C. Pearce: First of all, I'd like to thank the committee for allowing me to show up here today and present some of my research findings to date. It's sort of an ongoing process. We're still analyzing some of the results, still going out in the field and collecting some samples. It's an ongoing process, but I wanted to give you a quick update of what I've found so far.

Of course, this is the beast that we are looking at producing. These are adult geoduck clams that were produced on intertidal culture leases down in Washington State. Before I dive into the research end of things, I'd like to give you a brief introduction about the beast itself.

It's called the Pacific geoduck clam. The scientific name is *Panopea abrupta*. It's a bivalve mollusc — bivalve meaning it has two shells. It's closely related to oysters, scallops, other clam species. The average size is about 19½ centimetres in shell length and a one-kilogram wet weight, although they can get up to about 23 centimetres in shell length and almost nine kilograms in wet weight. So they can get quite big. It's actually the largest burrowing clam in the world, which is quite amazing. They're quite long-lived. The oldest individual on record to date is 168 years, so they're very long-lived.

On our coast they're found from central Alaska down to central California, and on the west coast of the Pacific, from Siberia down to Japan. They're also found in Panama. Of course, they're native to British Columbia, meaning they're not introduced, unlike Pacific oysters and Manila clams, which we also culture and which are introduced.

General habitat. They live in gravel, sand, silt, mud. They occur in the low intertidal down to a depth of a hundred metres or more. They're typically buried in the sediment to a depth of one metre. They're harvested with these high-pressure water jets or stingers. They need to use these in order to liquefy the sand in order to pull up the adult clams. You simply can't grab hold of the siphon and pull them out without liquefying the sediment first.

They are filter feeders, meaning they filter small particles out of the water column, so we're not adding any food to the system to feed the cultured clams.

They have separate sexes. Males and females are separate. Spawning typically occurs in the summer months. The eggs are fertilized in the water column,

and the larvae develop in the water column as well. Typically, it takes 40 to 50 days in order for the larvae to fully develop. Then they will land on the sea floor and metamorphose into the juvenile clam.

They can become reproductively mature as quickly as two to three years old, but I think they become 100-percent mature around seven or eight years old. They can recruit to the fishery as young as four years old.

[1040]

As Andy pointed out, there are no known infectious diseases to date. This has been studied by Dr. Susan Bower at the Pacific Biological Station and partly funded by the Underwater Harvesters Association. That's not to mean that infectious diseases couldn't develop once we start full-scale commercial aquaculture, but to date she's looked at hundreds of clams, and there are no known infectious diseases.

A little bit about production and value. I think Al touched on this a bit. In 2005 the B.C. fishery was worth $32.7 million. They brought in 3.4 million pounds at an average price of $9.50 per pound. Washington State that same year brought in 4.6 million pounds for $21.2 million U.S. at $4.60 U.S. per pound.

That same year aquaculture production in Washington State, which was 100-percent intertidal production, brought in about 960,000 pounds. That's almost 20 percent of their total landings. I don't have the economic values for the aquaculture product, but it's probably around the same price — $4.60 per pound.

This is what intertidal culture looks like down in Washington State. It's done on a fairly large scale. They have, I think, over 1,000 hectares in production. They use PVC plastic tubing, which they insert into the sediment as predator protection. They put the pipes in the ground, then they put seed in the sediment within these pipes, they cover the pipes with mesh, and that protects the young seeds from various predators.

This shows the extraction process in the intertidal. You can see the fellow on the left there. He's almost waist-deep in sediment. He's using the high-powered water jet or stinger to liquefy the sediment and pull up the clams. It's a fairly disruptive process. You're liquefying the sediment down to a depth of a metre or more.

Before I go on to summarize some of my own work, I wanted to give the committee a brief overview of what has already been done out there in regards to looking at the potential impacts of geoduck culture and harvesting on the environment. There are a few studies that have been reported.

