HANSARD

NOVA SCOTIA HOUSE OF ASSEMBLY

COMMITTEE

ON

RESOURCES

Thursday, January 19, 2017

COMMITTEE ROOM

Department of Fisheries and Oceans Canada &
Nova Scotia Department of Fisheries and Aquaculture
Re: Fish Mortality in Southwest Nova Scotia

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Resources Committee

Ms. Suzanne Lohnes-Croft (Chairman)
Mr. Terry Farrell (Vice-Chairman)
Mr. Stephen Gough
Mr. Bill Horne
Mr. Derek Mombourquette
Hon. Pat Dunn
Mr. John Lohr
Hon. Sterling Belliveau
Ms. Lenore Zann

[Mr. Derek Mombourquette was replaced by Mr. Brendan Maguire]
[Mr. John Lohr was replaced by Hon. Christopher d'Entremont]

In Attendance:

Mrs. Darlene Henry
Legislative Committee Clerk

Mr. Gordon Hebb
Chief Legislative Counsel

WITNESSES

Department of Fisheries and Oceans Canada, Maritimes Region

Mr. Morley Knight - Regional Director General
Mr. Alain Vézina - Regional Director, Science
Mr. David Whorley - Area Director, Southwest Nova Scotia
Mr. Mark McLean - Manager, Fisheries Protection and Regulatory Reviews

Nova Scotia Department of Fisheries and Aquaculture

Mr. Frank Dunn - Deputy Minister
Dr. Roland Cusack - Fish Health Veterinarian
Mr. Bruce Osborne - Executive Director
Mr. Alan Chandler - Marine Advisor

House of Assembly
Nova Scotia

HALIFAX, THURSDAY, JANUARY 19, 2017

STANDING COMMITTEE ON RESOURCES

9:00 A.M.

CHAIRMAN
Ms. Suzanne Lohnes-Croft

MADAM CHAIRMAN: Good morning, I'd like to call this meeting of the Resources Committee to order. My name is Suzanne Lohnes-Croft, I am the Chair of the committee.

We were planning on meeting on the lobster industry, but due to the urgency of the fish mortality in the Bay of Fundy we are substituting this meeting and the first question will come from Mr. Belliveau.

We will be hearing from Mr. Morley Knight, Regional Director General, Department of Fisheries and Oceans, Maritimes Region; Mr. Frank Dunn, the Deputy Minister of Fisheries and Aquaculture; and their staff.

I would like to ask people to introduce themselves. We'll start with Mr. Maguire.

[The committee members introduced themselves.]

MADAM CHAIRMAN: I'd like to remind people to turn off their cellphones, put them on vibrate. Also, only the media are allowed to take pictures during the meeting. Washroom and coffee are out in the foyer on the Granville Street entrance, and if there is an emergency, we ask that you exit the building through the Granville exit and meet up at Grand Parade Square by St. Paul's Church.

I'd like to remind our witnesses to wait until I acknowledge you before you speak, so that Hansard can record what you're saying.

I'm going to ask Mr. Dunn to introduce who he has brought to the meeting.

MR. FRANK DUNN: Good morning committee members. With me today are, to my left, Dr. Roland Cusack, our chief aquatic animal health veterinarian. Behind me I have Bruce Osborne, our executive director of Fisheries and Aquaculture; and Alan Chandler, who is our marine advisor on pelagic species, of which herring is one.

If there are particular provincial-related questions that either Mr. Osborne or Mr. Chandler can answer much better than me then we will do a bit of a shuffle if that's all right with the Chair.

MADAM CHAIRMAN: Mr. Knight, would you introduce those who you've brought.

MR. MORLEY KNIGHT: Good morning everyone. I'm Morley Knight, the Regional Director General for the Maritimes Region. I have with me this morning my Regional Director of Science, Alain Vézina; and David Whorley, the area director for southwest Nova Scotia. I also have with me Mark McLean, manager of our Fisheries Protection Program; if necessary, we may call on him to answer some questions pertinent to his expertise.

MADAM CHAIRMAN: Thank you very much. Mr. Dunn, would you give opening statements, please.

MR. FRANK DUNN: I understand the interest from the public, and particularly the Resources Committee, to better understand what caused so many herring and other species to wash on the shores near St. Marys Bay. It was concerning and generated a lot of interest on the part of the government, industry, and the public to find out what was happening.

Many individuals and various government departments, both federally and provincially, collaborated to try to solve the mystery. In this instance the federal Department of Fisheries and Oceans was the lead agency as they are responsible for the health of wild fish stocks. They are also responsible for the resource management, science, and enforcement of the herring industry.

Provincially the Department of Fisheries and Aquaculture is responsible for fish buyers, marketing, and processing. We are also responsible for aquaculture and have specialized fish health veterinarians and technicians. I will describe in a few minutes how these experts played a role in supporting the Department of Fisheries and Oceans in investigating the cause of fish mortalities.

The herring fishery occurs throughout Nova Scotia; however, there is a concentration in southwest Nova Scotia. The sector includes both harvesting and processing. Herring is very important to the Nova Scotia economy. Herring provides an income to a large number of inshore harvesters and is the principal income for many Nova Scotians. The fishery is also responsible for the employment of a large number of plant workers.

The direct landed value has been relatively stable in recent years at about $16 million. It is an export-driven fishery that provides a wide variety of products to the international market. The sale of roe to the Japanese market is an important one; herring fillets are another.

Herring is also an important source of bait used commonly for lobster and the snow crab fishery. Fisheries and Oceans and the Nova Scotia Fisheries and Aquaculture Department have a long history of collaborating in aquatic animal health. When the Nova Scotia Department of Fisheries and Aquaculture received a call on the herring fish mortalities we were quick to respond. Our chief aquatic animal health veterinarian, Dr. Roland Cusack, received a call from a concerned person about the wild herring mortalities. The Department of Fisheries and Oceans was contacted and we indicated to them that our department staff would be in the area and be willing to help if necessary.

Our department has an Aquatic Animal Health section that is staffed by veterinarians and technicians who investigate issues such as these, if required. The section works out of our provincial veterinarian pathology lab in Truro, which was recently upgraded. We have a long-standing relationship with DFO in looking at aquatic animal health issues.

While DFO took the lead on finding out what was happening, our department has daily contact and has provided support and analysis to assist in solving the mystery, where we could. Our department veterinarians conducted a number of specific tests for DFO, including site visits, growth pathology, histopathology, wet mounts of gill, skin and intestinal tracts, bacteriology, virology, specific molecular testing for significant viral disease agents, and blood tests. These tests were conducted to detect both infectious and non-infectious diseases, causes including parasitic, fungal, bacterial, viral or non-infectious anomalies that may cause detectable changes at micro or microscopic levels.

The information received from the tests was relayed to DFO. We continued to participate and advise throughout the investigation, the DFO herring coordination calls and the DFO Aquatic Animal Health section. Our veterinarian staff performed aquaculture site visits and sampling at all salmon farm locations in the affected area and no significant issues were noted.

The fishing industry is important to our province and we continue to be updated by DFO. We are relieved that no new losses have been reported. Thank you, Madam Chairman, and committee members. With that I will turn the floor over to Mr. Knight.

MADAM CHAIRMAN: Thank you, Mr. Dunn. Mr. Knight.

MR. KNIGHT: Thank you, Frank. First of all, we appreciate the opportunity to be here this morning to present an overview of our role in which we work with both provincial and other federal departments to obtain an understanding of what happened on the short section of shoreline in St. Marys Bay in Nova Scotia when herring started washing ashore in late November.

Even though we have worked with many others on this, we've worked very closely with the provincial government, as Mr. Dunn has outlined in terms of investigating and determining what might be the causes of this event. Also, DFO staff in locations in Dartmouth, St. Andrews, and Moncton have been involved in the investigations and we've looked at diverse factors such as: the evidence of cause of death on fish samples; predator-prey relationships with other species such as whales; fish distribution and density; water quality; presence of marine toxins; and weather conditions.

Our area office in Yarmouth has been involved since the start with monitoring the situation and remain to do so today with our offices, not only in Yarmouth but throughout southwest Nova Scotia.

I would also note that one of our key spokespersons on this issue, which many of you might have heard giving media interviews, whether it be radio or TV, Doug Wentzell, is not here today and that's because he's in British Columbia attending some meetings with our other regional colleagues. He would have been here today if it had not been for that.

When our staff became aware of the reports of herring mortality in St. Marys Bay in late November, we immediately acquired fresh, valid samples from the affected shorelines and sent them for laboratory testing. Right from the start we were in contact with our provincial colleagues, as well as CFIA and Environment and Climate Change Canada.

I'd like to again thank the committee for the opportunity to tell you a little bit about how we responded to this event and we'll be glad to respond to your questions afterwards. If I could, I'd now like to turn to the presentation that we brought with us today and is displayed on the screen.

