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**EVIDENCE**

## Wednesday, May 16, 2012

## Chair

**Mr. Rodney Weston**

# Standing Committee on Fisheries and Oceans

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● (1535)

[*English*]

**The Chair (Mr. Rodney Weston (Saint John, CPC)):** I call this meeting to order.

I'd like to thank Professor MacIsaac for joining us here today.

Professor MacIsaac, we're studying invasive species. I'm sure you're well aware of the work that we have been doing on this particular study.

I assume the clerk has advised you that we generally allow around 10 minutes for opening presentations from our guests; then we go right into questions. If I cut you off, I apologize in advance. Our members are limited by the amount of time for questions and answers. It's in the interest of fairness to try to keep our questions and answers as close to that timeframe as possible.

Having said that, Professor MacIsaac, whenever you are ready, the floor is yours.

**Professor Hugh MacIsaac (Professor, Great Lakes Institute for Environmental Research, University of Windsor, and Director, Canadian Aquatic Invasive Species Network):** Thank you very much.

Good afternoon. My name is Hugh MacIsaac. I'm a professor at the Great Lakes Institute for Environmental Research at the University of Windsor. I'm also the director of the Canadian Aquatic Invasive Species Network. I've been working on invasive species for 22 years.

I'd be happy to speak to any of the questions you might have; however, I'd like to begin by telling you about our network, and our successes and challenges with respect to aquatic invasive species in the Great Lakes.

CAISN, the Canadian Aquatic Invasive Species Network, is a consortium of 30 professors at 12 universities, six DFO labs, and provincial labs in Ontario and B.C. We are based in eight provinces. We currently receive about $5 million in total funding from NSERC, $1 million from DFO, and $750,000 from Transport Canada.

We work on all four coasts in Canada. We have four research themes, including early detection, rapid response, invasive species as part of a multiple stressor of aquatic ecosystems, and reducing uncertainty in the management of alien species.

CAISN is the only group of its kind in the world that combines academic involvement with government, industry, and NGOs. I can tell you that my colleagues in other countries around the world who are familiar with CAISN are very impressed with the work we've been doing.

I'm presently involved in an early detection project in the Great Lakes and in other coastal areas across the country that uses a new genetic technique called pyrosequencing to assess the presence of alien and native species in ports using environmental DNA. The technique is far more sensitive to species present at very low abundances than traditional sampling with nets and microscopes, and thus it is great for detection of both alien species and endangered species.

We have completed an initial screening of the port of Hamilton and have detected more than six times as many species of the two most common groups of organisms as all of the previous studies reported in the literature for that port. We're also processing samples currently from Montreal, Nanticoke, and Thunder Bay, all ports that we view as high-risk in the Great Lakes-St. Lawrence River area.

In terms of rapid response, we're conducting a global review of programs aimed at elimination, control of the spread, or population suppression to see what works and what doesn't. We hope we can use this “lessons learned” approach to inform programs across the country.

We are presently conducting trials with Fednav, which is a Montreal-based shipping company—they're the largest carrier of materials coming into the Great Lakes—to assess whether combining open-ocean ballast water exchange with chlorination provides either additive or synergistic benefits over either one of those two procedures by itself. We just completed our first trial on a ship running from Quebec down to Brazil, and the results so far look very promising.

We published a paper last year with our colleagues from DFO and Transport that looked at whether current ballast water regulations are effective at protecting the Great Lakes. As my colleague Dr. Tony Ricciardi explained to you a couple of weeks ago, all of the evidence we have available presently indicates or is consistent with a marked reduction in risk since ballast water regulations were implemented by Transport Canada in 2006.

We have a variety of lines of evidence for this. I'll run through some of them.

First, every ballast tank on every ship entering the seaway gets inspected by either U.S. or Canadian authorities to ensure that water in the ballast tanks is saline and thus of low risk.

Secondly, the abundance and diversity of risky species in the tanks —and we define risky as those that live in fresh water environments or brackish water environments—is now lower than before regulations came into effect.

Third, we did a retrospective test using simulated ocean water to see whether many of our recent invaders could have invaded had saltwater regulations been in place decades ago. We found that all of the species, including notorious ones such as zebra mussels and round gobies, likely could not have invaded if we had required ships to flush salt water into their tanks decades ago.

Fourth, we have not had a ballast-mediated invasion reported in the Great Lakes since 2006, which is the longest interval since the modern seaway opened.

Our studies have focused on invertebrate animals, and while it can be dangerous to assume that all species respond like them, all of the data we possess suggests that ballast water exchange, or flushing, appears to be working. If we're correct, then we expect the importance of this vector is going to be much reduced going forward.

● (1540)

What are the challenges? I'll review three that I think are very important. First, laker ships remain unregulated, and they commonly carry ballast water from freshwater ports on the St. Lawrence River for discharge in the Great Lakes. They could carry with them native species or invaders from the St. Lawrence River that are not yet present in the Great Lakes. Our studies are limited in terms of the number of ships and the amount of ballast water that we've sampled, but we think that ships from Quebec City might pose the greatest risk of introducing new species via ballast water to the Great Lakes.

Secondly, we think that the pet, aquarium, and live garden or pond trade represents a clear and largely unregulated threat to aquatic ecosystems across Canada. We are now studying two aquatic plants, water hyacinth and water lettuce, in Lake St. Clair. The plants can clog tributaries of the Great Lakes during summer, and are likely being reintroduced annually by people who purchase them in local stores. I found one vendor in the 416 area code—the Toronto area—that advertised nine different macrophyte or pond plant species for sale, all of which are invasive in Canada or some other part of the world. One species sold by this vendor is called water soldier, and water soldier is currently subject to an expensive multi-year eradication effort by the Ontario government in the Trent-Severn waterway.

Clearly, on the one hand we have vendors that are selling some of these plants without regulation. On the other hand, we have governments that are spending a lot of money to try to get rid of them. It doesn't make sense.

I should go back for one moment, regarding the pond and aquarium trade. A colleague of mine, Dr. Matthias Herborg, who runs the B.C. program on aquatic invasive species, notified me that they took video yesterday in Richmond, B.C., outside of Vancouver, of a snakehead in a lake there. So this is a problem across the country; it's not simply a Great Lakes problem. There are a number of snakehead fish species, but these are species we clearly want to keep out of Canada.

Third, Canada desperately needs a hull fouling policy. Hull fouling is often a more important vector for the introduction of alien species than ballast water in marine ecosystems. This vector is believed responsible for a small number of introductions into the Great Lakes, primarily algal species. Countries like Australia and New Zealand have developed risk assessment tools to determine the threat of ship hulls before the vessels actually arrive in their coastal waters. I think that we need to review their policies and develop ones that are specific to Canada based upon these experiences around the world.