Goodwin, 1978. He compared unharvested and harvested plots — small plots, three by 30 metres. He took sample cores in both plots prior to harvest and then after harvesting. He found that harvesting the clams did not significantly affect the sediment grain size in the plot as a whole, but when he looked at the harvest holes themselves — where they've actually stung out the clams — he found that the harvesting significantly decreased the percentage of fine- and coarse-grained sediments.

He found that harvest had little or no effect on larger benthic organisms or organisms in the sediment, but harvest affected numbers and weights of small organisms between one millimetre and 3.65 millimetres in size. However, he hypothesized that the effects would be short-lived and probably not evident after a year or two, although he didn't actually prove this; he just hypothesized it.

He found that the average hole size was approximately 0.3 cubic feet. After four days these holes filled in considerably, and also the disturbed depth decreased in this time period. And he found that the holes completely filled in after approximately seven months.

Another study, conducted by some DFO scientists in 1983 and available as a Canadian technical report of Fisheries and Aquatic Sciences, compared three different plots: an unharvested plot, a plot from which all geoducks had been removed two years previously, and a plot totally harvested half a year prior to sampling.

[1045]

They found that there was no significant difference amongst the three plots in terms of sediment grain-size distribution. They found that some of the infaunal species — infaunal being organisms living in the sediment — decreased while others increased due to harvesting, and there was no simple relationship. They actually found that species diversity was highest in the most recently disturbed plot and lowest in the undisturbed plot, which is an interesting finding.

One more study that I want to review is a private consultant company report. Ebasco Environmental did a study in 1992, which they submitted to the state of Washington Department of Natural Resources. They examined previously published research — basically, the two studies that I just overviewed: Goodwin, and Breen and Shields.

They also went out and conducted some field experiments, and they modelled sediment plume transport. What they did was go out and harvest clams in the subtidal with these high-powered water jets or stingers. They tracked the sediment plume in the water column, which was generated by the suspended sediments that were kicked up when they liquefied the sediment.

Their overall conclusion was that the transport and fate of suspended sediment associated with commercial geoduck harvesting would have minimal impacts on the physical environment in the harvest tract and adjacent areas. So that sums up, basically, the research that's been done in the past on looking at the effects of geoduck aquaculture and harvesting on the benthic environment.

Now I want to move into some of the research that I've been conducting in the last two years. As I said before, it's a work in progress. We haven't finished yet, but I want to give you an update on where we are to date.

We have two experiments running: one in the intertidal and one in the subtidal. They basically have the same three objectives. One is to assess the effect of different forms of predator protection on survivorship and growth of juvenile clams. I won't be presenting any

of this research today, because it doesn't really bear on the environmental impact issues. It's more of a production issue.

We are looking at assessing the potential effects of geoduck culture on the benthic environment. We're also looking at assessing the potential effects of harvesting the clams on the benthic environment.

A little bit about our progress to date. The intertidal experiment. We harvested the clams last July, after one year of grow-out. We've completed all the field sampling. We are still going through some of our sample processing now. We went out and did some benthic sampling immediately after harvesting, then at four and six months after harvesting. We still have some of those samples to process.

The subtidal experiment, we're still running. We will be harvesting those clams this month. The field sampling after harvest will continue on into the summer of 2007, and we hope to have all the sample processing done by the fall of 2007.

I want to talk a little bit about the intertidal study. I won't be presenting any of the results of the subtidal study today. We're still analyzing a lot of the samples. But I will focus in on the intertidal study. We're running that at the head of Nanoose Bay. It's an intertidal plot at about 0.5 metre chart datum — fairly low in the intertidal. It's a relatively small plot size — 20 by three metres.

[1050]

We're using the PVC tube–protection methodology that they use down in Washington State, as I showed you earlier in those figures. We're looking at three different factors. We're looking at the effect of tube diameter, tube length and the size of the mesh screen covering these tubes.

We have eight experimental treatments in total, with 30 replicates per treatment. So we have 240 tubes in total in the ground. This is what our experimental research plot looks like in Nanoose. You can see all the PVC tubes buried in the sediment.