Maybe we can go to the second slide. We were notified of the event of the herring washing ashore on the shore of Gilberts Cove, St. Marys Bay on November 22nd. On November 23rd our fisheries officers collected samples and they were shipped to our National Aquatic Animal Health Laboratory in Moncton. The National Environmental Emergencies Centre was also notified, and just for clarification, that's a coordination centre

for federal departments that are involved in what might be an environmental response to spills or other toxins that get into the marine or aquatic environment.

I'm on the third slide now. Since late November dead herring have been found along a 100-kilometre coastline from St. Marys Bay to Tusket, the vast majority being found in the mouth of the Sissiboo River and the Plympton area, which is an area of approximately 15 kilometres. There were also early reports of dead herring in parts of the Annapolis Basin near the mouth of the Cornwallis River but these were short-lived, isolated occurrences.

In the days before and after Christmas, some invertebrates were also reported in the same 15-kilometre stretch near Savary Provincial Park. Noteworthy, though, during the same time there were other instances of invertebrates, such as lobster, washing ashore to shorelines in New Brunswick and the west coast of Newfoundland. These incidents were generally believed to be related to strong winds, high tides, and heavy seas that occurred at this time. Now, that's not unusual, this occurs from time to time, that lobsters do, for example, wash up on the beach in very strong winds and tides. We had numerous occurrences around that time, three that I've mentioned, but quite likely they were more evident here because we had very intense monitoring of this area and there were a lot of people looking at the beaches in this area.

No new washups of herring and no evidence of invertebrates have been identified since January 2nd. Seabird activity in the area is also decreasing. The seabird activity is a bit of an indicator of the abundance of herring washing on the beaches.

For the current status, we continue to monitor the areas for evidence of any new incidents. Recent patrols have confirmed that most beaches from Tusket to inner St. Marys Bay are completely clear, with some existing dead herring still located from the mouth of the Sissiboo River to the Plympton-Barton area. No new washups have been identified, and no new evidence of invertebrates has been identified.

We'll go to testing and analysis. There's a number of slides here that explain the testing we have done over the course of the last two months. First of all, to reiterate, we've worked with federal and provincial partners, such as the Canadian Food Inspection Agency, and Environment and Climate Change Canada, to investigate the potential causes of the mass mortality, as well as working with the Province of Nova Scotia on getting assistance from them, as has been described by Deputy Minister Dunn.

Lab tests and analyses were carried out related to infection/disease, toxins, and water quality.

I think I would be repeating what Frank already said if I listed the work on the herring samples that is on here. I'll just go to the conclusion. No infectious or viral agents were detected after extensive testing of herring samples to explain mortality. No significant pathology was detected during microscopic examinations of the herring tissue samples.

DFO examined the adjacent sub-tidal areas on December 29th. Video surveys were conducted, and no evidence of dead herring or other species were found. Acoustic surveys were conducted, and several large schools of herring were observed. Oxygen measurements made at the surface and bottom in several areas indicate a saturation level of 95 per cent or above in all areas. In other words, normal.

The CFIA Dartmouth laboratory has completed testing of herring samples for amnesic shellfish toxins such as domoic acid, paralytic shellfish toxins, and diarrhetic shellfish toxins. No toxins were detected in the samples. CFIA also confirmed that the Canadian Shellfish Sanitation Program sampling in the area is current and shows no evidence of toxins at all levels that would result in the mortality seen in this fish kill.

Environment and Climate Change Canada tested for pesticides, metals, and a range of possible contaminants. Their results all came back negative.

From a communication and engagement perspective, DFO has been engaging various stakeholders and partners including providing regular updates through social media, local engagement through the area office, calls with fishing industry representatives and indigenous communities, and meeting with the Ecology Action Centre and the World Wildlife Fund as well as Citizen Science representatives to share information. We held two media technical briefings on December 30th and again on January 5th. A website has been launched to share up-to-date information.

Moving forward, as a result of the investigation conducted by DFO, CFIA, and Environment and Climate Change Canada, it appears that the event has concluded and has not likely been caused by direct human activities or contaminants. We will continue to monitor the most impacted areas for any evidence of new incidents.

That concludes my presentation. We're happy to receive any questions with regard to the presentation on what we've done in the past two months.

MADAM CHAIRMAN: Mr. Belliveau, we'll start with you.

HON. STERLING BELLIVEAU: I enjoyed your presentation. I certainly hope we have some time to get through a number of questions.

If we can revert back to your Slide 2, I find that very interesting - the day of November 22nd. There has been a number of shellfish closures across Nova Scotia, certainly since 2014 and tropical storm Arthur. There was a number of monitoring shellfish closures. My question first of all is, if that monitoring program was in place - to me, it's the same effect as the canary in the coal mine. You would know what is going on in that water column. If that monitoring program was extensive and in place in that general area, would that data help you to have a better answer today?

MR. KNIGHT: That's a good question. I think it's important that everyone understand a little bit more about the Canadian shellfish sanitation program closures. They occur quite regularly, particularly after a significant weather event like the one you talked about.

These closures are recommended to us by Environment and Climate Change Canada and/or the Canadian Food Inspection Agency based on their testing. They also have protocols in place that we make closures when there are significant rainfall events as a precautionary measure, because of the amount of water runoff that will occur during these significant rainfall events. Most normally, they are re-opened a week to two weeks later, quite often without testing because they know from the background levels, the potential for contaminants to be there would have dissipated.

In relation to that monitoring, it's conducted by Environment and Climate Change Canada, for the most part. The Canadian Food Inspection Agency also do monitoring but it's about either contaminants from land runoff or naturally-occurring toxins that occur in the marine environment. They're most prevalent and they're most serious for us to be monitoring for bivalves, such as mussels or clams, that can cause people to be ill if they consume them while they're contaminated.

MR. BELLIVEAU: Just a quick follow-up because this is crucial. What I'm trying to say is that it appears to me there has been a lot of testing from November 22nd on. My point is that if there was this basic monitoring in place prior to that, you'd have some baseline of data to say, this is what happened. But you're moving forward from November 22nd. That's the point I'm trying to make.

Again, I'll ask the question, if that monitoring was in place where there have been some severe science cuts across our Atlantic Provinces, would that assist in having an answer today?

MR. KNIGHT: Perhaps in relation to giving a bit of an illustration of the monitoring of the marine environment in terms of ongoing monitoring that our department does, while we continue to do monitoring, that monitoring has evolved in many ways in recent years through the use of technology. Maybe I'll turn to you, Alain, and get you to give a little bit of a description of the broad range of monitoring we have from our research ships, our monitoring stations, and the new technology we're using to do monitoring in the marine environment.

MR. ALAIN VÉZINA: Thank you for your question. You alluded to the impact of reductions, maybe, in the budgets. In this particular area there were no impacts of the reductions on the monitoring we do in this area, either oceanographic or related to the fish stocks. There is nothing that had changed due to the reductions that would have impeded our ability to detect or understand what's happening here.

This is a very small-scale event, very localized, and we cannot predict where it's going to happen so we don't have the monitoring everywhere in place. We didn't have it before the reductions and we will not have it in the near future because it's so small-scale that we can't predict where it's going to happen. We can't necessarily deploy instruments everywhere that it could happen.

That said, through the science reinvestment, we will invest more into research on small pelagics to try to get a better handle on their population and better support the assessment. We are investing in new technologies - automated vehicles that will allow us to monitor maybe at a finer scale what's happening in the oceanographic environment. We are also continuing our research on climate change, marine weather, and how that impacts the fish stocks and how that could influence the decisions we make in terms of managing these fish stocks for sustainability.

To be there when an event of that scale happens, it's extremely difficult and unlikely to happen, so basically, we have to work backwards. That's very difficult to do when you don't have the observations at the time that it happened. Thank you very much.

MADAM CHAIRMAN: Mr. d'Entremont.

HON. CHRISTOPHER D'ENTREMONT: Thank you very much for being here today. It's always great to have presentations like this that sort of look at the global issue of fisheries and fish stocks in our area.

Of course, Tusket is actually in my constituency as we go around, it runs around the corner. I can assure you that as far as I was concerned, the sky wasn't falling. I talked to my fishermen, I talked to the people in the industry who quickly told me that there's not a whole lot of concern here. There were wind conditions, there were temperature changes, and there were super high tides. It has been seen before, maybe not to the scale that we saw, but I don't think as concerning as others would have taken on this one.

My question is more for Mr. Dunn. Now with the sort of sensationalism that we got out of this through press releases and through media, how are we going to work on the impact to our fishery? People looked at our fishery a little negatively there for a little bit, it created a little bit of uncertainty in our pristine fishery waters product. What are we going to do to combat that negativity that was created during that time?

MR. FRANK DUNN: I guess the way I would start to answer the question to the member is, the department has had no calls or contact with regard to this specific mortality as far as the herring are concerned. I understand there may have been one client who was contacted by some of his customers with regard to whether the herring mortality was a concern - I believe it was reported in the media - but that has been it. As far as I know, we have not had any cancellation of specific orders.

