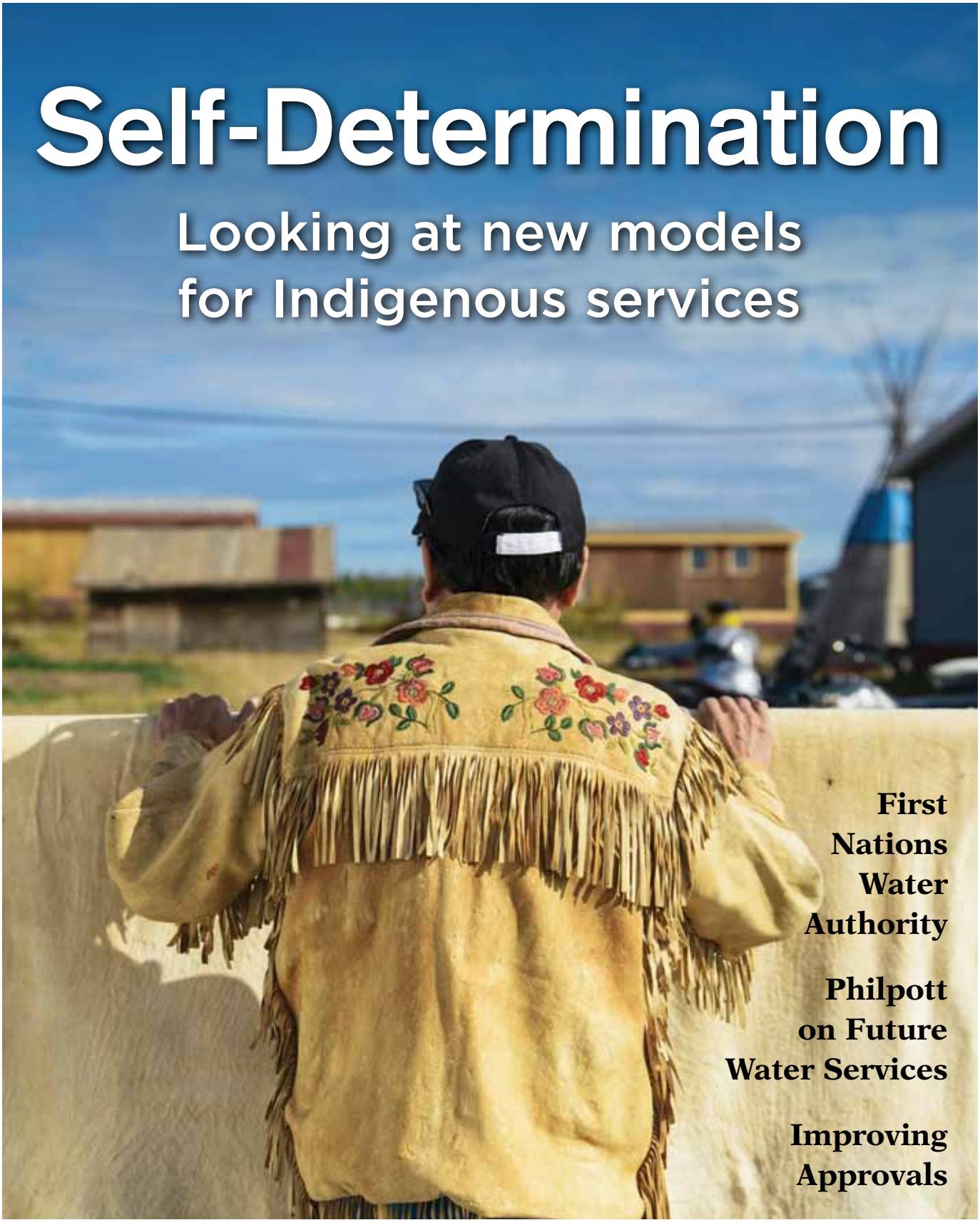
THE COMPLETE WATER MAGAZINE

JANUARY/FEBRUARY 2018

WATER CANADA



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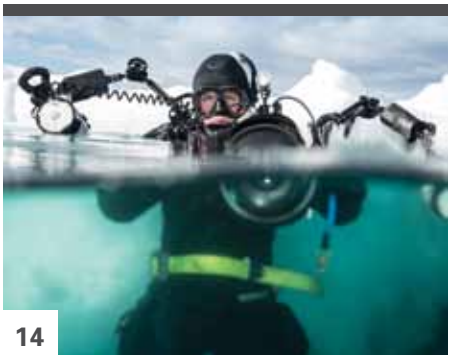
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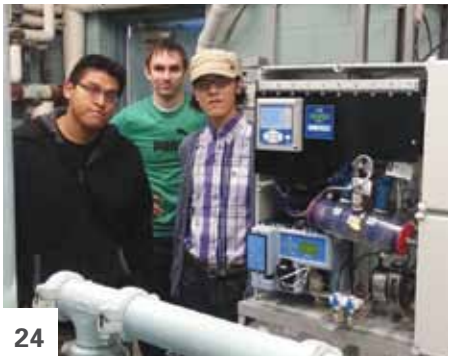
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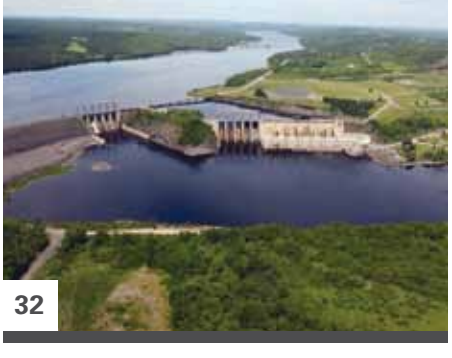
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WATERCANADA

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Determined, Self-Determined

BY KATHERINE BALPATAKY

ON THE 20TH ANNIVERSARY of what experts have called a landmark ruling to protect history of Indigenous land and title rights under the Constitution in B.C., Premier John Horgan declared that the Site C hydroelectric project on the Peace River would proceed. During the announcement, Horgan said that that it was "with a heavy heart" that they made the decision, however, the development would go forward, because it was, "in the best interest of the people." Best interest in this case being defined by revenues to pay for schooling, health care, and to keep energy costs down. The unspoken tradeoffs: The Site C dam would flood roughly 55 square kilometres, half of the remaining Peace River Valley land base; the dam would likely worsen the effects of low water levels threatening Wood Buffalo National Park's ecosystem (as forecasted by the International Union for the Conservation of Nature); and against the recommendations of certain cost-benefit studies that suggest the project doesn't make fiscal sense either.

Horgan noted, "When it comes to reconciliation and working with Indigenous leadership there has been over 150 years of disappointment in British Columbia," adding, "I'm not the first person to stand before you and disappoint Indigenous people." Indeed.