We seeded out the juvenile clams at about 20 millimetres to 60 millimetres shell length in July 2005 after having measured individual shell length and wet weights. We planted two seeds per tube. Again, they were planted at 0.5-metre tidal height. Then we went back a year later, in July 2006. We harvested the clams and we assessed growth and survivorship.

Now, I should point out that typically, you wouldn't harvest within a year of outplanting. It would take five, six, seven years. We didn't have that amount of time or money to conduct the experiment that long. So we harvested the clams after a year, and we harvested the sediment to a depth as if they were adult clams. We harvested down to a depth of approximately a metre, even though we didn't need to go that deep to get these juvenile clams out.

We are also looking at assessing impacts on benthic environment. How are we doing that? We took benthic sediment samples before placing anything out in the field. Before putting any of the clams out, any of the tubes, we took sediment samples to determine various things, including sediment grain size; the amount of organic material in the sediment, or percent organics; the concentration of sulphide in the sediment; ORP, which is oxidation reduction potential; TOC and TN, which are total organic carbon and total nitrogen; and infaunal diversity. These are typical measures that you would look for when you are going out and trying to assess environmental impacts on a sedimentary environment.

After having planted out the clams, we then went back immediately after outplanting and took further sediment samples. We also collected samples at four, six, ten and 12 months after planting out the clams. Then we extracted the clams with a high-powered water jet or stinger. We took sediment samples immediately after harvesting those clams, then we went back four and six months after harvesting and took further samples.

At each one of those time points we took samples within the culture plot, so where the clams were seeded — that three-by-20-metre area — and also at varying distances from that plot — five, ten, 25 and 50 metres distance from that plot along three separate transects. We had one transect running parallel to the shoreline at the same tidal height as the plot. We had another transect running perpendicular to the shoreline towards the ocean, and another transect running perpendicular to the shoreline towards the beach.

The next two slides are going to be summary slides. I'm not going to present any figures. I didn't want to bog down the committee with a lot of bar graphs and line graphs and bore you. Basically, I wanted to give you the bottom line of what we have found with the intertidal study.

There is a lot of stuff here, so I'll take it slowly. If you look along the left-hand side, the white letters there, those are the various variables that we measured — percent organics, concentration of sulphide at two centimetres, concentration of sulphide at four centimetres and so on. The next two columns, the blue columns, are comparing pre-seed samples versus post-seed samples, so before we put the clams out versus after. Then the two yellow columns are comparing preharvest versus post-harvest.

[1055]

Now, NS signifies non-significant. So when you see that, there was no significant effect of either the seeding process or the harvest process. When you see an "S," that means a significant effect.

We saw significant reduction in the concentration of sulphides at both two- and four-centimetre depth in pre-seed versus post-seed samples. The other point I should make here is that the first blue column is the zero-metre column. That's data collected from within the seeded plot, and then the second column, the zero-to-50-metre column, is data collected from the research plot as a whole. That includes all those sample points along the 50-metre transects that we took.

There was a significant reduction in sulphide concentration within the seeded plot and for the whole research plot, looking at pre-seed versus post-seed

samples. We had a significant reduction in percent of organics in the preharvest versus post-harvest samples.

But I should point out that those post-harvest samples were immediately after stinging out the clams. We haven't looked at the four- and the six-month post-harvest samples yet, so we could be getting back to normal conditions once we look at the four- and six-month samples.

The only other significant changes were with the oxidation reduction potential. We had a significant reduction looking at preharvest versus post-harvest samples. But we didn't actually see this in the seeded plot. This was in the whole research plot. So I'm not sure that's an actual effect of harvesting the clams per se. It may actually be an effect of season or time.

This slide shows more summary. We're looking at grain sizes now, so along the left-hand side you see various grain-size fractions running from greater than two millimetres to less than 45 microns. They're going from coarse to fine. Very few changes here. No changes whatsoever upon seeding the clams out. There were a few changes going from preharvest to post-harvest, a significant reduction in the amount of core sediments greater than two millimetres in grain size and a significant increase in the fines — 125 to 250 microns, 63 to 125 microns, and 45 to 63 in micron size fractions.