Finally, compared to 10 short years ago, Canada's federal departments—DFO and Transport—have come a long way to identify and reduce the threat of alien invasive species. Twelve years ago when the Auditor General was going to come out with her first report on invaders, I was asked to come to Ottawa and speak to the question of whether or not we were doing enough at that time. At that time I was highly critical of the Canadian federal government because we were doing virtually nothing to stop these species from coming into our country.

If you wish, I can describe some of the programs you're probably familiar with that both Transport Canada and DFO have brought into place since that time to try to address this issue.

Transport Canada has been a very responsive partner, providing essential financial support, and the agency has come to implement recommendations that CAISN makes. Our work is not done. We need to continue our focus on trying to eliminate the pathways that allow these species to get into Canada, and as a backup, we need good, rapid response and early detection protocols for when prevention fails.

With that, I'd be happy to take any questions that you might have.

● (1545)

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

We'll start off with Mr. Allen.

**Mr. Mike Allen (Tobique—Mactaquac, CPC):** Thank you very much, Chair.

Professor, thank you very much for being here with us today.

In your brief, one of the sentences said, “We have completed an initial screening of the port of Hamilton and have detected more than six times as many species of the two most common groups of organisms” than in previous records in the literature...”, can you just explain to me what “six times as many...of the two most common groups” means? What is your concern with that?

**Prof. Hugh MacIsaac:** This is one of the problems that we have in sampling organisms, particularly underwater organisms and if they're microscopic. We go out and we collect samples with nets. We bring them back to our lab and we analyze them under a microscope. It's very painstaking work. Typically, what a plankton ecologist would do is sample from that mixture and count and identify the first 300 or so organisms that you encounter in the sample.

The problem with that approach, and it's one that people have been using for hundreds of years, is that if organisms are present at abundances lower than one in 300, then the likelihood that you are going to pick them up in your microscope count is very low. In reality, there are probably many organisms that are found in nature that are found at one in a million or one in 10 million.

So there's an entire array of species that occur in aquatic ecosystems around the world that we rarely detect because their presence is so low. But if we use environmental DNA, you can track either the species itself or you can track the DNA that it's excreting into the water, and every species will leave a telltale signature.

So we're using a gene that is different for every single species, and instead of trying to identify the species the way we historically would do, we instead analyze the DNA and then we cross-reference the DNA to online databases. From that we can determine how many species there are.

In many cases, I can't give you the species' name, but I could tell you, in the example I just quoted from, that the two most common groups that you would find in an aquatic ecosystem are called copepods and cladocerans. Particularly for copepods, the taxonomy of that group is very difficult. It's hard to identify organisms. Consequently, frequently when people do an assessment of a plankton assemblage, say, from the port of Hamilton, they might count 15 species. When we do DNA work, instead we may get 60 species. So that's where the difference comes from.

**Mr. Mike Allen:** Do you see this type of method that you're using now as being complementary to some of the existing sampling methods we're using, or replacing them at some point in time?

**Prof. Hugh MacIsaac:** It's a good question. In our CAISN network in this particular project, we actually are doing three complementary studies at the same time.

Number one, we're doing this pyrosequencing.

Number two, we're collecting and we're splitting that sample. For a species for which we cannot get an identity—we know what the gene sequence is and we know it's a species, but we don't know what it is—we have another colleague at the University of Guelph who's processing those DNA sequences so that we can put a name to the species.

Number three, we have a third sample that's split off of the main sample and we do classical taxonomy work with that.

So we do all three.

**Mr. Mike Allen:** That answered my other question of whether the stuff you're doing is because of the complementary nature of the network.

You did open the door a little bit to being a little disappointed up to a few years ago with respect to the reaction of the government. But can you talk a little bit about some of these key programs that you think have been introduced? I think it would be helpful for us as a committee to know what you think and what you believe are some of the key things that have been done in programs that have been set up by Transport, so that we make sure those are included in the report.

**Prof. Hugh MacIsaac:** Transport doesn't have a research arm, unlike DFO, but what Transport has done is they have provided funding to research groups to try to get work done that they feel needs to be done.

We have been working with Transport funding for up to 10 years now. When Transport came up with their 2006 ballast water regulation, it was based on work that our group and a complementary group in Ann Arbor, Michigan, had been working on together for about 10 years. We determined that by looking at ships coming in with salt water, brackish water, or fresh water in their ballast tanks, we were able to determine the diversity and abundance of organisms.

We found that if the ships came in with salt water in the tanks, the diversity of threatening organisms—meaning those that could survive in the Great Lakes—was dramatically lower. We made note of that and informed both the shipping industry and Transport Canada. Transport Canada then took the initiative to require this open ocean flushing for all vessels coming into Canada. I think it's a great policy. I think it has been largely mimicked around the world now because it's effective.

I should also say that when we determined some of our genetic costs, this work that I just described to you, there were two downsides to it. As I mentioned, in many cases we can't put a name to the species that we find. We know they're bona fide species, but we don't know what they are yet. We can keep records of these and then in the future, as more and more species get genetically bar coded, we can go back and we can put names to those species.

The second problem is that it is very expensive to do this work. Each sample costs us about $10,000 to run. In most laboratories in Canada the professor may have $50,000 per year, so you're not going to get very far.

The nice thing about the network is that Transport gives us money and we can use that money to run samples. We're actually analyzing samples from 16 ports: four from the Great Lakes, four from the east coast, four from the west coast, and four from the Arctic. So we're doing complementary work across the country.

● (1550)

**Mr. Mike Allen:** Okay.

There are some draft amendments to the changes to the Fisheries Act that we're proposing right now, especially tailored to invasive species and the ability for some of those to be legislated, and to have some of the regulatory gaps possibly eliminated through identification, possession, import/export, release, and handling. Have you had a chance to review those? Maybe the flushing of these vessels should all be done with salt water, even the ones from Quebec City. Do you have any thoughts on potential regulations that we should be looking at going forward?

**Prof. Hugh MacIsaac:** I'd hate to say that we ought to be regulating those ships because before we regulated the other vessels, we had to determine the risks they posed. That risk, for the Great Lakes at least, was determined largely by the evidence that we saw—that somewhere between 55% and 70% of the invaders that had come into the Great Lakes were from Eastern Europe. They had no opportunity to get here other than by ballast water, so we knew ballast water was the villain. In that case, knowing that it was a problem, I saw no alternative whatsoever. In fact, I strongly encouraged a policy to require this open-ocean flushing.

In the case of the lakers I've mentioned, we've done a little bit of work, funded by Transport Canada and using a DFO scientist, Dr. Sarah Bailey, and we've analyzed some ballast water samples coming into the Great Lakes. However, I don't think the evidence is sufficient for us to now say these ships clearly pose a risk, therefore they should be regulated. That requires more study.

**Mr. Mike Allen:** Thank you.

I think my time's up.

