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Chair: Ms. Valerie Bradford





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• (1105)

[English]

**The Chair (Ms. Valerie Bradford (Kitchener South—Hespeler, Lib.)):** I call this meeting to order. Welcome to meeting 87 of the House of Commons Standing Committee on Science and Research.

Before we begin, I ask all members and other in-person participants to consult the cards on the table for guidelines to prevent audio feedback incidents. Please take note of the following preventative measures to protect the health and safety of all participants, including our interpreters. Use only an approved black earpiece. The former grey earpieces must no longer be used. Keep your earpiece away from all microphones at all times. When you are not using your earpiece, place it face down on the sticker placed on the table for this purpose. Thank you all for your co-operation.

Today's meeting is taking place in a hybrid format. For those participating virtually, I'll outline a few rules to follow.

You may speak in the official language of your choice. Interpretation services are available for this meeting. You have the choice, at the bottom of your screen, of floor, English or French. If interpretation is lost, please inform me immediately and we will ensure interpretation is properly restored before resuming the proceedings.

Before speaking, please wait until I recognize you by name. If you are on the video conference, please click on the microphone icon to unmute yourself. When you are not speaking, your mic should be on mute. As a reminder, all comments by members should be addressed through the chair. With regard to a speaking list, the clerk and I will do the best we can to maintain a consolidated order of speaking for all members, whether they are participating virtually or in person.

Pursuant to Standing Order 108(3)(i) and the motion adopted by the committee on Tuesday, January 31, 2023, the committee resumes its study of science and research in Canada's Arctic in relation to climate change.

It is now my pleasure to welcome, as individuals, Richard Boudreault, adjunct professor at the University of Waterloo and Polytechnique Montréal and chief scientist at CSMC, by video conference; Andrew Derocher, professor of biological sciences at the University of Alberta, by video conference; and William Quinton, professor at Wilfrid Laurier University, by video conference. Up to five minutes will be given for opening remarks, after which we will proceed with rounds of questions.

Because we have a vote scheduled for 11 o'clock and it's a bit delayed, I may at some point ask for unanimous consent to proceed until 10 minutes before voting closes so we can vote.

Go ahead, Michelle.

**Hon. Michelle Rempel Garner (Calgary Nose Hill, CPC):** I'm not sure what's going on in the House right now, so I'm a bit loath to give unanimous consent until we—

**The Chair:** I wasn't asking for it yet. I asked to have the TV on so we could see what was going on, because I really don't know why things are delayed.

**Hon. Michelle Rempel Garner:** Maybe we can deal with it in the moment.

**The Chair:** Yes, in the moment. At least we are here in the same building—sometimes we're across the street—so that makes it a little easier for us to scurry around.

To go back to our witnesses, up to five minutes will be given for opening remarks, after which we will proceed with rounds of questions.

Professor Boudreault, I invite you to make an opening statement of up to five minutes.

[Translation]

**Mr. Richard Boudreault (Adjunct Professor, University of Waterloo, Polytechnique Montréal and CSMC, As an Individual):** Thank you very much.

[English]

Thank you, members of the committee, for inviting me. I'm very happy to be here today. You can ask me questions in French, English or Mohawk.

I have been involved in climate change research for 40 years and in the Arctic for at least two to three decades, so my interpretation of all that's going on is based on this foundation.

The Arctic has had spells of temperatures in the thirties in the last two years, which was totally unobserved in the past and is a very big change. The Arctic warms up at about three times the temperature of Canada, and Canada warms up twice as fast, approximately, as the rest of the planet, so we're looking at six times the effect over the warming of the planet. Clearly, if we have a 1.5°C temperature over the 1880s, we are looking at 7°C to 8°C up north, which to a large extent has been demonstrated as well.

There are different tipping points that are owned by Canada or that are in Canadian land or very close to it. These tipping points are called, in French, *points de bascule*. They're essentially points of no return, where we've changed from one meteorological and environmental climate state to another. Returning may be extremely difficult or impossible.

It is having an impact on quite a few things. Let me state the five tipping points in Canada. There's polar ice melting. There's a stage at which it cannot recover. Greenland is thought to be in a melt-down process that will not be recovered. There's permafrost methane in the Arctic, which is created and put in the atmosphere. Methane has about 86 times the carbon effect of CO<sub>2</sub>. There are fires in the boreal forest. We have seen that in the last few years, and we've seen again this year that things are reoccurring. There's also the Atlantic circulation stream, the Gulf Stream, which is cooling the eastern part of the country but also managing the temperature of Europe.

All these factors are things that other nations may ask us to report on in the future. These are happening in our territory. We need to understand these effects and report situations that may not be recoverable.

The Northwest Passage is melting and mostly available. The polar vortexes are creating big changes in the temperature in Canada, the U.S. and now Mexico because of the extent of the polar vortex. The ocean temperature is also rising very quickly. Ocean temperature rises mean more environmental issues, such as typhoons and highly damaging tempests.

It's quite interesting that one of the big factors causing the ice to melt in the north is the deposition of soot. This soot is created by operating generators and by burning coal. It tends to accumulate in the north. It deposits on the snow and therefore increases the melting.

One factor that is very important to understand is that the Arctic ice is "the" tipping point. That's where all the effects are cascading over all the other tipping points, including the size of the rainforest and the capacity of the rainforest to be operational as a CO<sub>2</sub> capture forest. Soot is very important in driving polar ice melt. We are likely to be held accountable by other countries for what is happening.