That's to be expected because when you're stinging out the clams, you are liquefying the sediment down to a depth of one metre. The fines are coming to the surface, and some of the heavier particles are sinking. So that's why you see significant reduction in the core sediments and an increase in the fines. Again, this is looking at samples taken immediately post-harvest. So they may go back to background levels when we check the four- and the six-month post-harvest samples.

What is there to conclude from all this? Well, based on the published reports that I have reviewed for you and the current DFO research that I'm conducting, it seems that geoduck culture and harvesting appear to have relatively minimal effects on the benthic environment. Any impacts that do occur are restricted basically to near-field or near to the harvest plot and are typically short-lived.

What do we need to do in the future? Well, I think we need to conduct more research on potential impacts on nearby sensitive habitat, like eelgrass and kelp beds. Nobody has looked at this yet.

[1100]

I think we want to be careful and monitor the potential impact of commercial-scale aquaculture development. What we've been doing in the past — what these studies that I have

reviewed for you have done — is conducting research on typically smaller-scale plots, not really commercial sized. So we do want to be careful and monitor potential impact of larger harvesting practices.

I just want to end briefly by thanking my funding sources for this research: Fisheries and Oceans Canada; the aquaculture collaborative research and development project, ACRDP; B.C. Ministry of Agriculture and Lands; and our industrial sponsor, Manatee Holdings Ltd.

I thank the committee very much for allowing me to present today.

R. Austin (Chair): I believe we're going to be losing a couple of members for House duties. I'm going to open the floor for questions so they can have an opportunity to ask their questions before they have to leave.

Also, my understanding is that there's quite a difference between intertidal geoduck production and subtidal. So I think it will be interesting just to have a break here, because most of your research is about intertidal, but I understand from the first presentation from Al that the new industry or the commercialization is really subtidal.

Anyway, Dan has a question. I think he might have to leave, so why don't you start with Dan.

D. Jarvis: Actually, I've got a couple that run together. I just wondered, sir, if your seeded areas are treated in any way differently from what the wild would be, prior to being seeded.

C. Pearce: No.

D. Jarvis: Okay.

You mentioned about fallowing. Why would you have to fallow if there's no difference between the seeded and the wild? The wild certainly aren't fallowed — or do they have a natural fallowing? I'm not following.

C. Pearce: I didn't mention anything about fallowing.

D. Jarvis: I thought you mentioned…. Maybe it was Al that mentioned something about fallow.

C. Pearce: Al, did you say something about fallowing?

A. Castledine: No.

D. Jarvis: He mentioned purging. Maybe the purging is what I got confused with.

Then in that study done in '78…. You've mentioned the hypothesis had not been proved. Is anyone trying to prove it now or doing any experimental work on it?

C. Pearce: I am, yes. Besides that, nobody else, I don't think. No.

I am actually doing research in the subtidal as well. That project is ongoing. We will be harvesting the clams this month. It's basically running the same as the intertidal project that I just reviewed for you — very similar. Different predator protection techniques, but similar sampling in terms of going out and collecting sediments.

I will have data on subtidal harvesting as well within, probably, half to three-quarters of a year.

D. Jarvis: Quickly, what happened to the Clayoquot area that you seeded? Is it still there being allowed to

grow wild? Did you not say you seeded out in the Clayoquot area?

C. Pearce: Not Clayoquot, no. Nanoose and off Marina.

D. Jarvis: Oh, I thought somehow…. I don't know how I got Clayoquot in there. Someone…. Al, did you say that?

A. Castledine: At the beginning of my talk I referred to two outplants that DFO had made. One of them was in Clayoquot, I think.

D. Jarvis: Well, do you know if it's still operating or if it's just left to go…?

S. Fraser: No.

G. Robertson: First off, a question. The committee has had a number of submissions expressing concerns about the pace of this development. In particular, the sense that's out there is that there is no independent peer-reviewed research done on subtidal geoduck aquaculture. Can you confirm that?