MR. D'ENTREMONT: That's good to hear because I'm always concerned at what happens to our fisheries, due to either negative stories, whether we're talking about turbines in the Bay of Fundy and all kinds of crazy stuff, that it does have an impact on what happens with the view internationally on our product. We know that our product is sold around the world.

I'm also wondering, too, and maybe this is a question for DFO sites and Mr. Knight, if you can, this has been happening around the world. I think Cornwall had the same kind of incident happen around that same time. What's going to be the ongoing monitoring of this? Are we just going to sort of keep it there and look at it?

We had whales at Morris Island, which is something the guys hadn't seen in a while, so there are some temperature changes there, some world changes. I'm just wondering how we're going to monitor that into the future and - I know my colleague alluded to it a little bit - who is now responsible for some of these things? Bivalve monitoring is sort of Environment and Climate Change Canada in a way and I'm having a concern at Cape Island when it comes to clams and closures there, and I'd love to talk to you afterwards about it.

How are we going to manage some of these things when there's about three different departments involved in some of these monitoring issues?

MR. KNIGHT: Thank you very much for the question. I think it's important to note that while there are shared responsibilities for monitoring of water quality and food safety by three departments, we coordinate them and collaborate very closely on that. DFO is very aware of the concerns and the needs of citizens in your constituency and, for that matter, throughout Atlantic Canada when it comes to wanting to be assured that test results are being done to ensure that the food is safe, but also at the same time to have access to beaches and to product.

With regard to monitoring in the marine environment, in terms of fish and fish stocks, that is within the domain of Fisheries and Oceans Canada. Going back to the first part of your question about the events that occur in other parts of the world, we do have a lot of international networks and contacts - I have them and Alain has them. In researching this event, we have touched base with colleagues in both Europe and in the U.S., and we have investigated through them the causes of mortalities that appear somewhat like this in that there's mass mortalities of herring or other fish species such as mackerel.

What it would boil down to is that in some cases there are good explanations for the causes of mortality. Sometimes it's a thermal chill that's evident - extreme cold water moves in all of a sudden, traps fish in an area, and they die. In other cases, it could be contaminants that flow from the land, testing is done, and it's found to have caused the mortalities of fish.

In other cases, it's something, for example, like the lack of oxygen. There was an event in Iceland in 2012. Once we investigated with our colleagues in Iceland, we learned that that event was caused because herring had become densely concentrated in an area, inside either a causeway or a barachois. The area froze over, which meant there was not much wave action, and there was mass mortality. Not much wave action meant that they wouldn't be getting much oxygen, so there was mass mortality there. It was explainable.

In other cases, like the cases that occurred in England this Fall, they have theories about what might have occurred there. The theory that they gave to us, to use the term they used - I've not heard it used in the Canadian industry - is that it was probably slippage from a purse seine. In other words, fish had escaped from a purse seine while the purse seine fishing was occurring. We investigated that thoroughly as a potential cause in this situation, and we determined that there were no fisheries anywhere near proximity to that area where that might have occurred during that time, purse seine or otherwise. We have ruled that out as a potential cause.

I think you have to look at the broad scale when you're doing an investigation, look at all other sources, and look at the marine environment at least across the North Atlantic to see if there's a comparable example that we can draw on and learn from the experiences of others.

MADAM CHAIRMAN: Mr. Horne.

MR. BILL HORNE: It's great to hear some of the explanations and what went on. I want to ask you first about how the call-out occurred. Did it follow a procedure that's been determined by federal and provincial governments?

If that worked, in all your studies, have you come up with some sort of a scenario that you think may be a cause of this incident, such as so many fish in the area and the wind pushed them up to shore? Maybe there was some sort of creature feeding on the fish that, again, could be pushing them to the shore. There may not have been any evidence that that happened, but you must have some thought as colleagues talking together provincially and federally. I'm just wondering if you might make a comment on that.

MR. KNIGHT: It's a very good question. What I think we would like to do is break the question into two parts. I'll address the issue around the process and the call-out in collaboration with other agencies. I'll let Alain deal with the question about what we've assessed as a result of the event, if that's okay.

First of all, we do have a protocol that's put in place to address environmental emergencies if there is one in the system. Sometimes it's quite obvious. For example, it would be used if there were a major spill of a petroleum product in the marine environment. There is a process for the federal agencies and also the provincial agencies as applicable because this is at least an Eastern Canada if not a cross-Canada protocol. It depends on the

province which provincial agency would be involved. But there is a process to determine who needs to be called on and when.

When something goes through that call-out process, one of the first steps is trying to determine who is the lead agency, whether it be Environment and Climate Change Canada, DFO, or potentially, for example, a provincial environment department if it's a land-based pollutant or toxin. In this case, we did call on - I should put it another way - I think all of the partners that needed to be engaged were engaged early. As Deputy Minister Dunn has explained, his staff were on to this early.

Very early in the game, we at the Department of Fisheries and Oceans engaged our colleagues in the Canadian Food Inspection Agency and in Environment and Climate Change Canada. But because of the lengthy testing that we had to carry out to determine if there were toxins or pollutants or naturally occurring toxins, it was difficult to determine until well into the process. In fact, it was into the first week in January before we could determine there are no toxins occurring here in the marine environment or pollutants that might make it an Environment and Climate Change Canada lead, for example.

While I guess we took the lead in communicating to the public and trying to coordinate the efforts on the federal side and communicating with our colleagues on the provincial side, there was no lead agency determination like we would normally have very early in the game if it were something as evident as a ship-based pollution spill, for example. Maybe with that I'll turn it over to Alain to give an explanation to the second part of your question. Thank you.

MR. VÉZINA: As Morley just explained, we certainly know what it isn't; it's not human-caused and it's not toxins that are generated in the environment that would have moved through the food chain into the herring.

In terms of what actually happened, we're talking about a confluence of several factors, one is fish behaviour. We found out that actually there are huge schools of herring in St. Marys Bay, that it's unusual to see these huge schools of herring in a bay like that, but it does happen and it's totally unpredictable. So that's fish behaviour.

Then there's ecological interactions like predators, you alluded to that, and then there's weather. These factors probably interacted in some way to generate these events. To go back and understand very precisely exactly what happened would be extremely difficult because we don't have the data at the scale fine enough to say okay, that's the smoking gun here, that's exactly how it happened.

So yes, it's probably a natural, fairly local environmental effect that we're talking about. Exactly how it unfolded and given that we're talking about a series of different events, also this series of events, we would have to try to tie it to some common impact there and that would be very difficult to do but it looks like it's an environmental, local

effect related to a combination of weather, the fact that the fish were there in great abundance and maybe ecological factors involved.

MR. HORNE: A supplemental question. I'm wondering about what kind of physical testing you did on some of the samples or the water column. Also, did you do some diving in the area and check the bottom and see if there's any irregular issues there? Maybe there was an earthquake, which happened later, but who knows. I'm just curious.

MR. VÉZINA: Yes, we did do some video surveys, as Morley alluded to, around December 29th, covered a fairly extensive area. We didn't see any evidence of mortality on the bottom of the bay anywhere of herring or invertebrates. If it was something like an earthquake, for example, you'd expect to see mortality on the sea floor because a lot of the gases would have escaped from the bottom and caused mortality there and we would have seen the spillover on the beach. That tends to say it's a beach event, something that happened on the beach.

In terms of - sorry, I forgot the other part - oh, the divers, yes. We didn't send any divers. We did the video surveys and we did the acoustic surveys to measure the fish biomass. We also did a fair amount of analysis of the weather patterns and actually ran an oceanographic model to look at the factors that might have been involved, in terms of weather in oceanography. But again, the models are not on a scale fine enough that you can really pinpoint; it gives you tantalizing hints but that's not proof.

In terms of the testing that was done, maybe Roland can say some more about the testing that was done on the fish.

DR. ROLAND CUSACK: A lot of work was done physically with the animals themselves, in terms of necropsies of the animals in the lab, looking at physical anomalies or changes that could be done at a macroscopic level, so grossly looking at them, and then microscopic examinations of the tissues at the very smallest cellular level, using techniques called histopathology. That was combined with the tests for different types of pathogens that could have been there - like bacteriology, looking for virus parasites, fungal agents, and so on.

In terms of physically looking at the fish, a lot of work was done not only in our lab, but other labs were involved as well outside of government. We had lots of Citizen Scientists also providing information to us.

MADAM CHAIRMAN: Thank you. Ms. Zann.

MS. LENORE ZANN: Thanks very much, it's very interesting. I take it that we still don't really know, it's still a bit of a mystery as to what exactly happened.

I heard there was a whale washed up too. Was that a completely separate incident, was that completely separate? Did anybody do any test on the whale to see if it was in any way related?

MR. VÉZINA: I can take it. Basically it looks like the whale is not related. The whale was deceased a long time before the event started and we haven't seen any other evidence of other marine animals being affected like this.

MS. ZANN: The warming waters - I was watching last night and they said the waters have been warming and the temperature has been warming for the last 16 or 17 years. How does that affect herring in our area or does it have any effect on them?