If we look at the OECD countries that are involved in the Arctic, we have between four and 15 times fewer scientists than we would need based on the square kilometres of the surface of Canada.

• (1110)

**The Chair:** I'm sorry, Professor Boudreault, but that's our time for now. Hopefully, during our questions, we'll get to other comments you might want to make.

**Mr. Richard Boudreault:** Thank you.

**The Chair:** Thank you.

We'll now turn to Professor Derocher for five minutes.

**Professor Andrew Derocher (Professor of Biological Sciences, University of Alberta, As an Individual):** Good day. Thank you for the opportunity to be with you today.

I have conducted research across the Arctic—in the Yukon, NWT, Nunavut, northern Manitoba and northern Norway—for over 40 years. I primarily study polar bears but have also worked on Arctic grizzly bears, Arctic seals, caribou, northern mountain sheep and wolves. While most of my work has focused on the Canadian Arctic, I was a polar bear research scientist for the Norwegian government for seven years. I have been a tenured professor at the University of Alberta for 22 years. I first addressed climate change as an issue in 1993 with the publication "Possible Impacts of Climatic Warming on Polar Bears".

I'd like to begin on a positive note by recognizing the contributions of the polar continental shelf project of Natural Resources Canada, or the shelf. Their support has been vital throughout my work in the Arctic, most recently this past spring on the sea ice of Hudson Bay. Without shelf support, I would have left Arctic research long ago. The shelf is the glue that holds Canadian Arctic research together, and as such, it is a critical component of Canadian Arctic research infrastructure.

I have several points I'd like to make, but I'll preface them by saying that the research trajectory I have been fortunate enough to take over the past decades is likely impossible for new academics. Many of my colleagues are leaving Arctic research, and new ones view it as a non-viable trajectory in academia. I'd like to touch on funding and predictability.

I returned to Canada from Norway in 2002, as there was a stated desire to expand Arctic research in the 2000 report "From Crisis to Opportunity: Rebuilding Canada's Role in Northern Research", published by NSERC and SSHRC. While there have been successful Arctic programs, such as ArcticNet and the International Polar Year, the ability of Canada to sustain Arctic research with a focus on climate change has been limited. Funding levels have not kept pace with research costs and expectations. By its very nature, research on climate change requires long-term commitment, yet funding is often short-term—less than five years. Without the high profile of my research species, my work in the Arctic would have ended long ago. I rely more on funding from non-governmental organizations than any other source.

Further to this, as a past member and past chair of the review committee for NSERC's northern research supplement, I found it disheartening to repeatedly underfund—or not fund—many deserving Canadian researchers. The level of NSERC funding has not changed in many years for this program. The current average northern supplement would approximately cover the round-trip airfare to Resolute for a professor and one graduate student.

From a logistics perspective, Canada is lacking the appropriate infrastructure to conduct long-term research in the Arctic. The limited number of locations from which to base research is a significant constraint. While the Canadian High Arctic Research Station, CHARS, provides support for that area, the Canadian Arctic would benefit from a hub-and-spoke model. A series of well-funded, community-supported research facilities across the north would expand research capacity and increase community-researcher collaboration.

On this collaboration point, long-term research by default is collaborative, yet there are few means of linking researchers in the Arctic with communities and research opportunities. Joint research among various levels of government, stakeholders and universities is essential to maximize research outcomes. Without my long-term collaboration with Environment and Climate Change Canada, my research would be severely challenged.

Northern researchers are sometimes criticized for a “fly in-fly out” style. However, research timing is frequently decoupled from results, making communication with communities difficult. Southern-based researchers must collaborate with northern communities, but it is challenging when research funding is insufficient to travel back to the communities when they are available to meet. Enhanced collaboration between researchers and local communities would increase Canada's research productivity, as would more integrated teams of researchers. However, opportunities to collaborate with communities vary widely depending on the research topic, location and funding. Community-based research centres would facilitate researcher-community collaborations in a sustainable, long-term manner.

Thank you.

• (1115)

**The Chair:** Thank you very much, Professor Derocher.

We'll now turn to Professor Quinton for five minutes.

**Mr. William Quinton (Professor, Wilfrid Laurier University, As an Individual):** Thank you, Madam Chair.

My name is William Quinton. I'm a professor of cold regions hydrology at Wilfrid Laurier University in Waterloo, Ontario. I've worked in Canada's Arctic and subarctic regions since 1987.

The overall goal of my research is to improve the understanding of how climate warming is affecting Canada's northern water resources. The justification or rationale for this type of work is that it provides the mechanistic understanding needed to develop better predictive tools, forecasting models and so on so that we are in a better position to forecast what lies ahead of us as climate change continues. That, in turn, makes us better managers of climate warming and water resources in Canada's north.

Living in southern Canada but working in the north has given me a unique perspective on the stark contrast between north and south in terms of the rates, patterns and impacts of climate warming, all of which are much more obvious in the north, even to the casual observer. Since 1999, I've worked in what you can think of as the southern fringe of permafrost. It's the southern margin of permafrost that extends across our country from east to west, with my work being mostly focused in the Northwest Territories.