C. Pearce: Well, I would say the Breen and Shields study and the Goodwin study that I overviewed…. They were both conducted in the subtidal and both peer-reviewed. So there are those two papers.

G. Robertson: Were those papers related to geoduck aquaculture or just a wild harvest?

C. Pearce: Wild harvest. But the harvesting of wild clams would be very similar to the harvest of aquacultured clams.

G. Robertson: But in terms of the impact of large-scale…. You mentioned at the end that the research you've been doing is on small-scale plots and that the potential impact of industrial scale has not been looked at by peer-reviewed research.

C. Pearce: That is correct, yes. The Goodwin study was done on plots similar in size to what I'm working on. The Breen and Shields study…. I don't think they mentioned the size of the plots, so they could have been bigger. I don't know. I'm not aware of any real commercial-scale work that's….

A. Thomson: I'd just like to interject. The PSARC process is a peer-review process. The findings of the paper are presented at an open meeting that has both departmental scientists, but also external academics as well, attending. It's actually an open-forum peer review in which criticisms are given of the paper, and the paper is sent back for revisions before being accepted as a final paper.

G. Robertson: Accepted — does that mean it's a published paper?

A. Thomson: It's published on the Canadian Science Advisory Secretariat website and is available from the authors that way. It's not published in a journal, but it's published through the CSAS process.

G. Robertson: So it's internal to DFO.

A. Thomson: The publication is, but the peer review can include external scientists. The public meeting at which it's presented can have representatives from the industry, from first nations and from other areas as well. I don't know who was present at this particular meeting, but I could probably find out.

G. Robertson: Okay. I've had a look at that paper, and what struck me was that there were many references to not enough information throughout and that there were potential impacts including reduced genetic fitness, yet this has not been directly assessed. "Negative impacts on populations may be slow to detect…. It remains to be shown, however, that juveniles from one region are not carriers of disease for clams in other regions, nor whether disease issues might arise in the higher densities likely to be found in geoduck farms."

The paper seemed to be full of a lot of uncertainty and a lot of questions, which contradicts pursuing large-scale aquaculture at this point. It doesn't look like there's a lot of peace of mind from this paper. There are a lot of questions asked.

A. Thomson: Actually, if I can respond to that, that's exactly the point of the paper: to identify potential impacts. That's exactly why we had the paper authored. What we've done since then — I mean, the paper was in 2004 — is develop mitigation strategies to address those. In terms of genetic fitness, we require genetic samples to be taken of the individuals we had planted out, to look for changes in the population structure of the individuals being planted out.

In terms of disease monitoring, we have a disease-monitoring program built into the IDC component. As well, we're restricting the area of the harvest or planting to the Strait of Georgia, which is one of our shellfish disease zones. So you'd only have individuals going back in that

same zone. It's a way of mitigation against spreading a potential disease, should there be any one actually found around the province.

That's the exact point of this CSAS paper: to develop potential impacts, and then to allow government management, both federally and provincially, to develop a mitigating strategy to address them.

G. Robertson: This may be a question for Dr. Pearce. It sounds like the stage is set for these questions to be answered by further development of the industry. The question would be: is licensing 950-odd acres of seabed for geoduck farming…? Do you consider that a

precautionary approach to pursuing the next step of looking at geoduck aquaculture in the wild?

C. Pearce: I would, yes. Those sites were carefully chosen by consultation with Underwater Harvesters Association, first nations, the province and DFO. It really is a phased approach. In my mind it's taking it slowly and cautiously, yes. As Andy mentioned, we're restricting culture leases to the Strait of Georgia. We know that the clams within that zone are basically of all one genetic stock. We will only be taking broodstock from that area, planting out the seed to the same area. I think it's a cautious approach.

[1110]

G. Robertson: One last question for Mr. Castledine. You mentioned, on the chain of custody…. I think your sentence was: "We think we figured out the chain of custody." Is that as certain as we can be about that?

A. Castledine: What I was referring to there was my familiarity with it. I know that a year and a half ago I was engaged in discussions on how to achieve a chain of custody that would satisfy our requirements, DFO requirements, and the Underwater Harvesters Association.