MR. VÉZINA: I don't think we know precisely how it could affect the herring in our area. At this point we're pursuing general research on climate change and impacts on fish stocks and how it would influence our decisions on how to manage them, so we're pursuing that right now. We haven't done specifically on herring at this stage.

MS. ZANN: Just to follow up on that, did you contact or get the department of environment involved at all and talk to them about any of the problems that could be occurring in the area? I know there have been several people with speculation or even conspiracy - the red tide from the toxins from the blue algae. People are saying that a similar incident took place in Chile last year, and it was said that it was caused by harmful algae bloom. We know that's a problem here, like in Mattatall Lake and places like that. In some of these areas the algae gets so bad in lakes that it actually spills out into the ocean as well and it's toxic.

I know you said you did do studies on that, so how much involvement did you get with the department of environment, if any; if not, why not?

MR. VÉZINA: In terms of the toxic algae, we do have the capability to somewhat monitor. With CFIA, they do the Shellfish Sanitation Program so if there was an issue there that would be reported. There was nothing abnormal in the samples they collected in terms of environmental toxins.

We have looked at the temperature in phytoplankton bloom, the dynamics at that time of the year. The temperature was a bit warmer than usual for November. The levels of phytoplankton where the toxic blooms would come from were also a little bit higher than normal, but nothing that you could see that's associated with the toxic bloom. It wasn't a high enough level to say that's a toxic bloom.

MS. ZANN: In the ocean you mean?

MR. VÉZINA: In the ocean. At that point there's really no point in working with Environment and Climate Change Canada further because with the combination of evidence we had, it's not a toxic bloom effect here. From lakes, I don't know whether the province monitors that, whether there could have been some event in lakes that would have spilled over. In considering this, we have to realize that this bay flushes once a day so the tides are very high, the currents are very strong, and anything that would come from a lake diluted in that vast body of water - and then it would have been detected in the water samples from that.

MS. ZANN: Is there a river that comes out into the ocean?

MADAM CHAIRMAN: Can you save that for another time, Ms. Zann? Mr. Dunn.

HON. PAT DUNN: I think the majority should be very pleased with the very excessive investigation, analyses, and lab checks that have taken place very quickly. One question I did have, Mr. Knight, you gave a very good answer to it, it was dealing with the other areas around the globe and the causes there in comparison and so on. You've already answered that.

I guess one question - this particular fish kill was covering approximately 100 kilometres. Is that typical or does it depend on the waters where it does happen?

MR. KNIGHT: In this case the majority of the fish were within a 20-kilometre range. It did range over a bit broader area but it was most concentrated in a 20-kilometre range.

I think every case where there's a fish kill, sometimes it's very - the example I used in Iceland in my earlier answer, for example, that was a very precise location. In other cases where we've had fish kills, it's again a very precise location because it's directly related to a thermal chill event that usually occurs in an enclosed area in October-November, usually November-December. When thermal chill occurs it usually occurs in a very specific location, but there could be multiple locations in a situation like that.

In a case where there's a land-based toxin that causes a mortality, that's usually evident in terms of how it fans out from the source. If it's coming in a river, for example, that was referenced in an earlier question, it usually fans out and is evident in the adjacent area. In this case here, though, I think the flushing of the huge tides that occur in this area are a big factor that would have caused that to be very unlikely a potential cause of marine-based mortality.

In some other cases where there's a domoic acid or a toxic algae bloom, then it may be more distributed because of the nature of the tidal influences and how these organisms would be carried around by the tidal influences that are related to a particular location, so it really depends on the event. In every case, you have to investigate it and assess it based on its own merits.

MADAM CHAIRMAN: Mr. Gough.

MR. STEPHEN GOUGH: Thank you for your presentation today. I know that this event has caused a lot of interest in what's going on, as far as a fish kill like this. I'm just wondering if and when this may have happened before on the shores of Nova Scotia and in what season, or when it would have happened, if it has.

MR. KNIGHT: I'm going to start off with a general answer. I'm going to call on my colleagues to see if they can add to what I will say. I think if you are asking me, and I think that was your question, if another event like this one has occurred, precisely like this one, I don't think we have a record of one that is like this on the shores of Nova Scotia.

There have certainly been fish kills in certain areas around the shores of Nova Scotia over the years. In some cases they may be related to very precise causes, as the ones I've described earlier, for example. In the aquaculture industry there was a thermal chill event not so many years ago which I am sure some of you are well aware of. In thinking back in terms of an event like this, I'm not aware that we've had an event like this on the shores of Nova Scotia. I'll turn to my colleagues to see if you've heard information or reference to any of the previous events that might be like this one.

MR. VÉZINA: The only event that I'm somewhat familiar with is back in the 1970s there were some substantial herring kills, not at this time of the year, and related actually to a toxic bloom phenomenon. I think it happened twice. The late 1970s was a time where we did see some very large algae toxic blooms in the lower Bay of Fundy and that seemed to have affected part of the herring population at the time. This is the only big event that I'm familiar with.

MR. GOUGH: Now if it happened before, what species of fish are we talking about that it might have happened to? Is this something that can be common to herring? I know we have a lot of mackerel as well and they do school and things like that - any particular species?

MR. VÉZINA: The events I was mentioning, those were herring. There may have been some small events of mackerel or other species, but I'm not really aware of very strong reporting on those.

MADAM CHAIRMAN: Mr. Belliveau.

MR. BELLIVEAU: Mr. Knight, if I had one suggestion, if we had a map of the area but I'm going to ask you to use your imagination; St. Marys Bay literally encompasses - the land encompasses that particular water column like a horseshoe. We don't have a map so I'm using the visual here. To me it's interesting because so many representatives talked about fish behaviour. There was one thing that really jumped out at me and I'll make the point quickly here, there was a media clip of a fisherman coming in and the herring were

jumping out of the water in the wake of their vessel. I found that interesting because to me, in my experience, that's not the normal behaviour of herring.

A number of events and I'll just point to them, there were some large tidal surges, warmer waters in the area, a temperature shock in the month around this particular event, heavy rainfall, the heavy abundance of aquaculture - one of the suggestions was there's an aquaculture site there and some of the chemicals they may use for dealing with sea lice is a possibility.

To me, one thing that has been overlooked in all this is the organic matter that is literally lining the shorelines. My question is, with all these possible events I just pointed out here, several of them, could there be a lack of oxygen in that water column? I was taught as a young fisherman, and it's not going to show up on your computer slide, that the tides run there on the flood twice as strong as they ebb. So if you've got all the major weather events in your favour, you could create a perfect scenario where you keep compacting these materials or whatever, and deplete the oxygen. My question is, knowing that we had water temperature, rainfall, temperature shocks, possible chemicals, could any of these combinations create a herring kill?

MADAM CHAIRMAN: Who'd like to answer that? Mr. Knight.

MR. KNIGHT: Maybe I'll start off with a little bit of a general response and then I think it would be appropriate to turn to Alain and then perhaps to Roland, in response to the question about the aquaculture industry and the use of pesticides - is that appropriate? Okay, so we'll probably handle it in that way then.

First of all, the honourable member has indicated a number of factors that he has heard about that we have also either observed or heard about from local harvesters. Knowing your experience as a fish harvester, sir, I certainly suspect that you would find that somewhat strange to see herring jumping out of the water.

Related to that, I think, is some of the phenomena that some of the local harvesters told us but are also backed up by our own scientists from when they were observing in the area. For example, we heard that one local harvester thought that his depth sounder wasn't working, that it was going from 20 fathoms to two fathoms, and he knew there was more than two fathoms of water in that area. I think he later diagnosed that that was because of the density of herring that it was actually showing like bottom because the herring were so dense in that area at that time.

Our own scientists from St. Andrews Biological Station who were doing some monitoring in that area observed similar conditions: very, very dense aggregations of herring. Along with those other factors that you described - high tides, wind in particular, and the strong tides that are in that area as you indicate, quick temperature drops, they may all have been contributing factors to an event. As we described earlier, those things that occurred in the past, it is almost impossible to go back and recreate the conditions but there

certainly was evidence here, as you've indicated, that I think we all should take note of, in terms of these things when fish naturally aggregate in very dense concentrations that it may have impacts on what happens to the fish in those windows. Other circumstances occur at the same time.

I think, Alain, if you could talk about the monitoring of the oxygen a little bit and then probably we'll turn it to Dr. Cusack to talk about the monitoring in the water column and around aquaculture sites, if that would be okay.

MR. VÉZINA: In terms of the oxygen, we don't have regular oxygen monitoring in that bay so we don't know what the oxygen conditions were at the time of the various events. We did go on the survey on December 29th and found no evidence of oxygen depletion anywhere in the water column, but you cannot completely discount that something could have happened when we weren't there.

If you consider that when there's severe oxygen depletion events, usually related to pollution that stimulates plant growth, it's related to an area that is very productive, lots of aquaculture activity, and none of these conditions really apply to St. Marys Bay. It's a very low-productivity environment and with the flushing happening it's very unlikely that oxygen levels would have - and we don't know of any areas also of low oxygen outside that could have moved in the area. The waters surrounding in the Bay of Fundy and the Gulf of Maine are very well oxygenated, so it's very unlikely to happen.