In this region, Canadians live at the front lines of climate change impacts. They're dealing with many abrupt changes over recent years or the last couple of decades, including warmer winters; shorter winters; changes in precipitation regimes, which drive changes in river and stream-flow regimes; changes in the frequency and occurrence of extreme events, including droughts, floods and wildfires; and other changes as well.

To put a human face on this, I think of a colleague and friend of ours who is also a former grand chief of the Dehcho First Nations in the Northwest Territories. In 2021, she and all of her community of Jean Marie River, on the banks of the Mackenzie River, lost their homes to the flooding of that year, as did many other communities nearby. She and many of her community members had to build their new homes elsewhere, and she did, in the community of Enterprise, not too far away. Two years later, that community burned to the ground. Ninety per cent of it burned, including her house. She lost two homes to extreme events within two years. I just don't see its equivalent in southern Canada, and she's by no means the only person with these types of experiences in the north.

As to the southern fringe zone, you can think of it as the front lines of permafrost thaw. It's where permafrost is sufficiently thin, at five to 10 metres. It's relatively warm—it's pretty much at the melting point temperature—and it's discontinuous. Those three characteristics make it highly susceptible to rapid thaw. In fact, in this region, permafrost isn't just thawing rapidly. It's disappearing, and it's doing so at an increasing rate. As permafrost disappears, it has profound impacts on water resources, on ecology and ecosystems, on infrastructure and, of course, ultimately on communities.

I think I'll leave it there as a high-level overview. I'm happy to answer questions.

• (1120)

**The Chair:** Thank you very much, Professor Quinton.

We'll now turn to our first round of questioning. We'll kick that off with MP Soroka for six minutes.

**Mr. Gerald Soroka (Yellowhead, CPC):** Thank you, Chair.

Before I begin with questions, I have a quick comment on important business. On February 27, the chief science adviser, Dr. Mona Nemer, appeared before our committee to discuss the important work her office is doing. During her appearance, several written responses to questions were requested by members of this committee, including from the Conservatives, the Bloc and the Liberals.

Dr. Nemer later committed to providing these responses by May 10, giving her ample time—over two months—to respond. It is now May 21 and we still have not received the responses. This delay is concerning, as one of the core mandates of this committee is to review the work of the chief science adviser. The lack of timely responses undermines our ability to fulfill this mandate effectively.

I firmly request that the chair and the clerk follow up once again with Dr. Nemer to ensure these responses are produced in a timely manner, preferably this week. It is important that our questions are answered so that we can continue the vital work with the necessary information.

Thank you, Madam Chair.

**The Chair:** I have just been advised that the clerk followed up with her prior to this meeting, so you are clearly on the same wavelength.

**Mr. Gerald Soroka:** Okay. We would like that as soon as possible, please.

**The Chair:** Right.

**Mr. Gerald Soroka:** I will start off with Mr. Boudreault.

Given your background in environmental engineering and clean technology, how do you see the role of scientific research in addressing climate change in the Arctic, and what innovative technologies or approaches are currently being developed or used to address these challenges?

**Mr. Richard Boudreault:** Thank you for the question.

We need to understand the environmental situation better in the Arctic. I did that as the chair of CHARS and I do that now at the research institute of Aurora College. We try to bring in new technology to provide energy, removing ourselves from the diesel generators that are putting a lot of soot in the atmosphere. We understand things a little. A big wind generator was built using a steel that did not perform well in the Arctic. There have been different types of processes. People have been telling us that we cannot use photovoltaics in the north, but that winds up being false. You can follow the sun pretty well in the north during the summertime, and it is much cheaper to use these resources than others.

The biggest problem we have—you were told the same thing by my colleagues—is that we need more study of what's going on. We need to do more in our activities. We need to work more with the Inuit, who have a set of knowledge that is critical for us. I'd like to give you an example at one time or another, but that's not the question. Clearly, we need about four times the number of scientists we have right now in Canada. We do not compare with anybody around the world; we compare only with equatorial countries. Most other countries have more people who work there. We need 1,500 more scientists. As was said before, it's hard to keep them on the job, because it's very hard to be in the Arctic and—

• (1125)

**Mr. Gerald Soroka:** I hate to interrupt, but I will ask another question of you.

Have you been involved in the development of advanced materials and clean technology, and how can these innovations be applied to improve resource management in the Arctic? Are there specific projects or technologies you are working on that could particularly benefit the Arctic region?

**Mr. Richard Boudreault:** Yes, there are many of those. I'll just name one or two.

We were capturing CO<sub>2</sub> from generators to reduce the amount of CO<sub>2</sub> in the atmosphere. We need to filter out all the soot, as it has an impact on people living in it and an impact on the ice. We have also developed new technologies, such as a micronuclear reactor that would fit the bill and provide resources and energy in the north at very low cost and with very high environmental capabilities.

There are many of those. I still work on different projects in the north to generate better environmental quality.

One of them is very interesting, because the Arctic is a desert to a certain extent. There's not that much clean water available, so we have developed a technique that uses nanotechnology to extract water from the atmosphere at a very low cost, therefore providing a lot of needed materials and consumables people require to live.

**Mr. Gerald Soroka:** Thank you for that.

I will go to Mr. Quinton.

What technological advancements have been most important in your research on cold regions hydrology and climate change? Are there emerging technologies that you believe will revolutionize the field in the coming years?