Again, I was reflecting today my ignorance of exactly how it is working, but there are logbooks that are required for harvesting. The animals have to be offloaded only at designated ports. We have had some of our enforcement staff meet those. They're loaded on trucks, the trucks are sealed, and then they go to the processing plant. All of that is an attempt to make sure that wild geoduck can't be added to the load on the way.

Now, there may be some people who say it's inadequate. I was just having a chat with one of the underwater harvesters. He may not have as much confidence in that as I do, but I think it's a fairly rigorous approach. We only have the five areas that are currently being harvested, and our ministry is actively involved in that chain-of-custody process.

G. Robertson: There will be one last question for you. On these first proposed farmsites — are any of those ten applicants first nations?

A. Castledine: No. The answer is no. If I can elaborate a bit. Some first nations have expressed interest. It takes tremendous resources to get into this. We are trying to seek opportunities for first nations to get in, to have the opportunity.

In the past we've had something called memorandum-of-understanding sites, where the province has set aside certain areas for shellfish aquaculture — oyster, clam — in anticipation that a first nation may want access to those sites. A similar approach is currently being discussed so that they're not left out of this development.

R. Austin (Chair): Thank you. Four other members want to ask questions. I'm going to ask you to limit it to two so that we can hear the underwater harvesters prior to our time running out today.

C. Trevena: My question is for Mr. Castledine. It's about the process in finding the sites and approving the sites, the latest ones. You talk about recognizing the interests of first nations and proximity to first nations. I wondered what consultation you did with first nations in finding these sites.

A. Castledine: The proposed policy was sent out to the first nations in the areas where the opportunities were identified, and they were asked for comments and feedback. We heard from the Hul'qumi'num treaty group. When these sites actually went out and were identified, they were referred out to first nations — the specific sites — and their views were solicited. It was similar to how an oyster farm might be created. It would go out to the first nation for review prior to a decision being made. So there was contact with the first nations, yes.

C. Trevena: If I might clarify this. I don't want this to be my second question, but I might clarify it. So a letter went out to every first nations band. It was specifically going to be their territory that was going to be impacted by this. It was just a letter; there was no other move towards consultation?

A. Castledine: I wasn't involved, but when the letters go out, usually staff call to try to solicit a response. I could certainly find out more about that process if you wish.

C. Trevena: Thank you.

The other part of the process you mentioned is consultation with communities. I know that in my own constituency there was consultation in two communities, but only when pressed. I wondered what sort of process…. This is a different approach that has been used by the ministries than has been used generally when a new aquaculture site, a finfish site, is being looked at. I wondered why you have changed the approach in this.

[1115]

A. Castledine: The approach was generally the same as for a finfish aquaculture site in that there had to be open houses in the nearby communities. I understand there were two held.

But I must say, you bring up a valid point. Certainly, we will be taking more effort to engage communities prior to these decisions being made in future. We're currently getting ourselves organized to do that.

C. Trevena: One quick follow-up from that, if I might, Chair. The consultation that has happened with first nations and with communities on these ten sites — that's complete, as far as you're concerned, or you'll be going out again to talk to first nations and talk further with the communities on any moves that you're doing?

A. Castledine: I would suggest that the process is essentially complete for these ten sites. What I was looking at were future activities.

J. Yap: Your research shows, Dr. Pearce, that the benthic effects seem to be minimal. You also refer to a study by a Dr. Bower that shows there are no known infectious diseases associated with geoducks. How does this compare to other shellfish? And sort of related to this question, would it be fair to say that geoduck would be almost a perfect shellfish to harvest?

C. Pearce: Geoducks sort of differ from our other typical shellfish that we culture in B.C. in that they live in the sediment. Pacific oysters, Manila clams, Japanese scallops are typically reared via suspended culture techniques. You don't have that issue of having to dig up the sediment to get them, which is one of the big issues with geoduck wild harvest and aquaculture. You have to liquefy that sediment down to a depth of a metre or more. What is that doing to the benthic environment?