DR. CUSACK: If pesticides were a factor or contributor to the mortality, the levels of pesticides would have to be high enough that these would be detected in the fish tissue, if mortality was going to occur. Samples were collected and tested by Environment and Climate Change Canada as part of the investigation to determine if pesticides could have been a possible rule-out in this particular instance. The results came back negative in those test results.

MR. BELLIVEAU: I certainly have another question.

MADAM CHAIRMAN: You can have a supplementary.

MR. BELLIVEAU: To me this is all based on the science, and I'll ask the question that is the elephant in the room here. You have seen federal cuts to science, and I'm trying to be as diplomatic as possible because I really, truly believe that this is a valuable resource that needs to be protected. In the last decade, you see the federal government slash science on the fisheries and you've seen here in September a photo-op of the present government in Ottawa announcing that they're going to introduce $200 million for new science.

My question is, we have a photo-op but we do not have any action so I'm asking you the magic wand question - you are in control of that $200 million now to spend on science and I'm suggesting that we need to have better monitoring in place. My question is simple, do you think the monitoring presently around our coast is adequate to answer the questions of these kills, or where would you spend the $200 million to improve it?

MR. KNIGHT: Thank you very much for the question. There's no doubt about it that in my career in the federal government, which goes back a number of cycles of government now and a number of fiscal situations, that we go through times of restraint where we have to find ways to keep our programs going or keep the most important programs going and evolve programs and modernize them.

There's no doubt that in the period between 2010 and 2015 we had restraint, it was difficult to acquire new funding. That said, there were some freezes in place but not significant reductions to our science budget, certainly not in the area that requires the monitoring that we're doing in this area.

Having said that, I think I would turn it over to Dr. Vézina to talk about some of the reinvestments we're making in science, not necessarily to recreate things that we had done in the 1970s, 1980s, 1990s, or in the last decade, but to look at investments in areas where technology now presents an opportunity to help us better monitor the conditions in the marine environment and also to better monitor fish stocks. Maybe you can expand on some of the things we're doing, in terms of pelagic species monitoring in particular.

MR. VÉZINA: The science reinvestment was announced in the February budget and we're working as fast as we can to stand up all the new resources. Of course, $200 million is over five years and it's national, so it's not all coming to this region. We still have to husband our resource very carefully and target the priority issues.

In terms of priorities, using new technology is a priority for the reinvestment. By that, we mean that we would use remotely operated vehicles, and gliders that give us more flexibility in observing what's going on in the marine environment. We are working hard on acquiring new instruments and staffing up so we can deploy these instruments and it may give us a more rapid response capability if we have these instruments, so we're working towards that.

In terms of the pelagics, we are investing in acoustic technology, trying to enhance that with not only equipment but also expertise, so we can gather more of that information which would help us understand better what's happening with the small pelagics. That includes herring, mackerel, and a number of forage fish. So we'll have to think carefully about our priorities but herring is certainly going to be a major part, given that it's an important commercial stock for Nova Scotia and an important keystone species for the ecosystem.

We are gearing up to do more in these two areas, but again, I caution that when it comes to small-scale events like this, it is hard to imagine a level of investment that would give us the capability to be there when it happens. It's so local that we can't be everywhere at once.

MADAM CHAIRMAN: Mr. d'Entremont.

MR. D'ENTREMONT: Thank you very much for that. I'm thoroughly entertained by the questioning that we're getting. We actually just heard that federal austerity budgeting killed these fish; that's kind of what we're saying here.

Knowing full well that the pelagic fishery is probably one of the largest-studied groups of fish that we actually have - I mean there's a whole bunch of other fish that we probably could know more about. With pelagics, when you talk about surveying and fishing and the data that's collected from that fishery, I think it's phenomenal.

The fish we saw here and just going from the fish that I saw in the Tusket River, what year classes were we looking at? Is it specifically to a number of year classes, is it spread across those year classes, where are the fish coming from - those kinds of things. Talking to the fishermen that I know, the herring fishery had a really good year this year. I think that's an experience of that. Let's talk about the pelagics industry for a little bit and what kind of studying actually goes on in there.

MR. KNIGHT: I'm going to turn to Mr. Vézina for the answer to the question about the year classes of the fish. I want to clarify for the record that it is not our view that any austerity on the part of the federal government led to the mortality of the fish.

MR. D'ENTREMONT: Thank you.

MR. KNIGHT: We have done all the tests that have been known to us, we've contacted colleagues internationally in the domain of who does the testing, we've received input from various people around the Province of Nova Scotia and Canada. We have completed all known testing for the cause of mortality with our federal and provincial partners, and there has been no source of mortality detected.

We've also noted that in our domain and in other domains internationally, there have been naturally-occurring events from time to time. We have heard from certain members of the committee today, and we have also heard on the wharves from many of the people involved in the fishing industry, naturally-occurring events here in terms of the concentrations of herring and the tides and the winds that may be contributing factors to this event.

I think now we'll go to the technical part of the question and talk about the size range of the herring that we are seeing in this event, if there's a prevalence of one or the other.

MR. VÉZINA: The herring that were involved in the mortality events in the bay are predominantly juveniles, two or three years old so they haven't spawned yet. That you'd find juveniles in various bays in Nova Scotia is not unusual, that's what they do at this time of the year, they tend to disperse and they actually mix schools between different spawning stocks, so you can't associate the school that we see in St. Marys Bay, for example, to any particular spawning stock, the juveniles tend to mix and their behaviour is quite unpredictable.

Again, we observe very high densities of these young animals in St. Marys Bay this year at this time, but we don't know why they happen to be there at this time of the year in such abundance.

MR. D'ENTREMONT: Thank you for that. There was no criticism of the departments on this one - just the people who sit politically to my left who happen to be sitting to my right. Thank you.

MADAM CHAIRMAN: Mr. Maguire.

MR. BRENDAN MAGUIRE: Maybe for once in my life I have to agree with Mr. d'Entremont, I do find these rounds of questions very entertaining. I guess what I'm struggling with is who to believe here when it comes to the herring incident - the scientists with their research and facts, or the politicians with their words.

Let's rule out some of the stuff here so that it's very clear. I know you may not be able to say 100 per cent but if the departments were betting men and women here - we've heard red tide, super chill, toxins. Not just here today but some stories that we've read and some people out there who may be self-proclaimed Internet scientists, toxins introduced to the water, turbine impact, we heard aquaculture brought up here, sea lice. To me, a lot of these are just like words and phrases that are thrown out there to scare the public.

With your research, federal and provincial, is there any evidence to say that any of this happened; should we believe research and science here or should we believe the words of the politicians and the Internet scientists?

MADAM CHAIRMAN: Mr. Knight, would you like to start?

MR. KNIGHT: I would and perhaps . . .

MR. MAGUIRE: With a smile, too, I like that. (Laughter)

MR. KNIGHT: To begin with, I'll clarify that I'm not a scientist but I do have a scientist with me . . .

MADAM CHAIRMAN: Are you an Internet scientist?

MR. KNIGHT: Nor am I an Internet scientist but I have lots of experience in getting advice from scientists. In this case, here we have scientists and laboratories from three federal departments, and the provincial government who have participated in conducting tests to determine if any of these naturally-occurring or man-induced pollutants are evident in the environment. Based on that, based on the tests that have been conducted, I am confident that they did not exist.

With regard to the super-chill, I think it has been previously explained. We can't go back in time, we know that temperature changes have occurred as the honourable member, Mr. Belliveau, indicated. We know that they frequently occur at this time of year but we can't go back in time and recreate those.

We do have temperature monitoring stations that give us an indication, but unless you are right there in that location - they're dispersed throughout the Atlantic Coast of Canada. Some of them are sea-based; I know some of them have been in place for more than 50 years and perhaps close to 100 years. Some of the land-based stations that indicate air temperature - not water temperature - have been in place for a very long time and we've checked the temperature changes in the local area from the stations that we have available.

We can't go back and recreate those conditions, but I am confident that the tests that have been conducted have ruled out these other things, such as naturally-occurring toxins or man-made pollutants.

Can we say with 100 per cent certainty? We can say that we've done all known tests, not only in Canada but based on our connections with other colleagues internationally, we've conducted all known tests and we have had suggestions and questions from many people across the domain in Canada and elsewhere, have you checked for this, have you checked for this? Yes, collectively between the provincial government and the federal government departments, we have checked for all the things that people have brought forth to us in terms of known tests that are scientifically based that might cause the fish mortality.

MR. MAGUIRE: With confidence, I mean you can just do yes or no, a quick answer so we can pass it on, but with confidence you can say that sea lice, aquaculture, and the turbine, those things have not impacted and were not the cause of the herring - with confidence. I know you can't say 100 per cent but you've done all the tests - you feel comfortable with all the testing you've done.

MR. KNIGHT: For me to give a quick answer on that and not . . .