**Mr. William Quinton:** Given the time constraint, I will just jump into one example.

Our research is often driven by the indigenous communities we partner with. A lot of times, this is just at small scales—the scale of individual municipalities and communities. There are very practical problems arising from climate change. One piece of technology is the development of ground-freezing systems. This isn't anything particularly new. If you're familiar with thermo-siphons, which essentially allow—

**The Chair:** I'm sorry. I'm afraid that's our time. You have the option of finishing this in a written response, because that's quite interesting.

**Mr. William Quinton:** Thank you.

**The Chair:** We'll now turn to MP Kayabaga for six minutes.

**Ms. Arielle Kayabaga (London West, Lib.):** Thank you, Madam Chair.

I would also like to welcome our witnesses, who are joining us on Zoom.

When thinking about research ethics, how are universities, ethics boards and funding distributors ensuring that research in the Arctic is conducted in a manner respectful of local communities' rights and priorities?

**Mr. Richard Boudreault:** Are you asking me?

**Ms. Arielle Kayabaga:** Any one of you can respond.

**Mr. Richard Boudreault:** You've hit on a very important point.

Whenever there is an indigenous group of people in the Arctic or south of the Arctic, universities are required to go through an ethics board. Many of the ethics boards, with the new spreading of indigenous research in all universities, have decided not to take on these issues up front. There is a major lack of these types of boards. I'm the chair of the First Nations University of Canada. We're trying to solve that problem. Most of the universities cannot get the ethics board they need to make decisions. Still, the research needs to be done, so we're in a bit of a conflict.

Each of the communities in the north provides its own accord for some of the research. That does the trick presently, but it's still not at the level of a research ethics board. That is the problem.

• (1130)

**Ms. Arielle Kayabaga:** On that point, what would your suggestions be to improve that?

**Mr. Richard Boudreault:** At universities and colleges that are more involved with first nations, like the First Nations University of Canada, we could create a research ethics board that would allow people from different universities to present their projects in order to assess their impact on the people in the north and first nations inhabitants. We need those.

**Ms. Arielle Kayabaga:** Recently, we completed a study on the integration of indigenous traditional knowledge and science in government policy development. This was an important component of the motion to discuss how Arctic science and research are meaningfully conducted with local indigenous communities.

Do you think this contributes to your work, and are there any—

**Mr. Richard Boudreault:** Yes, definitely.

Again, I was the chair of CHARS and I'm still the chair of ARI and research centres in different universities. First nations are force multipliers for research. That term comes from the military, but it's still very valid. It helps us find things faster, because they know where the samples need to be taken.

We created a program at the Arctic College to educate people in the north to become environmental technicians. That's a program that does very well. We did this because we needed to get more personnel from the north into CHARS, the Canadian High Arctic Research Station. We were the last one to get those people. They were stolen by the people in the mining industry.

The key example of integrating ITK, which is indigenous traditional knowledge, into research has been demonstrated and proven to be very effective many times. For example, let's take a simple project. We needed to find the Franklin ships. That was an impor-

tant item for national sovereignty. It has an interesting historical nature, but it was very important to find those as a demonstration that Canada has had a presence in the north for a long time. The armed forces were expected to find these people. They couldn't find these people. We went to ask an Inuit historian and he said—

**Ms. Arielle Kayabaga:** I apologize for cutting you off. It's because of time.

What do you think is still required of the Government of Canada to implement the Arctic and northern policy framework? What are the missing links?

**Mr. Richard Boudreault:** We have found a way to sign another agreement with ITK, which is the Inuit Tapiriit Kanatami, the political arm of the Inuit in the south. There has been quite a bit of work on integrating ITK inside or internally with research. It's been demonstrated to be extremely effective when used correctly.

There's a relationship that needs to take place between ITK and the research centre or the research authorization.... I'm sorry. I'm forgetting the word.

**Ms. Arielle Kayabaga:** That's okay.

**Mr. Richard Boudreault:** I can't remember the name. I'm so old that sometimes I forget my own feet.

**Ms. Arielle Kayabaga:** That's okay. Once you remember, you can also submit that.

I don't know if I still have time, Madam Chair.

**The Chair:** You have 17 seconds.

**Ms. Arielle Kayabaga:** With my 17 seconds, let me just thank you for answering my questions.

**Mr. Richard Boudreault:** Thank you.

**The Chair:** Thank you very much.

We will now turn to MP Blanchette-Joncas for six minutes.

[Translation]

**Mr. Maxime Blanchette-Joncas (Rimouski-Neigette—Témiscouata—Les Basques, BQ):** Thank you very much, Madam Speaker.

Good morning to the witnesses who are with us today.

Mr. Boudreault, in your statement, you mentioned some pretty telling facts, including that warming is occurring more rapidly in the north. We also have information from the federal government that global warming is happening three times faster in the north—

• (1135)

[English]

**Hon. Helena Jaczek (Markham—Stouffville, Lib.):** Madam Chair, there's no interpretation.

**The Chair:** Let's hold it.

**Mr. Lloyd Longfield (Guelph, Lib.):** The volume has to go way up.

**Hon. Helena Jaczek:** Oh, maybe that's it.

**The Chair:** I can hear it softly. It does have to be cranked quite loud, it seems.

We will continue.

[Translation]

**Mr. Maxime Blanchette-Joncas:** Thank you, Madam Chair.

Mr. Boudreault, I was saying that global warming is happening three times faster in the north.