**The Chair:** Thank you, Mr. Allen.

Ms. Doré Lefebvre.

[*Translation*]

**Ms. Rosane Doré Lefebvre (Alfred-Pellan, NDP):** Thank you, Mr. Chair.

Thank you, Mr. MacIsaac, for being here. It is really a pleasure to hear what you have to say. I have a lot of questions to ask you.

My colleague Mr. Allen already questioned you on these techniques involving environmental DNA that you use in your work. I would like to have some further details on this. According to what I understood, as compared to traditional techniques, these procedures allow you to detect invasive species in a much more effective way when you collect samples. Generally speaking, how does this work?

[*English*]

**Prof. Hugh MacIsaac:** There are actually two ways to analyze environmental DNA. Some of you are familiar with this technique being used in the Chicago area to analyze for the presence of two Asian carp species. In that case, they selected a single gene, a sequence of DNA bases, that they knew was specific for each of the two carp species: the silver carp and the bighead carp. They went out and actually would collect just pure water and sample the water, and from that, extract DNA. They would collect the DNA that was filtered onto a mesh, and from the mesh, they could amplify it many times over and run it through a sequencer.

You can almost view it as sausages in a chain. What you need to do is determine the identity of each one of the sausages in that chain. Each sausage could be one of four different DNA bases. This is Biology 101. What we do, one by one, is cleave off the end one, determine what it is, and then we continue along the chain until we're finished. From that, you can determine what the sequence of DNA is.

They would be targeting two species and the DNA from those two species from raw water samples. That's a little bit different from what we are doing. In our case, we're actually collecting net samples, the way we've traditionally done, but instead of counting them under a microscope, we take all of the organisms.

It kind of looks like one of those toys you had as a kid—I forget what they're called—the little globes that you shake and see the snow flying around. That's what the plankton typically looks like, the snow in those little globes. So instead of trying to identify what every species is in that snowstorm, we take all the stuff and put it together, then we mash it all up. We don't try to identify the species. All we want to do is extract the DNA from those species. What you end up with is maybe 500 or 600 different species all combined together.

● (1555)

[*Translation*]

**Ms. Rosane Doré Lefebvre:** When you find 500 or 600 different species, what is the size of the sample?

[*English*]

**Prof. Hugh MacIsaac:** A very good question.

Every time we go out sampling, we collect replicate samples with a tow net. We go from near the bottom of the port to the surface water of the port. The net is one-half metre in diameter. We use two different nets: one that has 80-micrometre mesh, a very fine mesh; and another one that has 200-micrometre mesh. The reason why you use the larger mesh is because sometimes with a smaller mesh it starts to clog and as you pull the net up to the surface, some organisms can detect the pressure wave in front of the net and swim out of the way. By using a larger mesh net, they get captured.

As I mentioned, we collect from six different areas in the same port. We put all six samples together into one sample, so we're sampling comprehensively.

[*Translation*]

**Ms. Rosane Doré Lefebvre:** Do you collect these samples during certain times of the year, or do you do that all year round?

[*English*]

**Prof. Hugh MacIsaac:** That's another good question.

We're trying to be as comprehensive as possible, because we recognize some species occur in the spring, some occur in the summer, and some occur perhaps in late fall.

What we're doing with our research sampling is we're going to each of those 16 ports that I mentioned twice per year: once in late spring and once in midsummer. Again, it's getting kind of complicated, but when we have the DNA sequence of all these organisms, we use a technique called PCR, which creates many copies of each one of them. Then we can put them through the sequencer that I mentioned, determining the order of the basis in that sausage chain. From that, you can reconstruct for each one of between 1.5 and 1.7 million DNA sequences, and you can go back and cross-reference each one of them against an online database to determine what species you have.

**Ms. Rosane Doré Lefebvre:** Wow.

**Prof. Hugh MacIsaac:** This is why it's expensive.

[*Translation*]

**Ms. Rosane Doré Lefebvre:** This must be really interesting work. It's really impressive to imagine that. I have done some experimental fishing on boats where they used different-sized nets, but what you have described is equivalent to *Star Trek* in my mind. That's really something.

I have a question that is related to what you were saying earlier. You said that you had done a first test on a boat that was travelling from Canada to Brazil and that you had had some very promising results. Can you give us more information on those results?

[*English*]

**Prof. Hugh MacIsaac:** The shipping industry has been very accommodating. They don't like to be portrayed as environmental villains. They know they have a problem. From the time that I first started working with them 10 years ago, even before Transport Canada brought in their regulations in 2006, we had been going to Montreal and meeting with the umbrella group, the Shipping Federation of Canada. We told them that they could dramatically reduce their risk if they put salt water into the tanks before they came into the Great Lakes.

They didn't tell us they were doing it, but between one year and the next year when we started sampling, we noticed a huge difference in what had happened. We couldn't figure out why we weren't seeing fresh water in the ships anymore. We went back to them and their lawyer told us that they had instructed all of their partners that they had to start flushing salt water through. They are very willing to allow us to board their vessels and to run experiments on board their vessels.

The current one that we're working on is to see whether or not we could combine ballast water exchange with chlorination to get some type of additive benefit. I'm somewhat reluctant to say a lot about it because we've only been able to do one trial thus far. The ship began in Port-Alfred, Quebec with all 10 ballast tanks loaded with fresh water. Two of the tanks were going to service control, so we would sample all 10 tanks initially. Two of the tanks were chlorinated, three of the tanks had ballast water exchange, and three of the tanks had ballast water exchange and chlorination. We had samples collected at time zero from all 10 tanks.

When the ship went on its way down to Brazil, they didn't like it, but we had them stop in mid-ocean for about 12 hours. All they did was put water through the tanks in which we needed ballast water exchange to happen. Some of those tanks also got chlorination at the same time. This just happened 10 days ago.

What we found for the groups that we've analyzed thus far were three different bacterial indicators, as well as algae or phytoplankton. In both cases, we saw that the lowest abundances of organisms are always in tanks that have both ballast water exchange and chlorination. They appear to meet the proposed IMO D-2 standard, which is a ballast water treatment standard that's going to be implemented in the future.

If we can demonstrate this with three more trials that we're going to be conducting over the course of the summer, I think it's something that Transport Canada may wish to consider, because once ships put certified ballast water treatment systems on board, we're not going to actually sample the biota that's contained in the tanks to see whether or not the ship is compliant. All we're going to look at is whether or not they have a compliance system on board.

Unfortunately, sometimes technology breaks down. You run the risk that if we're running a compliance system, but something happens to it in mid-voyage, they could actually be carrying risky water. We think it might be advantageous if you're still doing ballast water exchange, in addition to the treatment. It's a backup, if you will, to ensure that the ships are coming in with the lowest risk possible.

● (1600)

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

Mr. Hayes.