In that respect, geoducks are different. Geoducks are, I would say, a great species to culture. They are very valuable. They were $9.50 a pound in B.C. in 2005. That's a lot of money.

They typically occur in beds. In the wild they're typically aggregated, so they're used to living in high densities, which means they'll probably be amenable to high culture densities as well.

Does that answer your question?

J. Yap: Yes. My follow-up question. You touched on the price. Why would there be a price difference between B.C. and Washington State?

C. Pearce: Good question. I noticed that when I was putting the talk together, and I didn't get a chance to get back to my Washington contact to ask him why. But it seems that Washington State clams are quite a bit lower in price than B.C. Perhaps Michelle or James or Bruce could answer that.

J. Austin: The Washington State fishery is managed completely differently than the Canadian-B.C. geoduck fishery. They have a bid system. They have 50-percent tribal involvement in the fishery.

There are a lot of players and a lot of confusion in the industry sometimes, and there seems to be difficulty in maintaining a high market price. They quite often get a lower price than we do. We have one industry that's contributing to the marketplace, and in Washington they have several. They do have some lower quality, and they have a track system where they have no choice; they have to fish in certain areas of the state. Sometimes those areas that are bid are low quality, and they have no choice. That might be an annual quota that might come up.

But the fisheries themselves are managed completely differently than ours in B.C. That, I would say, is a large contributing factor to the difference in price.

The aquaculture prices that Dr. Pearce was mentioning earlier — part of those prices were lower because they're a younger species, and they were smaller. They were taking a discount price so that they could sell it into the marketplace.

J. Yap: Okay. So we're not really comparing apples and apples, oranges and oranges.

[1120]

J. Austin: Well, not with the wild fishery, and young aquaculture product is not really a similar product.

J. Yap: But with regard to the pricing, if for comparable quality Washington is selling for less and we're selling for more, then are we able to sell what we can produce? Is the demand there so that we can do that?

J. Austin: Currently we sell everything that we produce. There's no…. Not only do we sell…. We have it preordered before we even go fishing.

J. Yap: And is it export market or…?

J. Austin: Mostly all export market.

S. Fraser: Just quickly, a clarification on the research. You've cited the earlier Breen and the Goodwin reports back last millennium there. This was on harvesting technique and potential impact. The new stuff you're doing is specifically around, potentially, aquaculture of the product. That subtidal work isn't complete. Stop me if I'm wrong anywhere.

The intertidal is preliminary, and it's quite specific. It's been adapted, it's suggested, to time constraints. The grow-out time is long, so you've nailed it down to 12 months. You've tried to find ways to mitigate that. In the harvesting part of the study, you've gone down as deep as you can, but it's not a full grow-out. You haven't had any chance to do a repetitive harvesting — the potential impacts of that.

I mean, there are so many…. This hasn't been done yet. This is not finished yet. This is in one site that is 3 by 20 metres. And this is precautionary principle in opening up aquaculture. I'm having a problem with that. I can't reconcile that as being…. There are so many gaps here.

I guess I'm going to ask the question again, maybe just with that segue, of Dr. Pearce. You consider this precautionary? It seems like we're early days in the research.

C. Pearce: Well, as Al correctly pointed out, we've been doing the Fan study for 15 years now.

A Voice: Ten, anyway.

C. Pearce: So we have a lot of data built up. There are those other studies that I pointed out. Yes, I do admit that we haven't really looked at commercial-scale potential impact.

S. Fraser: Which is what we're potentially talking about.

C. Pearce: Yeah. We do have a proposal in the works for funding. There is a proponent who wishes to harvest an intertidal lease this summer. It's a commercial-size lease, and he won't be able to harvest that unless we have some sort of research plan in place to assess potential impacts. So we are working on getting funding for that. If that comes through, then we will be studying that this coming year.

I do understand your concern. Looking at my research, it's strictly a 3-by-20-metre plot of land. It's the same with the Goodwin study. The Breen study — I'm not sure. They didn't report on what plot sizes.