I'd like us to go back to basics. What causes global warming? From what I understand, it comes from greenhouse gas emissions linked to human activities. In 2021, a federal government report told us that in Canada, 28% of greenhouse gas emissions came mainly from the oil and gas sector.

So, Mr. Boudreault, my question is simple: Does increasing oil and gas production increase greenhouse gas emissions and accelerate global warming, and even more so in the north?

**Mr. Richard Boudreault:** Yes.

**Mr. Maxime Blanchette-Joncas:** All right.

I'd like to call on your scientific expertise, Mr. Boudreault.

The Trans Mountain oil project will boost oil production from 300,000 barrels per day to 890,000 barrels per day, an increase of nearly 200%. According to the Impact Assessment Agency of Canada, this will increase greenhouse gas emissions by 21 million to 26 million tonnes per year.

Given all these facts, would you say that increasing oil extraction, production and transportation, and doing so using public funds, is a good, science-based decision on the part of the government?

**Mr. Richard Boudreault:** From an environmental standpoint, this is not a good decision.

**Mr. Maxime Blanchette-Joncas:** Thank you very much.

**Mr. Richard Boudreault:** On the other hand, you also have to view things clearly.

Petroleum emits a lot of CO<sub>2</sub> into the atmosphere. It also emits some after combustion. However, the biggest problem we have right now is the radical increase in methane in the atmosphere. Methane has 86 times the strength of CO<sub>2</sub> as a greenhouse gas. So all you need to do is emit one tonne of methane, which can come from anywhere in the oil and natural gas supply chain, to create a situation that is 86 times worse.

**Mr. Maxime Blanchette-Joncas:** I see.

**Mr. Richard Boudreault:** So your numbers are good, but since you're not taking methane into account, which is still very unknown, because there's not enough research on it, you're being conservative.

Oh, maybe that wasn't the right term. Ha, ha!

**Mr. Maxime Blanchette-Joncas:** Ha, ha! Okay. I'm a Bloc Québécois MP, Mr. Boudreault, but I have no problem understanding what you mean about greenhouse gas emission projections increasing global warming, particularly in the north, where it's accelerating.

Mr. Boudreault, let me come back to the essence of our study. Now that we've understood how global warming works, I'd like to hear from you about what the federal government is doing in terms of funding.

Researchers at Université Laval's Centre d'études nordiques, which has nearly 60 years of expertise in northern research, told us that they were seeing a decline in funding, that this would affect their ability to get to the field by air, in particular, and that infrastructure was outdated.

What can you tell us in this regard?

**Mr. Richard Boudreault:** It's true. Northern transportation is extremely expensive. Researchers are less able to finance themselves. That's why, in addition to all the extra researchers we need to know what's going on and work in the field, we also need extra money to send these people up north and to partner with scientists from abroad, international partners, to do research with us. We need about \$500 million more a year to invest in Arctic research, and at least three or four times as many researchers to reach the average number of our colleagues around the Arctic Circle.

So, we're watching very little of what's going on, and we're going to have some surprises. We already have surprises. People abroad are going to ask us how come we didn't warn them before. It's a big problem.

• (1140)

**Mr. Maxime Blanchette-Joncas:** Yes, Mr. Boudreault. The things you mentioned are very important. You say that other countries interested in the Arctic Circle are investing more.

Do you have any data to that effect, on the fact that Canada underinvests in northern research?

**Mr. Richard Boudreault:** Yes, in my notes I included a table I made of the relative density of researchers from different countries in the Arctic. I gave Canada the relative density of 1. The Americans are well below us, at 0.6. Russia is about the same density as us, but has more researchers, because it has a larger territory. On the other hand, Norway has 10 times more researchers than Canada; Sweden has five times more; Finland has six times more; Denmark has 1.8 times more. In proportion to its surface area, Iceland has 13 times more Arctic researchers per square metre than Canada.

**Mr. Maxime Blanchette-Joncas:** So we're not leaders in northern research. That's my understanding, Mr. Boudreault. Canada is at the back of the pack.



**Mr. Richard Boudreault:** That's right.

However, we have an advantage: We have the terrain. Canada has the land. So we can invite people to work with us because we have an expanse of land that's immense and that's going to be able to be used to build relationships with foreign countries.

**Mr. Maxime Blanchette-Joncas:** This concludes my speaking turn.

Thank you.

[*English*]

**The Chair:** That's our time. Thank you very much.

We'll turn to MP Cannings for six minutes.

**Mr. Richard Cannings (South Okanagan—West Kootenay, NDP):** Thank you all for being here today. This is all very interesting. I wish we had more time, as usual.

I'd like to turn to Dr. Derocher.

I'm so glad you brought up the polar continental shelf funding. I was fortunate enough to take advantage of that funding way back in 1983. I spent the summer doing research in Old Crow and Herschel Island using polar shelf funding.

I think it was in 2018 when I heard that this funding had not gone up at all for 20 years. It was similar to the situation we just dealt with regarding graduate student scholarships. I think it was rectified somewhat shortly after that.

I'm wondering if you could talk about polar shelf funding, where it stands now and where it should be. As you said, this is the glue that holds research together. It's the logistics support. The main problem for researchers in the Arctic is just getting around.

Could you spend a minute or two talking about the polar shelf, how important it is and where the funding stands at the moment?