MR. MAGUIRE: You can do a long one, that's okay.

MR. KNIGHT: . . . to draw on my experts, I will say that I have been advised by experts in my department, in other federal departments, and in the provincial department, that I am confident, yes, that these things are not the causes.

MADAM CHAIRMAN: Is there anyone else who wants a go at this? No, okay, Mr. Belliveau.

MR. BELLIVEAU: I was a bit taken by your comment about how this is a localized issue or a localized event. Again, if we search the web pages we'll see that events like this have happened in our neighbouring Province of New Brunswick. We look at Newfoundland and Labrador just in the last several months or weeks here, we look to Europe and we see events like this, we look to Chile and see events like this. This is not local, if you back off that, I think they made reference to it in World War II that the Atlantic Ocean was the pond. These events are happening and to me, the Bay of Fundy is the fastest-warming body of water in the world. To me, this is why it's so important.

I endorse the science, I want you to spend this money correctly. There are things happening in the water column that need to be addressed and we need to have the answer to it. I believe they are going to affect the policies over how we manage the fisheries in the immediate future. We have lobster stocks moving as we speak now, moving to the east or north.

My question is, these events are like the weather, the events that we have to deal with, are you going to be spending this science and managing the policies of the future and taking all this into consideration and do you want to readdress how this may not be just a localized issue in southwest Nova Scotia?

MR. VÉZINA: What I meant, this particular event is localized in terms of the spatial scale. The epicentre was about tens of kilometres. There was some spill-over over a range of 60 kilometres but compared to the whole coast of Nova Scotia, it's fairly localized.

Now each of these events you mentioned are also localized. We had events in New Brunswick and in P.E.I., as you said, but they were also localized in areas where you would expect these weather events to cause these kinds of mortalities. The same thing in Newfoundland and Labrador. The event in Cornwall also was very localized.

Now in terms of if there's a common cause to this, I have no evidence to say there is some link between these events, absolutely no evidence of that. Now we know that the ocean is changing, we know that the Gulf of Maine is one of the most rapidly-warming areas in the ocean and we know that especially, for instance, in the south in the U.S., stocks are moving.

We have undertaken research to assess which stocks of fish are more vulnerable to climate change, to factors like acidification as well, and we are moving on now towards what tools we need to provide managers to make better decisions maybe, in the face of climate change. That's our focus, it's really to help the management of the resources. If fish kills become part of that broader context, then it will be; if not, then we will not go and try to investigate every specific fish kill in order to better manage the resources.

MADAM CHAIRMAN: Mr. Belliveau, do you have a supplementary?

MR. BELLIVEAU: I think it's all connected. If you're going to have policies of the future - you alluded that the fish stocks, especially the lobsters, are moving to the north or northeast, and the policies of the future have to adjust. There are going to be new species that the fishing industry will want to go after, to pursue. Are you confident that those policies will be friendly to the communities?

MR. VÉZINA: My job is to provide advice to the policy managers to make those decisions. We will join the research in order to maybe provide better advice on the impacts of climate change on policy decisions, but it's not my job to make those decisions.

MADAM CHAIRMAN: Mr. Dunn.

MR. PAT DUNN: One quick question around monitoring the situation in early January. You mentioned in your introduction that the event seemed to be over, there's little or no further fish kill. How long do you monitor this? Is there a day coming where that's it, you're finished and moving on?

MR. KNIGHT: It's a good question. About five years ago we had a huge number of seals that were dying on the north coast of Labrador, between Makkovik and Nain, in very remote areas. We monitored that, in consultation with the provincial authorities and the local communities.

What I'm illustrating is that from time to time, things like this crop up somewhere in Atlantic Canada and we have to dedicate more resources to one particular location than another when an event is occurring. In southwestern Nova Scotia, we have a significant staff of fishery officers who work in that area, somewhere in the range of 50 to 60 people if you look at the area from here around into the bottom of the Bay of Fundy. We also have people on the New Brunswick side of the Bay of Fundy.

Part of their job on a daily basis is that not only are they there to ensure compliance with the rules and regulations and to protect the fishery, but they're also there to observe the local conditions and report on them. Right now, we're probably concentrating a significantly heavier level of resources in terms of that local monitoring than we would otherwise be doing, but it's something we could re-enact pretty quickly if there were indications from local sources that there were problems. We could have monitoring resources in place pretty quickly.

How long will we continue to dedicate resources? Not much longer if there are no indications because we know we can be back there pretty quickly if we get reports from local sources.

MADAM CHAIRMAN: Mr. Farrell.

MR. TERRY FARRELL: I'll ask Mr. Knight to address this and then pass it off, as you see fit. I guess I was as alarmed as anyone when I first heard of this. It seemed like something that could be catastrophic or could have arisen from some kind of grave environmental concern or disaster.

I followed it in the media like most Nova Scotians did and as it progressed, I guess I got more and more confident and comfortable in the way that it was being handled. Frankly, when there are as many government agencies and departments involved as there are in something like this, I think some people might find that a little bit surprising but in fact it seemed to work very well.

I'm wondering if you could help to explain just how that took place in that manner - there's some of that in your presentation but perhaps the protocols that are in place, how the other agencies were brought in, and maybe Mr. Dunn will end up speaking to that from the provincial point of view. It seemed like a lot of work was done involving a lot of departments and a lot of interaction in a fairly short period of time.

MR. KNIGHT: A very good question because as you indicated, there were three federal departments involved in this, plus the provincial government was heavily involved. What I will say is that we can develop policies and procedures that are there to guide government operations, and that's what they're there for, but there's never going to be a policy document written that is going to be perfect for all situations. As in this case, sometimes things have to evolve organically as the situation evolves.

As I indicated earlier, there was no clear indication until very late in the investigation that there were - we wanted to be sure, in other words, that there were no naturally-occurring toxins or man-induced pollutants or toxic matter in the waters that were causing this mortality.

If the question is how does it evolve, it evolves as necessary. Recently, for example, we've been heavily involved with a number of departments with regard to the tanker that went aground in the Sydney area, because of the potential for an oil spill in a marine environment. We worked on that matter very closely with the provincial Department of Environment, the Coast Guard, and the federal Department of Transport. On a federal and a provincial, no matter what the situation, we'll engage the people who are necessary or who can assist. In this case the three federal departments all have laboratories that do different types of testing. They are in place for different reasons, as the provincial government within its mandate has laboratory and personnel, like Dr. Cusack, who can do specific types of testing.

We don't want to create redundancy or repetition or waste money doing things that the provincial government does within its mandate or can do better, and I'm sure it's the same within the federal system. Environment Canada has a mandate, the Canadian Food Inspection Agency has a mandate, and Fisheries and Oceans has a mandate. But quite often it's necessary to collaborate to make sure that we're leaving no stone unturned, that we investigate all potential causes.

I don't know if the provincial government representatives have anything to add but I'll turn to them to see if there's anything they may wish to add to that.

MADAM CHAIRMAN: Mr. Dunn.

MR. FRANK DUNN: Madam Chairman, I won't repeat what Mr. Knight said, other than to say although this instance was unusual and you heard in my opening remarks how we initially became involved, there is close collaboration with our federal colleagues at Fisheries and Oceans on many Fisheries files. I think it's important to remember, and Mr. Knight mentioned it, that there are resources we can provide and efficiencies that both organizations can attain when doing these things.

You've heard Dr. Cusack answer some questions this morning. We have a state-of-the-art fish veterinarian lab in Truro which we use on a regular basis and is available to Fisheries and Oceans when possible. I just wanted to make a note that we continue to talk about many issues, and this is one that happens to have been highlighted recently.

MADAM CHAIRMAN: Mr. Belliveau.

MR. BELLIVEAU: I asked a question earlier about understanding the science behind the catch and to me that's important. I know that a number of members may find some sensitivity around that regarding the federal cuts, but I think this is crucial. My initial question was about the shellfish monitoring, especially for recreational shellfish use. To me that has been simply severed off in the last 10 years. What I'm hearing here is that you find that the monitoring is adequate now to give you some information if there was another herring kill.

I've observed these shellfish closures all over our province in the last decade, simply because of lack of monitoring. I'm asking you now, are you confident that these shellfish areas are open or are they closed across Nova Scotia? I see more of them being closed almost on a yearly basis. My question is, are the shellfish in the immediate area of St. Marys Bay open, as we speak? Are there more of these closures across Nova Scotia being open?

MR. KNIGHT: I think the best way is for me to start off answering that question and then I'm going to defer it to the local area director with regard to specific closures to the extent that he knows about on the area in question.

First of all, I think it's probably useful to explain the process for a shellfish closure. It is shared among three departments. The Canadian Food Inspection Agency has a responsibility to monitor the fish that is coming out of the ocean to make sure it's safe to consume. As part of its mandate, Environment and Climate Change Canada also have a responsibility to monitor for pollutants and things that are in the water column that would make fish unsanitary to consume.