Perhaps other people may wish to speak to this precautionary issue here.

A. Castledine: If I could make a comment. The areas we're talking about sound substantial, but not all of that area is suitable for actually planting geoduck. The other thing is that there is a really significant deficit of seed supply, which is going to slow things down dramatically. I'm not even sure that the Fan tenures are being fully exploited yet.

The other thing is that the harvest techniques, at least, are identical to what happens in the wild fishery. I'm fairly confident that parts of the harvested areas in the wild fishery are comparable in density to what you might find in an aquaculture tenure. I'm not saying that the whole area would be, but there would be spots in a harvest area that are similar to the density.

[1125]

We're on a fairly slow road here. There isn't enough seed available currently to satisfy the tenures, although an opportunity will then drive hatchery production. I think, without pressing too much, perhaps the Underwater Harvesters presentation might actually be helpful in terms of looking at the wild fishery, how it's prosecuted and how similar some of these activities are for aquaculture.

S. Fraser: I appreciate that, although I wanted to talk to Dr. Pearce about his work and where I thought gaps were.

The second question, very quickly. The disease issues that John had brought up earlier. Again, the work that's been done — I haven't read it, but you've cited the work of Dr…. I forget her name now.

C. Pearce: Susan Bower.

S. Fraser: Thank you, yes. And there are no known diseases. Again, we're opening up a new industry at a commercial level. Oysters — it's agreed that they're free-hanging in a lot of cases. Denman disease — things like this have occurred and have more frequency with the onset of the farms. So there are potential diseases with shellfish, with bivalves that are very similar, as was pointed out, to creatures maybe not quite as big.

Has there been work done on diseases associated with the farms in these waters? Is there potential for…? I mean, these are the indigenous species, so you're bringing in…. You've got a disease that happens with an oyster. Well, okay, but where's it going to go? It will go maybe within the industry. I don't know the comparable species there, but there is wild stock here. That's the concern: protecting the wild.

When we have this level of farming, I know density is high where they exist in the wild, but there's contact. Physical contact occurs. There are things that happen that are different than in the wild. Have they yet been studied as far as potential for disease transfer and/or development of disease?

C. Pearce: Not to my knowledge, no. That study conducted by Dr. Bower was done with wild clams. Correct, James?

A Voice: Yup.

S. Fraser: All right.

C. Pearce: So nothing has been done on aquaculture product. Correct me if I'm wrong. Nothing was done with Fan?

Interjections.

A Voice: Why don't you come up and get it on the record?

Just state your name.

B. Clapp: Bruce Clapp. I work for the Underwater Harvesters Association. I also previously worked for the biological station in Nanaimo so I am privy to some of these other studies.

When Susan was doing the work on the disease, we gave her every and all kinds of types of weird geoduck we could find from aquaculture product. This was enhanced product that we had come from the hatchery. We also provided her with quite a number of juveniles. She tried to do disease transfer to the juveniles and was unsuccessful as well. So it is an aquaculture product, but it is also wild because they were spawned from wild stock.

R. Austin (Chair): Thank you.

Gary — very short, no preamble, just the question.

G. Coons: I also have a concern of precautionary principle in relying on data and science from 25 and 30 years ago. My question is: when taking the cautionary approach, is this following the intent of the precautionary principle as followed in other fisheries, or is aquaculture on an equal footing with our wild stocks as far as the precautionary principle is concerned?

C. Pearce: I'm going to hand that off to Andy. Can you handle that one, Andy?

A. Thomson: Yeah. Certainly in the application of the precautionary principle, as was the direction from cabinet, we apply it equally to both fisheries and to aquaculture. There are no special cases for aquaculture management over fisheries.

G. Coons: One last comment, just a comment. And I guess that's why there is a concern here about using the precautionary principle. DFO provides precautionary advice, I think, on siting and issues dealing with peer-reviewed science. Is that correct?

A. Thomson: I'm not clear on your question.

G. Coons: Okay. I'm done, Robin.