**Prof. Andrew Derocher:** The polar shelf is an agency that I've been working with since the mid-1980s. A lot of the logistics support that it provides is almost impossible for your average Canadian researcher to establish on their own. Of course, there are cost efficiencies by bringing in a large agency to set the procedures in place. A lot of my research support is helicopter-based, so what I'm looking for from them is to supply the helicopter and, very often, the fuel to conduct research in various locations.

It hasn't kept pace with the rising costs. It's a very small fraction of my research budget. This past spring, it was in the neighbourhood of about 20%. However, it's the logistics support that puts things in place, which allows me to bring in other funding and be more efficient.

I don't work out of Resolute right now, but in the past—in the 1980s—something I pushed for when I was on the scientific steering committee for the polar continental shelf was that we try to retain the base we had at that time in Tuktoyaktuk. The closing of it was a major blow to research efforts in the western Arctic. It was a hub for much of the research that you were probably involved with in the Herschel Island area at that time.

The problem is that right now, polar shelf is centred out of Resolute, but we don't have the infrastructure to base from many other areas. It's extremely expensive to move across different parts of the Arctic. To speak to the scale of the Canadian Arctic, while CHARS itself is a major step forward, it cannot serve Nunavik and the other northern parts of Nunavut very well. Again, I think we need to see that infrastructure.

If we could do one thing, it would be to increase support going to the shelf and also to NSERC and the northern research supplement. That really doesn't carry the day anymore.

• (1145)

**Mr. Richard Cannings:** How much time do I have?

**The Chair:** You have two minutes and 20 seconds.

**Mr. Richard Cannings:** I'll continue with Dr. Derocher.

You study polar bears. Polar bears are often considered to be the poster child of climate change around the world. When I was on the Committee on the Status of Endangered Wildlife in Canada, we struggled to assess the polar bear population status and often used your work as the basis for our deliberations.

I'm just wondering if you could let us know what the status of polar bears is these days. How is climate change affecting their environment?

**Prof. Andrew Derocher:** In brief, there are 19 populations across the circumpolar Arctic, of which 13 are wholly or partly in Canada. The status of these populations varies dramatically depending on where you're looking.

The one in the southern Beaufort Sea, north of the Yukon and NWT, has declined by up to 50%. That is the same for western Hudson Bay in Nunavut and Manitoba. The one in southern Hudson Bay has declined as well but to a lesser extent. Other populations are doing quite well. It's really predicated on the trend in sea ice. If the sea ice is changing, the populations are affected.

Ultimately, this is of great concern to northern communities that rely on polar bears for sustenance. Also, culturally, hunting polar bears is very important. This creates a lot of challenges going forward as we have a declining resource but a growing population that would like to hunt polar bears as part of their cultural activities.

In the future, I think polar bears are going to be severely challenged. We will see an increase in conservation concerns going forward. I'll note that federally, the polar bear program of Environment and Climate Change Canada has not been adequately funded nor adequately staffed for many years now.

**The Chair:** You have 17 seconds left.

**Mr. Richard Cannings:** I'll leave it there and come back to it later. Thank you.

**The Chair:** We'll now turn to Michelle Rempel Garner for five minutes.

**Hon. Michelle Rempel Garner:** Thanks, Chair.

To the witnesses, in reviewing the government's Arctic and northern strategy, adaptation is only mentioned a handful of times, and it's in the preamble. It says that at round tables, "people felt that adaptation activities should take precedence over mitigation actions in the region" because of its "small emissions footprint" and the "magnified impacts". It also talked about how conservation issues "drew a varied response" from people in the region, and it said that some expressed concerns over the "weight of regulation and its impact on resource development".

I'm wondering how we square these circles, because we have this strategy that notes these themes came up in round tables, but they didn't make their way into goals. From what I've taken from some of your testimony, they haven't really made it into Canada's research strategies either.

I'll start with this. Would you support a recommendation for the government to place greater emphasis on concrete Arctic adaptation strategies in its official Arctic and northern strategy? That question goes to anyone.

**Mr. Richard Boudreault:** There is a bit of a chasm between policy and reality. We see people in the north who are essentially hampered. They're handicapped by the fact that the ice is melting, and it's pretty hard to get things done.

**Hon. Michelle Rempel Garner:** I have a very short period of time. I'm looking for concrete recommendations.

The question was this: Do you support a recommendation for the government to place a greater emphasis on concrete adaptation strategies in its official Arctic and northern strategy?

**Mr. Richard Boudreault:** I would say no, because we need to ensure that we reduce the amount of soot and methane in the Arctic. That's what's going to get our goose at the end of the day.

**Hon. Michelle Rempel Garner:** What you're saying is that the government should ignore the feedback of stakeholders who are saying that they need the government to adapt things like housing and indigenous hunting to climate change and that we should focus on emissions reduction in an area that doesn't produce a lot of emissions. Is that your recommendation?

• (1150)

**Mr. Richard Boudreault:** Yes, because, for example, in Northwest Territories last summer, because of the wildfires, we had to empty the entire territory. Everybody left.

**Hon. Michelle Rempel Garner:** Just to be clear, though, it seems a little crazy to me that we wouldn't be supporting adaptation to climate change given that people live there.