The three federal departments work in collaboration; Environment and Climate Change Canada have a monitoring program and do testing, as does the Canadian Food Inspection Agency. When they detect or when their monitoring processes determine that fish are unsafe to consume, they make a recommendation to Fisheries and Oceans Canada to close an area. They confine that based on the testing or the protocols they have in place, such as a major rainfall event that I described earlier that could cause runoff and bring land-based pollutants into the marine environment. When that occurs, the Department of Fisheries and Oceans makes a prohibition order which prohibits people from harvesting in that area until further notice.

We communicate that to the public by notice to harvesters, notice to fishers, and by the variation order. We post signs in the affected areas and our fishery officers conduct patrols in the area to make sure that people aren't harvesting there. If people are harvesting in closed areas, then it's the role and responsibility of Fisheries and Oceans Canada to take enforcement and compliance action. All that is based on the monitoring and testing conducted by the two other agencies.

I'm not in a position to speak about the monitoring that the representatives of the other departments do, but we are guided by their advice and recommendations to us. We do have constant consultation with them about that, we do provide them with lots of feedback with what we're hearing from local harvesters and local communities, but at the end of the day only they can speak to the monitoring that they do for food safety purposes.

There's a pretty distinct difference between that monitoring and the monitoring that we do in the marine environment that is about the oceanographic conditions and how those conditions may be affecting fish stocks like herring.

Now I'd like to turn to the area director to see if he can answer the question about closures in that local area.

MADAM CHAIRMAN: Mr. Whorley.

MR. DAVID WHORLEY: I don't have a lot to add, that's a pretty comprehensive description of the division of labour among the parties. In the area, you're quite right. Over the summer there were closures around Digby exactly the way Mr. Knight described, based on advice from Environment and Climate Change Canada. I'm thinking back, I think there was a greywater spill around Digby, probably mid-summer, so exactly as described, we issued a prohibition order. I think that eventually that got reopened, but I think it may simply illustrate in detail maybe the process that has been described here.

DFO's role in this is the notification, the issuing of the prohibition order, and the enforcement component based on advice from the other two CSSP partners. In the area, you are quite correct; I think that Digby might have been the only one over the summer that actually underwent a closure.

MADAM CHAIRMAN: Mr. Belliveau, are you satisfied?

MR. BELLIVEAU: No, the point I'm trying to make here is that are you confident that there's going to be monitoring, moving forward here - and I'm referring to the $200 million that the federal government has announced for new science. What I'm trying to suggest here is that we need to make sure this monitoring is in place so we'd have - to me, I think it would have some bearing on knowing the outcome of the herring kill and there's also people in the community who would like to have access to recreational shellfish harvesting. The science - that's the question.

MADAM CHAIRMAN: Mr. Knight.

MR. KNIGHT: Just to clarify that the monitoring for the water quality for shellfish consumption, not even necessarily shellfish health, because some of these things that occur in the water aren't detrimental to the shellfish health but they are detrimental to human health and well-being if they are consumed when the shellfish are consuming these things that occur in the water because of land-based contaminants or greywater spills, as the case may be, or toxins that occur in the natural environment in the ocean. That monitoring won't be conducted by the funding received by DFO in the announcement that we're talking about. That monitoring is solely and wholly conducted by the Canadian Food Inspection Agency and Environment and Climate Change Canada.

We're confident that with the new investments we're making in science in DFO that we can reinvest into better monitoring, new technology, and have better resources to monitor the oceanographic conditions, and in some cases, to increase our monitoring of fish stocks.

MADAM CHAIRMAN: Mr. d'Entremont.

MR. D'ENTREMONT: I would be remiss if I didn't take the opportunity, while we have all these people here, to talk about the lobster fishery because I think that was our original topic before this one came up.

I want to throw this out to you. We've had a relatively successful lobster season - we're hearing the catches are a little down, prices are pretty good, the weather has been a little off. Maybe I could ask our DFO friends and maybe our department friends: how is the health of the stock in what you've seen so far, what kind of compliance issues are you seeing in Districts 33 and 34, and maybe pricing and marketing - how are things going in the fishery today?

MR. KNIGHT: I'll start off and then I'm going to ask my science colleague to talk a little bit about the health of the stock and the area director to talk a little bit about what we're seeing in the local fishery this year when it comes to the trends in landings and compliance in the fishery.

MADAM CHAIRMAN: And I think Mr. Osborne has something to add as well.

MR. KNIGHT: First of all, what I would illustrate is, we've talked a little bit in terms of the changing in the ocean environment. In the last 15 years, lobster landings in Atlantic Canada and in the domain of our neighbours in the U.S. have increased significantly. They are at all-time highs. Although efforts may have changed and fishermen are likely more capable of being very productive these days with the gear and technologies they have available, lobster stocks throughout Atlantic Canada and the eastern U.S. are at an all-time high in terms of the landings. They have gone up and up generally over a pretty consistent period.

It's consistent with some other trends that are throughout Atlantic Canada for other shellfish species. We've seen crab stocks in the domain of Atlantic Canada be at all-time highs during these same last two decades in general, since about the mid 1990s. Generally speaking, shrimp is the same thing, and in that same period we've seen generally a significant decline in groundfish stocks.

I think that's a general parameter we should set for the discussion, but now maybe I'll turn to my science colleague and ask what he can tell us about the lobster stocks - probably in southwestern Nova Scotia in particular.

MR. VÉZINA: I may be brief here. I can talk a bit about the assessment we did previously, last year, which indicates that the lobster stocks in Nova Scotia are still very much in what we call the healthy zone. We have indicators that we have thresholds for, and all indicators last year were that the lobster stocks in southwestern Nova Scotia were very much in the healthy zone. No concerns about the abundance, size, or distribution. All our indicators were green.

Now the season is still open for southwestern Nova Scotia so after the season is closed, we will look at the landing data and combine that with our information from working with actual partners in the fishing industry on recruitment, settlement, the size and age, and all these considerations. We'll put that together to do a new update on the status of the stock and then we'll be able to better assess where it is at the present. But until now, it looks like the stock is very much still in the healthy zone.

MR. WHORLEY: In terms of catch, you're quite right. The annual reports from fishermen in lobster fishing areas 33 and 34 seem to indicate that the catch is down a little bit compared to last year. You're right about weather, last year was an exceptional year for weather and it was a really great fishing season. The good news this year is that price remains high. I think the last price I saw from last week, lobster is running around $9, which is quite good. In terms of enforcement, discussions with regional colleagues in Conservation and Protection, there doesn't seem to be anything outside of the usual.

I'd say maybe by way of a fun fact, your question isn't actually - with respect to the lobster industry and the discussion of herring, they actually are related. The weekend this story was breaking was actually the launch of the LFA 33 and 34 season, and you might remember that we delayed that because of high winds - it's kind of a memory jogger, how windy and rough the conditions were at that time.

In general, I think the industry is pleased with the price. As Alain says, we'll have to see how the rest of the season plays out with total catch compared to last year. But in general, it looks good, I don't think there's any major enforcement issues.

MR. BRUCE OSBORNE: I have just a couple of things to add to what has already been said. In terms of landings and the stock, I would echo what our federal colleagues have indicated. To illustrate the point, I was recently looking at a graph of historic landings that I think started around 1900 and comes to the present. It used to be that that graph was roughly U-shaped - much higher landings around the turn of the century, a bit of a trough, and then increasing in the latter part towards today. That graph has started to look more like a J in recent years than a U, as the landings in recent years have continued to increase.

Now, as we talk about overall landings, it's also important - we hear anecdotally, as others have, that not everybody at all times enjoys the benefits of those increases, and certainly there can be variations from port to port and region to region. We've certainly heard some of that this year anecdotally from harvesters as well. The weather this year has also played a challenge in terms of fishing days.

Heading into the season, in terms of market and price, some of the things we were hearing again mostly through industry folks, was a very strong interest in how the season was going to turn out, as there is every Fall. In particular, there was some concern about inventories, particularly on the process side of lobster and how that was going to play into price and whether the lobster could move in the marketplace. We're not hearing of any big problems right now. As has been indicated, price has strengthened quite a bit - I think it opened around $5 or $5.50, and it's now around $9 so the market seems to be doing quite well.

I would note that the growth in the China market since 2008-09 has been significant. From a market that was, in terms of scale, almost non-existent for Nova Scotia, exports have grown substantially since that time. We export as much seafood to China now as we do to the EU. In terms of having more customers looking for lobster, that seems to help be a good buffer in terms of pricing, market supply, and market access.

MADAM CHAIRMAN: Mr. Maguire.

MR. MAGUIRE: Since Mr. d'Entremont kind of changed the topic a little bit and we have Mr. Osborne here, I have a couple of questions for Mr. Osborne. You did touch on one of the questions I had, which was the lobster export to the Asian market; we've seen significant growth in that. Could you give us a little bit of an update on maybe the lobster handling and the quality and how that may have had an impact on some of this stuff? Also, a bit of an update on the actual applications and interest since the trout and shellfish aquaculture has been reopened - are we seeing renewed interest in shellfish and trout aquaculture? Two questions.

