for a number of years, and it's not a comparison, necessarily.

MS McGARRY: Well, on our side of the table, we are charged with looking at other permitted activities and consented activities and the effects of those activities and then comparing those to the effects of this activity proposed.

MR SAUNDERS-LODER: So in order for you to be able to make a reasoned judgement on that, you need to have the best available information. And that's what I'm hopefully trying to provide.

MS McGARRY: Yes. Thank you.

MR SHAW: A very neat conclusion to the answer, Mr Saunders-Loder.

MR SAUNDERS-LODER: Oh, sorry.

MR SHAW: No, all good. All good. Mr Coates.

MR COATES: I'll try and mop up with the few remaining questions. You talked about fishermen who regularly fish the Rolling Grounds saying that if the storm events cause discolouration, and the high value catch disappears, but of course it doesn't disappear, does it? It goes elsewhere. Elsewhere within FMA 8, or --


MR COATES: Yes.

MR SAUNDERS-LODER: That's what I truly suspect. You're not talking about it leaving the country.

MR COATES: No.

MR SAUNDERS-LODER: It's actually moving in conjunction with that discolouration and sedimentation. So it's having an effect on the fish, but my general belief is that it would be relatively temporary, to be honest.
MR COATES: But the fishers would then have to steam further to find some catch?

MR SAUNDERS-LODER: I suspect that's why they make the distinction. The --

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MR COATES: What would be the sort of margin or operating costs? You talked about three or four hours of steaming to get to a fishing ground. What percentage increase in boat costs would steaming twice the distance mean?

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MR SAUNDERS-LODER: It's a very difficult question to answer because you're just talking about such a variety of operations.

MR COATES: I'm thinking about, is it sort of 1% or 2%? Or is it 10%?

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MR SAUNDERS-LODER: A fishing boat at the moment would be operating on about 15% fuel. So if it was required to, say, double the distance that it was travelling, then it's potentially increasing its fuel costs accordingly. I wouldn't say by double. Because you're in a situation where you're able to cut down on travelling time dependent on where you go, but I'm just conscious of the fact that I could have a boat that could travel one distance and it could cost $1,000, and another boat could cost $4,000. So it's relative to the horsepower, the type of vessel it is. How many crew it's got, etc, etc. So the costs are very difficult to try and pinpoint.

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MR COATES: Yes.

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MR SAUNDERS-LODER: But if you wanted to, and you thought it was valuable, I would be happy to try and give you some examples, if that was useful. Rather than thinking on the hoof, give some consideration to what that would mean.

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MR COATES: It may be helpful. So if it was not too much trouble, it could be useful. But again, I think the indicative figures you've given are okay for now.

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MR SAUNDERS-LODER: Okay.

MR COATES: You've talked about quota and ACE, and my understanding is that quota is often owned by people who don't fish the quota, they lease it out for a period of years, or is it at least an annual basis? Is that correct?

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[5.20 pm]

MR SAUNDERS-LODER: There are people within the industry that own quota and do not fish it. But in the main I think they're relatively few and far between. I think most companies and most fishermen have got strong enough relationships and understandings that they utilise their portfolios effectively. So, a company like ours, for argument's sake, in the best

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interests of meeting all of our expectations, we want to be able to maximise our portfolio. So it's about working with a great number of fishermen and ensuring that your quota is caught.

But there's a few, what we refer to, "Queen Street quota owners", and I just don't think in the main that there's a great deal of them.

MR COATES: I didn't think many Māori lived in Queen Street. Māori would be perhaps the more likely to lease out, do you think?

MR SAUNDERS-LODER: Possibly. There are some iwi entities that have made a real good go of trying to participate in an operational sense. But yes, no, that's an example of one group of people that would predominantly lease fish out. Or collaborate, identify with larger volumes that they can part with.

MR COATES: And the ACE is an annual catch entitlement?

MR SAUNDERS-LODER: Correct.

MR COATES: And so that goes with the quota lease?

MR SAUNDERS-LODER: With the quota shares. The quota owned. So the ACE is spooned from the quota owned, and it can be transferred separately.

MR COATES: Separately to the lessor?

MR SAUNDERS-LODER: Correct.

MR COATES: I think the question of Sanford has been canvassed enough. When you talk about, "The footprint of TTR may alter fish aggregation and abundance", just tell me about aggregation versus abundance. Are you saying that fish will group together in a different place?

MR SAUNDERS-LODER: I guess, to be honest, I'm struggling with the concept of it because of the fact that I don't know what impact a sediment plume might have on fish generally. In terms of an aggregation, my comments about sedimentation and what I've heard and seen in terms of being able to redirect fish, aggregate it, I stand by. But I don't know that I can -- my comments in respect of abundance are relatively speculative, in the context of me not yet knowing what sort of detrimental impact that might have, if any.

MR COATES: Yes.

MR SAUNDERS-LODER: So I guess, just to be clear, that my comments in respect of abundance are relative to whether in actual fact there's an effect.
MR COATES: You're saying it's a potential, rather than a --

MR SAUNDERS-LODER: Something that I know not yet.

MR COATES: Yes. And in your conclusion, in paragraph 48, you say:

"It has the potential to significantly undermine the existing property rights and capital value for all quota owners, but also the livelihoods of all fishermen that fish in the area."

And that's a statement that you stand by?

MR SAUNDERS-LODER: Most definitely, if it eliminates our ability to continue harvesting or accessing the quota we've got available. I'm sure it will be the case.

MR COATES: Yes. Thank you very much.