**Mr. Richard Boudreault:** Adaptation is very low-cost. The villages are very small. One of the adaptations—

**Hon. Michelle Rempel Garner:** Would the other two witnesses like to jump in on this?

**Mr. William Quinton:** It's an interesting question. Where I work in the Dehcho region, things are happening so quickly that it's all hands on deck, and there's always a willingness to partner with any

organization. I think sometimes the challenge is the large number of organizations. There's a federal territorial government, a regional Dehcho government and a local government.

**Hon. Michelle Rempel Garner:** What I'm getting at is that it's very clear that people who live in the north said they need help adapting to climate change—

**Mr. William Quinton:** Yes.

**Hon. Michelle Rempel Garner:** —yet our strategy doesn't address that is all. Now I have some academics in front of me who don't live in the north objectively telling me that perhaps we should override the advice of people who live in the north to look at adaptation strategies. I'm not saying to get rid of mitigation strategies. It just seems to me that we should be helping people to figure out how to live there more effectively with climate change. However, I'm being told no. That seems weird to me.

**Mr. William Quinton:** Well, I'm not saying no. If I understood your question, it was whether the federal government should develop adaptation strategies. These need to be co-developed with local communities, to be clear, and I think we're developing the science and knowledge simultaneously—

**Hon. Michelle Rempel Garner:** Then the recommendation would be that the government should support or place a greater emphasis on co-developing adaptation strategies to address climate change and the challenges of living in a region where climate change very much impacts the dwellers who live there. Would that be a recommendation any of you would support?

**Mr. William Quinton:** From my perspective, that would be well received by the communities I work with.

**Hon. Michelle Rempel Garner:** Thank you.

**Mr. Richard Boudreault:** So do I, but the question you asked at the beginning is whether it's one or the other. I'm saying that both need to be there.

**Hon. Michelle Rempel Garner:** It wasn't. Perhaps you misheard, but I'm happy to send you the transcript.

Thank you.

**Mr. Richard Boudreault:** Maybe I misheard. That would be great. I'm looking forward to it.

**The Chair:** We'll now turn to MP Longfield for five minutes.

**Mr. Lloyd Longfield:** Thank you, Chair.

Thank you to the witnesses for being here.

I'd like to start off with Dr. Derocher.

You mentioned in your testimony the logistics that are needed, and the hub-and-spoke model potentially. I'm wondering where CHARS might play a role. I understand it was set up in Cambridge Bay in 2019, and it was turned over to Polar Knowledge Canada in 2023, I believe. Could that organization increase capacity if we were paying the right attention to it?

**Prof. Andrew Derocher:** One of the challenges with CHARS—I was involved in some of the earlier consultations about this—is that most of us did not advocate for a single location in the Canadian Arctic. The scale is just too large. We accepted that a hub was useful. Most of us actually recommended Resolute for the hub because it existed with the polar continental shelf based there. Then a series of smaller stations would be established in the communities, run by the communities, where researchers could more easily integrate with those communities. I've worked a lot in these communities. It's challenging to even find housing in small places like Ulukhaktok. It's hard for researchers to get in there and find a place to stay.

Going forward, CHARS exists. It's excellent. However, it would not have been my choice for a high Arctic station. It's mid-Arctic by my standards. Again, it's establishing new research, whereas it really doesn't facilitate much of the long-term research that's going on in many other parts of the Arctic, such as Bylot Island with researchers from Laval. It's very distant. While it's useful, it needs to be replicated on a smaller scale across the Arctic.

• (1155)

**Mr. Lloyd Longfield:** In terms of our study, to understand the network, I went up to Eureka and we refuelled in Cambridge Bay. I would say it's a pass-through to other locations as well. What you're saying is it's also important to look at what we already have in Resolute.

**Prof. Andrew Derocher:** Yes, resolute, for sure, but I would say there are other communities. Igloolik already has a base of operations for wildlife researchers and other researchers there. There are many places across the Arctic. Where I'm working right now is sort of subarctic, out of the Churchill Northern Studies Centre, which is an excellent facility but very underfunded.

We have some kernels to work from, but we really do not support the diversity of researchers. It is a dwindling community as well. I think if we build it, they will come, but we also have to have the support to get there.

**Mr. Lloyd Longfield:** Thank you.

I'd like to go to Dr. Boudreault on the handover of the management of CHARS to Polar Knowledge Canada.

Do you have any comments? I believe you were on the board.

**Mr. Richard Boudreault:** Yes, I was chairing the board.

It's important to note that there was a competition between different cities to host CHARS, which was a project of the Conservatives. We corralled the resources there because it covered a segment of the country that is pretty good.... We also had as a view to fuse with the polar shelf and provide all these services. However, at this point, that has not occurred. It was one of the strategic points that

would allow us to have a western and eastern type of facility for people.

There are a lot of very small, impoverished research centres that—

**Mr. Lloyd Longfield:** I'm sorry to interrupt, but we are running out of time.

Is there a document you could provide the clerk about any input from your group, which studied this, for our study?

**Mr. Richard Boudreault:** I do not know, but I will look for it.

**Mr. Lloyd Longfield:** Okay, thank you.

**Mr. Richard Boudreault:** I can even write something if you want.

**Mr. Lloyd Longfield:** That would be brilliant. Thank you.

Dr. Quinton, very briefly, you mentioned wildfires, which have already started, and their impact on the Arctic.

We have only 10 seconds.