MR. OSBORNE: I'm going to answer the second one first, so you might have to remind me of the first one. The world is hungry for seafood right now. You can look at the United Nations projections for population growth and available seafood supply - all those things indicate that producing seafood through aquaculture is really important for the future and necessary. Most wild stocks, the same international organizations also report that globally most fish stocks are either fully-utilized or over-subscribed, so future growth for seafood to feed the world the protein that it needs and demands is going to come from aquaculture. There is always a strong interest in people to initiate and establish aquaculture businesses in Nova Scotia, and that continues. We do have some interest in the types of aquaculture you just mentioned.

The first part of your question - what was the first part of your question again?

MR. MAGUIRE: You know what, I'm going to stay on aquaculture, actually. I just wanted to ask you - just to continue down that line of questioning - have we, as Nova Scotians, reached our full potential when it comes to aquaculture? Are we anywhere near our full potential? What's holding us back, if we're not, and what's the future of aquaculture in Nova Scotia? Also, what kind of impact does this have on local economies, and not just in Nova Scotia, but I assume that you've researched other jurisdictions and how it has impacted economically - let's say, New Zealand, Australia, places like that - and what kind of relationship they have with the local community?

MR. OSBORNE: I think the first part of your question was have we reached our potential? I think in general the answer is no. When we look around at our Atlantic colleagues we currently produce about $60 million worth of farmed product in Nova Scotia. We have recently invested significantly in not only new regulations but in a new approach to aquaculture development in Nova Scotia, and we hope that will help us move forward.

The industry, as you noted in your question, is a very significant economic contributor in other provinces and in other countries, as it is here in the communities that it occurs. We do think there is more potential and we will be doing work to locate and ascertain what that potential is, where would be appropriate places for farming.

If we look at some of the other adjacent provinces where aquaculture is significant, Newfoundland and Labrador, for example, has seen tremendous growth in the last seven years, from a situation similar to ours - $40 million, $50 million worth of production to a little under $200 million worth of production. The effects of that in communities and on the economy in the local regions where that is occurring is significant and visible.

MR. MAGUIRE: And environmental.

MR. OSBORNE: All these things are done in an environmentally responsible and sound way. As governments, we have our roles to play in how we review and approve and monitor these farms, and also the industry - as in the commercial harvesting industry, third-party certification programs, market access, and consumer acceptance - is also demanding many of these third-party certifications, which is yet another layer of monitoring of industry performance. Aquaculture is no different; there are aquaculture certifications as well. That's another - I don't want to say trend because that kind of makes it sound trivial, but another development along the way as we move forward in a sustainable way for commercial fishing and aquaculture.

MADAM CHAIRMAN: Mr. Dunn, you had something to add?

MR. FRANK DUNN: Madam Chairman, as deputy I'd be remiss if I didn't take the opportunity in front of the Resources Committee just to mention something. The One Nova Scotia Report that came out some time ago and that we're all aware of, there was a recommendation there to double our exports on the seafood side by 2020.

I can tell you that we've already reached that goal, and for 2015-16 our exports were $1.7 billion, almost somewhere between 35 per cent and 40 per cent of the exports in Canada. I just wanted to mention that to the members, that it has been a real success story, as far as our export markets. As Mr. Osborne said, we will continue to pursue other markets and we will continue to pursue increases in exports from an aquaculture perspective as well. I just wanted to mention that to the Resource Committee. I get a chance to plug all the hard work that the staff at the department do. Thank you.

MADAM CHAIRMAN: We could do a quick round, but we have to give time for all three, and we have some committee business to do, so quickly. Ms. Zann.

MS. ZANN: I've been waiting patiently here for one last question. It's good to hear you talking about the way forward with aquaculture. I would be remiss if I didn't give a shout-out to my colleague to my left, who was the Minister of Fisheries and Aquaculture, and who was the one who actually said to all of us - I remember him saying it - that aquaculture is the way of the future. This is how we're going to be able to feed people. There are so many people in the world who are going to be needing our seafood and our oceans. We don't want to deplete them, so we want to do it in a sustainable manner. I say thank you, Sterling, for starting the ball rolling there on trying to get people on board. It was hard at first, but it seems like more and more people are understanding that if it's done in a sustainable fashion, it's not going to hurt our wild salmon stocks, for instance.

I don't believe any of the questions here have been fearmongering. I think it's about trying to get to the bottom of what happened when a number of fish were mysteriously killed. Again, I want to thank you for your diligence at trying to get to the bottom of it. Obviously, we still don't know what the answer is.

Hearing everybody talking about the extreme weather and the warming of the oceans and the results of climate change, I know we do have to remain diligent about this.

MADAM CHAIRMAN: Do you have a question, Ms. Zann?

MS. ZANN: Yes, I was just getting to it. I would like to know what type of research you are planning to do and is starting to be done to understand the potential effects of this on our marine life going forward.

MR. VÉZINA: Actually, we've been investigating climate change for 20 years at the Bedford Institute of Oceanography. A large part of it is the oceanography monitoring that we've done for the past decades which had allowed us to contribute very strongly to a risk assessment that was done in previous years on where our vulnerabilities are with

respect to ecological change and the impact on commercial fish. We identified major vulnerabilities that the department needed to look at.

What we've been doing with funding from the climate change adaptation program for the past five years is, we've been compiling a lot of information on which species are vulnerable to climate change. We have that information now. We know, based on the best information available, which of the many species in our waters are most vulnerable negatively to climate change, or maybe also positively - which ones would benefit.

We've done a fair amount of research also on the impact of acidification on some commercial species like lobster. We are continuing to enhance our monitoring program to take ocean acidification into account, for example, to get better monitoring of what's happening there.

Also, we're moving towards a phase where we're trying to develop better tools to inform how you would take the impact into account when you make a decision about the management of a particular fish stock. That's the phase we're entering now: trying to move towards actually developing tools that can be applied to make those decisions.

MS. ZANN: Great. Thank you very much.

MADAM CHAIRMAN: Anything to add there? No.

Okay, I think we'll end our questioning here. We do have some committee business. I would like you to do your closing remarks. We'll start with Mr. Dunn.

MR. FRANK DUNN: I don't really have anything to add other than to thank the committee for bringing us here today and to thank my federal colleagues. I look forward to meeting with you all again.

MADAM CHAIRMAN: Mr. Knight.

MR. KNIGHT: I'll just echo that by saying thank you very much for the opportunity to appear before your committee today to provide you with the information of what we knew about this event and what we've done to monitor it, and also for the opportunity to answer some other questions that I'm sure were of interest to the committee today. Thank you very much for the opportunity.

MADAM CHAIRMAN: Thank you for being here today. We'll take a two-minute recess while our witnesses exit, and then we'll resume our committee business.

[10:50 a.m. The committee recessed.]

[10:53 a.m. The committee reconvened.]

MADAM CHAIRMAN: We're going to call the meeting back to order. Going through the list, there was correspondence received from the Department of Natural Resources with additional information on the Cape Breton Private Land Partnership. You all received copies by email, any questions regarding that? No, okay.

We have rescheduled the visit to the gypsum mine. That was to take place in October, and we're now going to do it June 15th. Any questions about that?

MR. D'ENTREMONT: Pending an election, right?

MADAM CHAIRMAN: Pending an election or the sitting of the House.

The lobster industry, we just had a conversation with Deputy Minister Dunn, and they are not available for the March break or the March 23rd rescheduling of the meeting if we are in agreement. Did we check? Are we ready? Are you willing to move a meeting from the March break to March 23rd? We're all in agreement on that?

MS. ZANN: When is the March break?

MADAM CHAIRMAN: That week, March 16th.

MS. ZANN: When does it start? What's the date?

MADAM CHAIRMAN: I think it's around the 12th.

MRS. DARLENE HENRY (Legislative Committee Clerk): It's the week of March 13th and committees don't normally meet that time. That's why we have to move it.

MADAM CHAIRMAN: Right, meetings don't traditionally meet that week so we'd like to move it to March 23rd. Unfortunately, the Department of Fisheries and Aquaculture is in Boston for their big event, so Darlene will look into substituting another meeting.

MRS. HENRY: At this point, because the lobster industry people cannot attend the March 23rd meeting, the rotation has to go back to the Liberal caucus. In this case, it's either going to be the forest fire prevention and protection strategy or the protected parks areas. It's going to be the Department of Natural Resources anyway, depending on which topic they want to come in on for March 23rd.

Since I am speaking, with regard to that - once this is scheduled, the committee is scheduled from this point until June 15th. All your meetings are booked.

MS. ZANN: Is there one in February?

MADAM CHAIRMAN: Yes.

MS. ZANN: What's that one?

MADAM CHAIRMAN: The February meeting is the maple industry.

Do we agree that Mrs. Henry can go ahead and book the Department of Natural Resources? Great. Our next meeting is February 16th, 9:00 a.m. to 11:00 a.m. It will be the maple industry, as we said.

I adjourn this meeting. Thank you.

[The committee adjourned at 10:57 a.m.]