**Mr. Bryan Hayes (Sault Ste. Marie, CPC):** Thank you, Mr. Chair.

So far in the study, we've been talking about the prevention of invasive species getting into the Great Lakes and the elimination or control of those that are already there. I notice some of your research speaks to preventing the spread of existing aquatic invasive species from the Great Lakes to inland lakes. I don't think, as a group, we had even thought of that. This is the first time I've seen it. That's probably just as critical as preventing them from getting into the Great Lakes in the first place.

Can you speak a little bit to some of your research and share with us in terms of preventing Great Lakes aquatic invasive species from getting into inland lakes and how important that is?

**Prof. Hugh MacIsaac:** Thank you. It's a huge issue. Some of these species we're dealing with are from the Black Sea basin. You hear the word “sea”, and you say, why are marine species coming into the Great Lakes? They're not strictly marine species. They live in coastal areas, in river outflows in the Black Sea—things like the zebra mussel and the round goby, etc.

They've come over largely because they built these canals throughout Europe that allow them to get into what we consider to be hot ports, such as like Rotterdam, Antwerp—freshwater ports. Once they're in those ports the ships bring them to the Great Lakes. Otherwise they could never get here.

Once they're here, a whole host of other human mechanisms allow them to spread from the Great Lakes to our inland lakes. The three worst cases we're dealing with currently are zebra mussels, quagga mussels—they look identical, although they are distinct—and the spiny water flea.

The spiny water flea is an organism with the total length of maybe half an inch. As the name suggests, it's a small organism with a long spiny tail. The tail prevents small fish from feeding on them. This species has now spread to at least 160 lakes that we're aware of in Ontario. It just spread last year into Manitoba. If we want to preserve Canadian biodiversity in our lakes, this is precisely the type of species we want to keep out.

My colleague Dr. Norman Yan at York University, has demonstrated conclusively that as the species invades new lakes—it's a predator and it preys on the native plankton—on average it will drive three native species to extinction in those lakes. This has happened at least 160 times that we're aware of, where it has been reported. We're losing lots of populations of native species due to the spread of this water flea.

The way it's spreading is that people go out with a downrigger line, say out on Lake Ontario or Lake Erie or Lake Huron, whatever the case may be. It's in all of the Great Lakes. If I go trawling through the water for salmon, I have that line down. If you think of that, how often would a person pull up their downrigger line? It's not very often. As the boat is moving, that vertical line is sampling an enormous volume of water, because it's cutting through the water.

These animals are small but they have this big tail, and they can't get out of the way as the fishing line comes by. The fishing line grabs the animal by the tail, and they move down the fishing line until they reach a rough spot. They will form a bolus or a knot at that rough spot. The angler finds out they have a problem when they try to retrieve the line. They reel the line in, and all of a sudden it stops. It stops because you have this knot on the line, and the knot might be comprised of, say, 500 individual fleas.

Many of these species can reproduce either sexually or asexually. The asexual ones are the problems. These females can produce eggs that are just like apple seeds. If she happens to have some of these apple seeds in her brood chamber where she holds the seeds and you take this bolus out of the water on the fishing line, all the animals on that line die immediately. But if the females are carrying eggs, the eggs are desiccation resistant. If you view them as apple seeds, they can go through a duck's or a fish's stomach.

If that angler then goes to another lake, maybe three weeks later, and doesn't clean the fishing line off first and then uses the fishing line, this crust falls off into the water. The eggs suddenly detect they're being hydrated, start hatching, and you get new populations. It has spread throughout Muskoka. It's on the border of Quebec—it may well be into Quebec by now—and we know it just invaded Manitoba.

The zebra and quagga mussels are far more famous. Most people know about the zebra mussel, but the bigger problem is the quagga mussel. They will adhere to any solid surface on the exterior of a boat. They could be on the motor or inside the motor.

If people trailer their boats that have these animals attached to them.... In many cases the animals grow on aquatic plants in coastal areas of lakes and the plants break off and get stranded around the marinas. You back your trailer down to pull your boat out and the trailer gets a lot of these aquatic plants attached to it. If you don't clean the trailer off and you go to another lake, not only might you introduce the plant, but you're going to introduce all the zebra and quagga mussels that are living on the plant.

These organisms—

● (1605)

**Mr. Bryan Hayes:** I'm going to stop you there because I want to get a second question in.

**Prof. Hugh MacIsaac:** Okay.

So it's a big problem. There are lots of secondary vectors, which is what we would call them, that allow them to spread.

**Mr. Bryan Hayes:** My second question is that I realize the Canadian Aquatic Invasive Species Network is a consortium of 12 universities, six DFO labs, and provincial labs in Ontario and B.C. You're based in eight provinces. Who else do you partner with in terms of sharing information?

I'm trying to get a sense of what the dominant organization is in terms of communicating research results or coordinating the implementation of recommendations that come forward from these results. What I'm finding is that there seems to be an awful lot of fingers in the pie, and I'm trying to get a sense of who is in charge when it comes to aquatic invasive species in the Great Lakes.

**Prof. Hugh MacIsaac:** In this case in terms of transmitting information, ultimately I am in charge for our research network.

We just began a new five-year installment last year of this network. But with our previous one, when we finished that network we came up with, essentially, a book in which we listed all of the projects and the take-home messages for managers, and then we distributed that to all of the interested parties—the ship industries and a variety of federal and provincial governments across the country.

We also work, and we're trying to partner—particularly with this genetic stuff that I mentioned—with American labs right now. They're very interested in using the same type of approach that we're using in Canada.

● (1610)

**Mr. Bryan Hayes:** Do I still have time?

**The Chair:** No, you're done. Thank you very much.

Mr. MacAulay.

**Hon. Lawrence MacAulay (Cardigan, Lib.):** Thank you very much, Mr. Chairman.

Professor MacIsaac, I don't know if we've ever had a more qualified person here than you, and I'm pleased to ask you a few questions.

Number one, I am impressed with your network of combined academic, government, industry, and NGOs. That's wonderful.

We've heard a lot of different statements made here, but I believe —and I'd ask you—there are a lot of things that can and should be done, but education would seem to me.... I do not believe that the angler wishes to back that trailer into the water. I do not believe they want to have that line contaminated.

But you've been at this for 22 years, and you know more, by far, than anybody around here. I'd like you to just elaborate on what type of an education program should be put in place. I know you talked about the wieners and you were a little above my head. I'm just a commoner in the House of Commons. But the truth is that we have to stop these things from happening because it's a massive financial loss, not only in the Great Lakes but the inner waters and all across the country.

**Prof. Hugh MacIsaac:** Absolutely. With respect to the ships, I don't think there is any education that needs to be done. What we need there is regulation, if and when it's required.

**Hon. Lawrence MacAulay:** Sir, I would be more interested in how you wish.... I think it's the person, even with the person who imports some of these things. I doubt if people really import these species that are really a danger to our water. I'd just like you to elaborate on that line, too.