**Mr. William Quinton:** They are impactful, with unknown trajectories and unknown territory. This is off the charts in recent experience over the period of record.

**Mr. Lloyd Longfield:** Thank you very much to all of you.

**The Chair:** Thank you.

We will now turn to MP Blanchette-Joncas for two and a half minutes.

[*Translation*]

**Mr. Maxime Blanchette-Joncas:** Thank you very much, Madam Chair.

Mr. Boudreault, we spoke earlier about the Polar Continental Shelf Program. The chief scientific adviser, Ms. Mona Nemer, has published a report on this program and on the growth of northern research.

In the conclusion of the report, she states, among other things, that a more strategic and coordinated effort is needed to support scientific research in the North by strengthening scientific capacity and the role of local communities, increasing overall logistical support for scientific research, and channelling this increase on the basis of a shared long-term vision and well-established priorities. She also points to the need to provide the specialized support capacity required by new technologies. All these needs are well known.

To your knowledge, what has the federal government done, concretely, since the tabling of this report, to take action and follow the recommendations of its chief scientist?

**Mr. Richard Boudreault:** One of these recommendations is that structural changes must be made. Yet these structural changes have not been made.

For example, the Canadian High Arctic Research Station is located in the western Canadian Arctic. We need one in the east. On the other hand, it should be much larger and be able to fund smaller research centres and support their logistics, which is not being done at present. This station receives a lot of people from abroad to do research, but it has very few systems to be able to do the same thing as the Polar Continental Shelf Program. The station works with the Polar Continental Shelf Program, but this merger is necessary. We need to integrate a set of research centres that belong to universities and make a network that would distribute research in the north.

Once again, we would need four times as many researchers to do the same things as our Arctic neighbours.

**Mr. Maxime Blanchette-Joncas:** Mr. Boudreault, we know the tenor of the situation, we know the issues and the needs, but I'd like you to tell us about the consequences as well. We're not perfect, we're making progress, but it seems to be at a snail's pace.

What will be the consequences if we don't act quickly to further support northern research?

**Mr. Richard Boudreault:** There will be a huge backlog compared to other countries around the North Pole. In addition, there will be a depopulation of the north, since people in the north would want to leave their region to go south, which would pose a huge structural problem in terms of northern sovereignty, because we have to have resources there.

Choosing not to know what's going on is like putting a blindfold on your eyes and plugging your ears, and hoping that things will be okay. Yet, according to the information we currently have, they won't.

• (1200)

[English]

**The Chair:** I'm sorry, but that's our time.

[Translation]

**Mr. Maxime Blanchette-Joncas:** Madam Chair, I would appreciate a written response from Mr. Boudreault if he would like to share any additional information.

Thank you.

[English]

**The Chair:** Perfect.

We'll now turn to MP Cannings for two and a half minutes.

**Mr. Richard Cannings:** Thank you.

I'm going to continue with Dr. Boudreault.

You mentioned in your opening remarks that there were five tipping points in the Arctic. I had down polar ice melting, permafrost,

methane, boreal forest fires and Atlantic circulation. Did I miss one?

**Mr. Richard Boudreault:** You have the dwindling of polar ice, which is the most important tipping point because it influences the rest of the planet. There's the permafrost, which is emitting methane, and fires in the boreal forests. One of the big factors here is that they could zip throughout Canada. We've seen only the start-up of the fires. There's also the Atlantic Gulf Stream, which regulates temperature; the freezing of the Northwest Passage; and the polar vortex extending over the north and influencing, in a catastrophic way, weather in the south. We've seen that in the last three or four years, as well as the rising temperature of the ocean. These are factors from these tipping points.

**Mr. Richard Cannings:** You also mentioned earlier that the permafrost methane emissions were one of the most important factors.

**Mr. Richard Boudreault:** Yes.

**Mr. Richard Cannings:** I've seen that in my brief trips to the north. I've been to Herschel Island, for instance. How are we doing with that monitoring? When you emit methane, as you know, it's a very powerful greenhouse gas. How is Canada doing in methane monitoring in general and in the Arctic in particular?

**Mr. Richard Boudreault:** I would say poorly. We're not doing great. That is likely to be a big factor in global climate change. As a matter of fact, it's a big factor in the crisis, and we have very little information about it.

When the permafrost melts, it turns into water. Some of the methane goes into the ocean or the rivers and is absorbed, and some of it goes into the atmosphere. This is a very powerful material, and it's going to be driving the climate up there. We need to be able to measure it better. There are some satellite-based systems that exist and an optical-based system that exists, but we have not spread them over Canada.

It will be important that we have an understanding of these CH<sub>4</sub> emissions, or methane, for our own survival. It's an existential problem.

• (1205)

**The Chair:** Thank you. That's our time.

**Mr. Richard Cannings:** Thank you.

**The Chair:** We'll now turn to the Conservatives. I'm not sure who's taking this for five minutes.

Oh. We are at the time. I'm sorry.

**Hon. Michelle Rempel Garner:** That's okay. We were just looking to see if there was a vote or not.

**The Chair:** Thank you very much to our witnesses, Professor Richard Boudreault, Professor Andrew Derocher and Mr. William Quinton, for your testimonies. They were fascinating and very informative.

You may submit additional information through the clerk. Some of you have been asked to. Please see the clerk for any questions.

We'll suspend briefly and resume in camera.

*[Proceedings continue in camera]*

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