MR SHAW: Just as for some fishermen, the journey will be longer, for others the journey may be shorter, mightn't it?

MR SAUNDERS-LODER: It could well be.

MR SHAW: Which is exactly the case today.

MR SAUNDERS-LODER: Yes.

MR SHAW: And will be tomorrow, and next week, won't it?

MR SAUNDERS-LODER: I'm sure it will be.

MR SHAW: The thing about fish is, they're not always where you want them to be, are they?

MR SAUNDERS-LODER: No, they're not.

MR SHAW: No.

MR SAUNDERS-LODER: They're not.

MR SHAW: And the question is, and this is an important issue, because I think when we looked at the image that, I think, came initially from Dr MacDiarmid, the pixelated image.

MR SAUNDERS-LODER: Yes.

MR SHAW: About where the effort was going on, and where the tonnage was being caught. And it was very different, wasn't it, the effort that was going
on inshore, the number of trips, many, many more than the number of trips in the outer area, beyond the mining area. But the tonnage being caught beyond the mining area was far, far greater.

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MR SAUNDERS-LODER: Yes, and that's --

MR SHAW: And the value was far, far greater, as well.

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MR SAUNDERS-LODER: And that's what I'm largely referring to, I think, in the context of my evidence. As I said before, my position is more to do with the downstream effects in the South Taranaki Bight, where the plume is effectively going to go, and you're going to -- see, in the context of the NIWA survey, and the information that Dr MacDiarmid provided, I took from individual stocks throughout the South Taranaki Bight that there's actually reasonable abundance for most of them. The ones that I'm concerned about. She promotes it in her summary.

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MR SHAW: Absolutely.

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MR SHAW: I think it's also very important when you look at that, and again this might even go to the issue of conditions, I don't know.

MR SAUNDERS-LODER: Right.

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MR SHAW: But where you look at lines drawn on the ocean in terms of the extent of the plume, the plume is not equal at all, it's not the same density everywhere, its effects are going to be different.

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MR SHAW: And the load against the existing or background I think is going to be different. But the overall conclusion of the experts who looked at the impact on fish, they were pretty consistent one with the other in that that impact was far from spectacular, but that that was only the beginning point. And this was the point that I think was being made by Dr Helson this morning.

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MR SAUNDERS-LODER: Yes.

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MR SHAW: That that's the starting point, and these other factors have got to be taken into account. And I'm not sure that we've got our heads entirely across that.
Anyway, Ms Haazen, have you got any questions?

MS HAAZEN: No, sir.

MR SHAW: Mr Holm? No? Anything from you, sir, Mr Dawson? No? Well, that was easy. So thank you, Mr Saunders-Loder.

MR SAUNDERS-LODER: Thank you all very much.

MR SHAW: And we are at 5.27 pm, which seems like an excellent time to call a halt to the day. Thank you all very much. We'll see you all in the morning.

MALE SPEAKER: Could I raise just one point of information?

MR SHAW: Yes. Yes.

MALE SPEAKER: There was a considerable discussion this morning in relation to crawler noise in the ocean and marine mammals.

MR SHAW: Yes.

MALE SPEAKER: Largely due to my oversight, I forgot to bring to your attention that there is in fact a technical report dealing with this topic in the material that was handed in with the impact assessment. I'd just like to be able to refer that to the panel, and any other parties --

MR SHAW: I think that would be very helpful.

MALE SPEAKER: -- and make sure that everyone gets to read it before we --

MS McGARRY: The Hegley report.

MR SHAW: Yes.

MS McGARRY: Well, we'll be referring to that.

MR SHAW: Yes, we've got it. But, anyway, no matter. That would be good.

MR SHAW: All good. Thank you. Yes, Mr Dawson?

MR DAWSON: Sir, I did forget one matter. Would Mr Loder be in a position to be able to respond to Don Robertson's comments in --

MR SHAW: Not at 5.27 pm this evening, he's not.
MR DAWSON: No, no, not this evening, but just in writing, in a similar fashion to Dr Helson?

MR SHAW: Absolutely. Yes, yes, fine. Well, we're hearing from Dr Robertson tomorrow.

MR DAWSON: Next Thursday.

MR SHAW: Thursday, was it? Yes. Yes. So, yes, by all means.

MR DAWSON: Thank you, sir.

MR SHAW: And, these matters, when we get to oral responses to those, then they're obviously there in closing submissions as well.

MS HAAZEN: Ms Haazen?

MS HAAZEN: Sorry, I had a question. We've been following the uploading of the transcript, and some of our follow-up questions were going to be based off the transcript or just a finer reading of it.

MR SHAW: Yes.

MS HAAZEN: The transcript is not loaded up yet, but once it does, do you mind that delay? That we put in written questions for (overspeaking) on that.

MR SHAW: For? If they're in writing, yes, but it's only in pretty extreme circumstances that we're going to be calling people back.

MS HAAZEN: I understand.

MR SHAW: We've got a big body of work to deal with.

MS HAAZEN: Yes.

MR SHAW: And as I said before, we want to avoid playing table tennis. So we don't want questions asked that beg a whole new set of responses.

MS HAAZEN: Yes, that wasn't the intention, no.

MR SHAW: Yes.

MS HAAZEN: Just for those experts that we didn't manage to have follow-up questions for.

MR SHAW: That's fine.

MS HAAZEN: Yes.
MR SHAW: Okay. Thank you all very much, and we'll see at least some of you tomorrow.

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MATTER ADJOURNED AT 5.30 PM UNTIL THURSDAY, 23 FEBRUARY 2017