**Prof. Hugh MacIsaac:** In terms of outreach, the primary group that we work with is called the Ontario Federation of Anglers and Hunters, and I believe you're going to have one of their representatives speak here, if they haven't already. They try to educate boaters on how to prevent aquatic invasive species from spreading to inland lakes.

There are a couple of things we can do. Sometimes there are certain lakes that we know are either especially vulnerable to being invaded or they are likely the source of the new invasions going somewhere else. I will choose Lake Muskoka in Ontario, as an example. It is used by thousands and thousands of boaters. What we can do is post signs at marinas on that lake to warn people that they must take precautions to make sure they're not taking species out of the lake with them.

The other approach is, if you know you have a very vulnerable system, you can establish boat wash systems. This is now done in Minnesota and Wisconsin. They charge boaters a nominal fee—$5 to $10—and they will power wash their boats before they allow them to put them into new systems.

**Hon. Lawrence MacAulay:** Should that be required?

**Prof. Hugh MacIsaac:** In certain cases, yes, I think it's certainly a reasonable thing to do, if you know there's a high likelihood the species are going to come in and there is no other way to do it.

Some other jurisdictions in the United States—California—is afraid of invasive insects coming in and destroying their agriculture system, so they set up these highway checkpoints and now these same checkpoints are being used to check every boat that's being trailered into the state. They want to make sure that people are not bringing invasive species, like zebra mussels, into the state on their boats.

In fact, the northwestern U.S. states are doing the exact same thing now. They now relate their findings to the Government of British Columbia to let them know. I think last year there were three boats destined for B.C. that had zebra or quagga mussels attached to the boats or the trailers, which were intercepted on interstate highways before they ever got to Canada.

People have to be made aware that they are part of the problem or they can be part of the solution, both anglers and boaters.

**Hon. Lawrence MacAulay:** You also indicate in your statement that Quebec City traffic seems to be the greatest risk for bringing invasive species in. Why?

**Prof. Hugh MacIsaac:** We did two things.

First, we looked at the amount of ballast water that we think is being sourced from different freshwater ports on the St. Lawrence River and is destined for the Great Lakes. The overall amount of water being carried by lakers into the Great Lakes is equal to the amount of water that's coming in from the foreign vessels from overseas. It's a substantial amount of water.

The thing about the port of Quebec is that the environmental conditions in that port are very similar to the ports where that ballast water is being discharged. If we have a huge environmental mismatch between the source port and the destination port, then we're not so worried about whether or not invaders are going to survive. If we have a saltwater source port, I'm not worried about those species surviving in the Great Lakes. But in this case, we have similar conditions in the port of Quebec City to some of the ports in the Great Lakes, and therefore we think they may pose a threat.

● (1615)

**Hon. Lawrence MacAulay:** But you're also indicating that there should be chlorination and the salt water. Do you think we need more regulation? Or is it just in certain places that this needs to be done, or what?

**Prof. Hugh MacIsaac:** In the study that I mentioned we're doing —with the shipping company going down to Brazil—we're trying to determine whether or not, if we did this for transoceanic vessels coming into Canada, this could provide us with another level of protection.

We haven't suggested that we should do this for the lakers. The problem with the lakers is that there's no good place for them to do ballast water exchange. We want mid-ocean salinity, which Transport Canada defines as salinity greater than 30 parts per 1,000. Fresh water is zero parts per 1,000.

So the vessels have to come in with greater than 30 parts per 1,000, and there's no place on the St. Lawrence River where you're going to find 30 parts per 1,000. The only way you could potentially use ballast water exchange as a mechanism to reduce risk of lakers is to make them go well out into the Gulf of St. Lawrence and then come back. And no one's going to do that.

**Hon. Lawrence MacAulay:** So the chlorinated water is a necessity there.

**Prof. Hugh MacIsaac:** Some form of treatment might be required. If we can demonstrate—

**Hon. Lawrence MacAulay:** What would you suggest?

**Prof. Hugh MacIsaac:** I really don't work on the treatment side, but there are probably 15 different approaches, some of which are patented, that—

**Hon. Lawrence MacAulay:** Is this the regulation that the U.S. is talking about implementing, or...?

**Prof. Hugh MacIsaac:** The State of New York had been very aggressive in stating that they wanted a much more stringent ballast water policy than what the IMO was going to implement.

I'll give you an example—the spiny water flea that I'd mentioned, which is a type of zooplankton. If I were to go out and sample in a pond right now, I might find 150 of these organisms, all the different animals combined, in a litre of water. In a cubic metre of water, which is what we normally talk about in shipping, there are 1,000 litres. If we take that pond assemblage, it has about 150,000 individuals per cubic metre of water.

The IMO standard that would apply to this group is that vessels would have to come in with fewer than ten live organisms of that size in their tanks. We're talking about going from a possible 150,000 down to ten.

**Hon. Lawrence MacAulay:** Do you test that? How do you know that this organism is out there? How do you know—

**The Chair:** Sorry, Mr. MacAulay, your time is up.

**Hon. Lawrence MacAulay:** Oh, my.

I'm sorry.

**Prof. Hugh MacIsaac:** We can come back to it.

**Hon. Lawrence MacAulay:** It's questionable.

**Voices:** Oh, oh!

**The Chair:** Thank you very much, Mr. MacAulay. As always, your cooperation is appreciated.

Monsieur Tremblay.

[*Translation*]

**Mr. Jonathan Tremblay (Montmorency—Charlevoix—Haute-Côte-Nord, NDP):** Thank you, Mr. Chair.

Thank you, Mr. MacIsaac.

There will probably always be invasive species, and that is why it is so important to have early detection and intervention capacities, as you mentioned in your introduction. Invasive species often come from abroad or from the continent, through the St. Lawrence Seaway or other navigable routes, through the gulf, or by way of surface transport. The bait comes in numerous ways.

Where should we begin in order to improve our early detection and intervention capacity? Are current efforts sufficient to reach that goal?

[*English*]

**Prof. Hugh MacIsaac:** The Auditor General addressed that question in 2008 and identified what she felt were deficiencies in early detection and rapid response. One of the reasons why Transport, and Fisheries and Oceans, were willing to provide new money for our research network was to specifically address those objectives, so we're doing the best we can with the resources we have available to us.

As I mentioned, given the expense of trying to run some of these analyses, we're restricted in terms of how intensively we can sample. Ideally I'd like to sample 15 ports in the Great Lakes, but we only have funding to sample three on the Great Lakes and one on the St. Lawrence River.

We're using state-of-the-art approaches. Currently, we're the only group in the world that is doing this in an orchestrated fashion. I have colleagues in the United States who are doing this piecemeal. One colleague at Wayne State University in Detroit is sampling the port of Toledo, Ohio, and is using some of the knowledge we've gained to help his study, but he's only sampling one port.

We would like to see a comprehensive, collaborative approach by both the U.S. and Canada as part of this early detection program. Once our sampling of these 16 ports is done, we don't have sufficient funding to go back and resample. We did 14 last summer; we're doing two more in the Arctic this year.

It's not going to be by us, but we ought to have periodic, systematic sampling of key ports throughout Canada. You can't sample all ports, but you would target the ports that you perceive to have the highest risk of new invaders, and then you would go back every five years and resample, and then compare your previous results with your new results to see whether or not you have new invaders.

● (1620)

[*Translation*]

**Mr. Jonathan Tremblay:** Thanks to creative and innovative people like those in your group, innovation is happening.

If we compare American investment in invasive species in the Great Lakes to Canadian investments, we see that there is quite a difference.

Should we invest more, here, so as to increase our effectiveness?

[*English*]

**Prof. Hugh MacIsaac:** As I mentioned, the U.S. does not have this systematic approach that we're using.

We met with the science agency called the NSF a couple of weeks ago to see if they would be willing to fund American colleagues so that they could do the type of work we're doing. A number of other agencies, NOAA and EPA, are interested in doing this and using the Canadian model.

On the one hand, to answer your question, there is a Great Lakes Protection Fund, which last year had hundreds of millions of dollars. A lot of it went for salary support and things like that, but very clearly they had strongly ramped up their surveying, but it was only for one year. They have $50 million this year. I think they had $800 million last year, so it has been cut dramatically. Still, $50 million is a lot of money for restoration projects, and some of that is going to be dedicated to invasive species.

Currently, the U.S. is probably investing more. Ours is more stable, but at a lower level.

I certainly would like to see more, particularly for this type of surveillance. I don't think you can consider it a one-off when you have to come back repeatedly to see whether or not the high-risk areas are being colonized by new invaders. That takes money.

**The Chair:** Thank you, Mr. Tremblay.

Mr. Kamp.

**Mr. Randy Kamp (Pitt Meadows—Maple Ridge—Mission, CPC):** Thank you, Mr. Chair.

Thank you, Dr. MacIsaac, for being here. We appreciate your testimony.

I understand you're a member of the Society of Canadian Limnologists, and in a moment I'm going to ask you to tell us what that is. I assume from the Greek root that it has something to do with lakes or inland waters. I read that you won an award fairly recently.

When we started this study, I think our primary focus was on Asian carp and the potential for serious negative effects if it made its way from the Mississippi basin into the Great Lakes, and then as you say, perhaps into lakes beyond that. As you are a limnologist, I want to ask you your view about the threat there in particular. I think I read that some have hypothesized that the carp would have a difficult time in the Great Lakes because there are not enough food sources. I wonder what your opinion is.

● (1625)

**Prof. Hugh MacIsaac:** Thank you very much.

I applaud your knowledge of Greek. “Limnos” is the Greek root for “standing water”, so limnology is the study of standing waters.

The award is named after a gentleman named Frank Rigler, who was a prominent limnologist first at the University of Toronto and then at McGill University. He died prematurely. I was an undergraduate student and got to hear a speech by him at my own undergraduate school when I was a fourth-year student. It's one of the few talks I ever have been able to recall hearing, and it was 30-something years ago. The reason I remember it is that he talked about Loch Ness monsters. His whole presentation was on why Loch Ness monsters couldn't possibly exist—there simply wasn't enough food in Loch Ness to feed monsters.

Now, the Asian carp clearly are a concern. What I can tell you is that we're not certain what the effects would be on the Great Lakes, so the best thing to do is apply the precautionary principle and keep them out.

There are two possible factors I've seen that might limit the success of the species in the Great Lakes. We think, based upon environmental modelling of where they currently occur globally, that similar types of habitats exist in the Great Lakes, so there's nothing such as temperature to keep them from doing well in the Great Lakes.

What could keep them from doing well is either the food limitation that you described—many of the areas of the Great Lakes simply do not have high enough productivity levels of zooplankton and phytoplankton to support large populations of Asian carp—or, it has been suggested, that the fish requires extremely long rivers in order to breed successfully. They discharge eggs, and the eggs float downstream as they're developing.

There are rivers on the Great Lakes that are sufficiently long, but overall I'm skeptical that these fish are going to eat the Great Lakes the way that people have suggested they are. The literature I have read suggests that this is unlikely to happen, unless they can feed on foods that we're not currently aware of. If they can feed on very small particles, then they may be able to obtain enough energy to do very well in the Great Lakes.

But certainly areas such as the Detroit River, western Lake Erie, and Lake St. Clair are habitats that would be prime for them—particularly western Lake Erie, because the amount of food available there is much higher than, say, in large parts of Lake Ontario or Lake Huron.

**Mr. Randy Kamp:** Well, I think that's good news.

Some have suggested that other invasive species, such as the zebra mussel and the quagga mussel, have changed the trophic state of the lakes and that the water is much clearer than it used to be. Could that in some ironic kind of way make them less hospitable for Asian carp as well?

**Prof. Hugh MacIsaac:** That's an excellent point. Yes, it could. We find that these zebra and quagga mussels are what we call “ecosystem engineers”. They change physical aspects of the habitat, chemical aspects of the habitat, and the biology of the systems. They have literally transformed the way the Great Lakes operate.

Initially, I thought that those effects would be limited primarily to the shallower basins, such as Lake St. Clair and western Lake Erie. But now what we're seeing is that systems such as Lake Huron and Lake Michigan have been completely transformed by quagga mussels as they spread to those systems.

One of the results of this is actually a positive one, in many cases. For example, if you own a cottage on a lake, your cottage value is partially determined by how clear the water is. The clearer the water, the higher the value of your cottage. Ironically, if you had zebra mussels there, they might clarify the water and the value initially might go up.

The reason the water is being cleared is that the animals are filtering both zooplankton and phytoplankton, and silt and clay. Using their gills, they either consume that stuff, or they spit it out and it sits on the bottom of the lake. The net result is that you remove a lot of particles that used to live up in the water. They are now being deposited on the bottom of the lake. If it's down there, then it's not available for the carp species, which are filtering the water as they swim through it.

So ironically, you're correct that it is possible that the effects of zebra and quagga mussels could make it more difficult for these fish to do well in the Great Lakes.

● (1630)

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

Ms. Doré Lefebvre.

[*Translation*]

**Ms. Rosane Doré Lefebvre:** Thank you, Mr. Chair.

Mr. MacIsaac, your presentation was really very interesting. According to what you say, invasive species are a serious problem that is everywhere, on boats as well as in these channels that have been created. However, I really did not expect to hear that they are also to be found on fishing lines. I don't know how people could wash their fishing lines every time using salt. Be that as it may, that's good to know.

If we installed laboratories like the ones you mentioned and if Transport Canada did sampling on the eastern and western seaboards in the spring and in the fall, in salt water and fresh waters, for instance in the port of Quebec or in Canada's north, would that be a viable approach? Would the money the department gives you allow you to implement such a program?

Can you give me a rapid estimate of the amount you would need for something like that to work?

[*English*]

**Prof. Hugh MacIsaac:** I'm not sure if Transport would be the appropriate group.

DFO has hired a number of research scientists over the past decade explicitly to work on invasive species issues. Now I wouldn't say that it's their sole responsibility to go out and count samples like this, but very clearly if we had a national program, they could oversee the counting. Often what they're going to do is send it out to a company to do the actual counting and identification, but you would then have these scientists interpret that data to see whether or not there are new problems over time.

I would love to see that happen. I'd made a call for it years ago. I think it should be done. Invasive species are one of the odd issues that the more trade you have, the greater your exposure is to invaders. All of us want to see our economy grow, and because of that, our exposure to these invaders—primarily through shipping but also through airplanes—is going to increase in the future.

I think it would be smart to set up programs where you can try to.... What we do is we study the vectors of the so-called pathways that transmit those species. You're not going to be able to control all of those pathways, but if you focus on the major ones such as ballast water in ships, then you can try to figure out how you can mess up that vector so that it can't transmit the species, without interfering with the trade.

[*Translation*]

**Ms. Rosane Doré Lefebvre:** Do you really think that that control will change things in any substantial way?

You said that you had noted a gradual decrease, but is there any way of increasing the chances of survival of the habitat and indigenous fish species rather than seeing them disappear? Do we have any way of turning back the clock a bit?

[*English*]

**Prof. Hugh MacIsaac:** We can't go back to the way things were, but there's a thing in toxicology called the dose-response relationship. Essentially, if I expose an organism to a certain dose of chemical, what's the response going to be with the chemical? We can do the same thing in invasion biology. If I have 10 propagules coming in on a ship, I don't know what the exact risk is of 10 propagules, but I do know that it's a lot lower than if there were a thousand or a million propagules. It might be a linear relationship that the more you add to a system, the more we inoculate the system, the greater the risk that some of those species are going to survive.

What we want to do is drive the number of organisms in these vectors, in this case in ballast water, down so low that even though the species may be introduced to Canada, they're not introduced at a sufficient abundance that the species can survive and establish here.

My colleague a couple of weeks ago, Ladd Johnson referred to a thing called the Allee effect. Essentially what happens there is that if the organism abundance that gets introduced is small enough, they can't find mates. And if you can't find mates, then you may survive but you're never going to reproduce and therefore.... We have an organism, I'll give you an example, called the Chinese mitten crab. The Chinese mitten crab has these big claws that look like mittens. It lives primarily in rivers but during the adult stage, lives out in the sea; sorry, they reproduce in the sea and they live in the rivers. We have caught these crabs in Lake Erie on a number of occasions, great big mature crabs, very large individuals. They don't pose an invasion risk to the Great Lakes because they can't reproduce in fresh water. They must go out to the sea to reproduce, so they pose no invasion risk.

What we want to do with all of our vectors, or certainly with the major vectors, is we want to emasculate them, if you will. We want to reduce the number of individuals that they're carrying to the point where they're no longer risky.

I may be wrong, but I think we're at that stage with ballast water. I haven't talked about hull fouling, but I think it's a huge issue for Canada.

● (1635)

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

Mr. Leef.

**Mr. Ryan Leef (Yukon, CPC):** Thank you very much.

Yes, it's been great. Your presentation was quite succinct as well. It was easy to follow, which is great for sometimes highly technical presentations. You talked about the lessons learned approach and now I'm just going to shift it, because we're always talking about what we can do, but presumably, when we move to investing in things, sometimes it's often as important to know what doesn't work. Can you give us some feedback on maybe some things that are commonly tried. I think the temptation every once in a while is to do something instead of nothing, but sometimes something is just completely ineffective.

Are there things going on where we should just not go down that road because we know it's nothing more than a waste of money or completely ineffective?

**Prof. Hugh MacIsaac:** Excellent question. There are case studies we can look at. I can cite two where I know they've been very successful. There's an animal called the black-striped mussel, it's like a zebra mussel; it attaches to things. They found it in a port in Australia. The cordoned off the port and they blasted it with chemicals to kill it. In another case, an algae called the killer algae, which came from the Mediterranean Sea, was found down in San Diego. It lives on the bottom of the sea and grows up. Scuba divers found patches of this stuff and so they were able to put tarps over top of it and then they threw chlorine pucks underneath the tarps and they managed to kill it.

The important thing there is that there are two success stories and both of them have involved aquatic ecosystems, but we're talking essentially about a two-dimensional environment. It's not open water. These are things that are living on the bottom.

So if we have organisms that are living in the water, like spiny water fleas, we're not likely going to be successful in trying to eradicate them if they get in. If that happens, then you've just lost the game. If zebra mussels get into your lake, you've lost the game. It's highly unlikely you're ever going to get permission to go in and chlorinate or put sufficient potassium in to kill all the animals in the lake; people aren't going to tolerate that.

So what we're trying to determine is whether there are cases where success can be predicted or failure can be predicted. What I can tell you is that I know of a couple of cases where... For example, there is this macrophyte I mentioned in my opening comments, which is in the Trent-Severn waterway, and they've spent at least two years now trying to eradicate the plant. The problem is that if you miss only a couple of seeds, then you think you got everything and you come back the next year and the thing's growing again. In some cases you may have to return repeatedly before you're actually going to be able to claim victory on that.

We're only at the stage now where we're assembling cases from throughout the world where people have either been successful or unsuccessful, and we're trying to relate it to the size of the habitat, the type of intervention, and ask, “Were they trying to eradicate the species?”—such as with the black-striped mussel that I mentioned—or “Were they trying to control the spread?”

In Ontario we had the emerald ash borer. How many people know what an emerald ash borer is? It's a beetle. It arrived in wood packing materials on a ship, literally, into almost my backyard. This thing just took off and it's spreading through. I think it's into Quebec now and it's over in Wisconsin. It's like a big bomb has gone off with this thing.

Initially, they tried to reduce its spread by cutting a 10 kilometre swath from Lake St. Clair down to Lake Erie where they said we can prevent the dispersal of the beetle if we remove all the ash trees it lives in. They went onto both public and private property and cut all the ash trees out, and they found it was unsuccessful because someone had already moved the beetles east of where they were cutting. So there are case studies like that where you have to be very certain that someone hasn't already taken them beyond what you're trying to do.

A third strategy is suppression, and the most common example of that.... And you may hear about it from the Great Lakes Fishery Commission, whose mandate is largely to reduce the problems caused by sea lamprey in the Great Lakes. So they have a wide array of techniques that they're using to try to kill the larvae of the fish before they can go in and cause problems in the Great Lakes. That's a successful example of a suppression, but you notice that they're not exterminating the fish from the Great Lakes. That doesn't appear to be possible.

We are looking at that, though. I think it's an important thing so you can then tell the government, look, before you try to remove this fish from a stream, you should be aware that 15 previous studies have tried this and only one of them worked.

● (1640)

**Mr. Ryan Leef:** Good point. Thank you.

You mentioned that Australia and New Zealand have the risk-assessment tools to determine the threat of ships' hulls before they arrive. You recommend we review policies and develop something similar for Canada. Do you have a couple of examples in mind?

**Prof. Hugh MacIsaac:** I have one. I read in the newspaper this morning that two people have been charged with bringing Tamil refugees to Canada a couple of years ago onboard two vessels. I wrote the Minister of Public Safety at the time. I think I should have written the Minister of Transport. We need to make sure that these vessels never enter Canadian waters.

In our previous network, we did a risk assessment of vessels coming into Canada, and we found that high fouling of the vessels was associated with poor hull husbandry, which means that the ships had not been coated with anti-fouling paints for a long time. I suspect that the gentlemen who brought these vessels to Canada knew that they were going to be grabbed by the Canadian government, and they probably hadn't been treated with any anti-fouling paints for a long time.

They were coming from tropical waters, which is another risk factor. They probably had been sitting in ports in Sri Lanka before they came to Canada. These are risk factors. These things are like floating little islands of species, and we brought them into our coastal waters in British Columbia. I think it posed an enormous risk to the country.

I don't want to talk about the migrants. That's not my area. We should have offloaded the migrants well offshore, kept the ship offshore, and done something with it out there. We should not have allowed it into Canada.

As part of our study, we found that we never found hull fouling on vessels that had been coated in the previous 180 days. The Australian regulations stipulate that the ship falls into a high-risk category requiring at least some level of scrutiny when it comes in. They use a 90-day window. If you've been treated in the previous 90 days, they don't view you as a threat. If it's been more than 90 days, when you come into shore, someone's going to stand on the dock, and he's going to look for fouling organisms on the side of the ship. If he doesn't see any, the ship is deemed to be safe. If he finds fouling organisms, they would get SCUBA divers to go in and look for more. We don't have to reinvent the wheel. We can look at what these people have done and adapt it for Canada.

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

Mr. MacAulay.

**Hon. Lawrence MacAulay:** Professor, you said that one of the big problems has to do with aquariums and garden ponds. You mentioned also the water soldier. What is the water soldier, and what type of regulations need to be put in place?

Perhaps the people that are selling them might have an idea, but I expect that a lot of the people who are buying them do not realize what they're doing. Again, it's back to the education.

**Prof. Hugh MacIsaac:** A good friend of mine, a dentist, has a nice pond. So does my brother-in-law, who is also a dentist. They both have these plants in their gardens out in the backyard. The problem is that they grow so prolifically when it's warm that if they put a plant in their pond, a month later the pond surface is covered with them.

If they're living around a creek, which some of these people do, they take the plants, and instead of throwing them in the garbage, they throw them in the creek behind their house. These plants have these air vacuoles that allow them to float. You can watch them float out into the Great Lakes.

An undergraduate at my school called me and said there was an invasive plant called water lettuce in his backyard. I didn't know anything about water lettuce, so I Googled it, and the first thing I came up with was this pond shop. I almost fell out of my chair. When I saw the species he was selling, I realized he was selling not only the two that we're dealing with, but also a whole series of other ones. So I now use this example. I gave a presentation to the provincial fisheries ministers last year, and I showed that every one of the nine species that this gentleman was selling was invasive either in Canada or in some other part of the world.

● (1645)

**Hon. Lawrence MacAulay:** But should he be allowed to sell them? Should there be information when you sell this kind of thing?

**Prof. Hugh MacIsaac:** One of the responses of Fisheries and Oceans to the Auditor General's audit was the creation of a centre called CEARA, the Centre of Expertise for Aquatic Risk Assessment, and it's based in Burlington, Ontario. Before you can ban the sale of these organisms.... This is trade, and so the government could, in fact, be sued by the vendors, if the vendors initially selling these are, say, somewhere in the United States or some other part of the world. They could say that their business had been harmed. Before we can do that, the World Trade Organization has rules that governments must play by if they want to ban live sale of organisms.

One of the things you must do is a formal risk assessment. DFO has this centre and they will do the formal risk assessments as they've done with snakeheads and with Asian carp species. After those ecological risk assessments are done, if the answer is that they could survive in Canada and that they would harm Canada if they were introduced—you have to have a yes to both of those questions—then the government is legally entitled to ban live sale of that organism in the country. That's when Ontario then brought in legislation to ban possession of live Asian carp in Ontario. So, you'd have to do this with these plants as well.

**Hon. Lawrence MacAulay:** Does that happen before it comes in, or is it a legal case that goes before, or...?

**Prof. Hugh MacIsaac:** No, you can do it before it comes in.

**Hon. Lawrence MacAulay:** So, you can stop them from coming in, and then it goes before the WTO and all this process takes place.

**Prof. Hugh MacIsaac:** No. We had concern about Asian carp, so CEARA did a risk assessment before the Asian carp were introduced in large numbers to Canada. They said that they thought that these fish were a threat to Canada; therefore, they have a legal ability to prohibit live possession. Then Ontario was the one that brought in the regulation. You would have to do that on a species-by-species case. These two plants that I mentioned, most governments do not perceive them to be a problem because they're from Brazil. They're tropical plants.

**Hon. Lawrence MacAulay:** But, they are a problem

**Prof. Hugh MacIsaac:** I saw them in 2010 at a number of locations. In 2011 a woman who lives on one of the tributaries out in Belle River, Ontario, outside of Windsor sent me a whole series of photographs and said that they couldn't navigate boats through their little waterway because it was choked with these plants.

Either the plants are surviving when they are not supposed to, and I don't think that's happening, or they're reproducing when they're not supposed to, and we don't think that's happening. What we think is the most plausible thing is that people are purchasing them in local stores—pond shops—and if they have too many of them growing in their pond by midsummer to late summer, they take some of them and dispose of them in areas where they shouldn't, and they end up in the Great Lakes.

**Hon. Lawrence MacAulay:** Thank you very much.

**The Chair:** Thank you, Mr. MacAulay, your time is up again.

Professor MacIsaac, on behalf of the committee, I would like to say thank you very much for taking the time out of your busy schedule to be here with us today, for taking the time to answer our questions, and for making a presentation to our committee. If you have anything further that you'd like to add to your presentation, or anything of that nature, please feel free to forward it to the attention of the clerk. Certainly, we do look forward to anything further that you might have to add. Thank you very much for being here today.

There being no further business, this committee stands adjourned.

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