The decision's timing was uncanny. It was declared exactly 20 years after the 1997 trial of *Delgamuukw v. British Columbia*, where the Supreme Court of Canada ruled that aboriginal Constitutional interest is paramount to the Crown's interest. It also follows Horgan's recent bold commitments to adopt the United Nations Declaration on the Rights of Indigenous People (UNDRIP) and henceforth enable meaningful engagement of First Nations in decisions impacting their lands.

Now that the West Moberly First Nation and Prophet River First Nation have announced their intention to obtain a court injunction to halt the construction of the Site C dam based on Treaty 8 infringement, the provincial government seems intent on repeating the same mistakes of governments before it.

Continually clogging up the courts only to land at the same conclusion—the need to respect Indigenous peoples' rights and to grant or withhold their free, prior, and informed consent—doesn't make sense. Let's not forget that the Supreme Court of Canada recently quashed the Yukon Government's land use plan for the Peel Watershed for not complying with their modern treaty obligations. It's clearly time to give Indigenous Canadians an equal seat the decision-making table in decisions affecting their livelihood.

In this issue of Water Canada, we not only demonstrate this can be done, we hear from the federal government on how things will be done. On page 8, we speak to leaders from the Atlantic Policy Congress about their proposed Indigenous-led water authority; on page 24 we revisit efforts to expand the Safe Water Project First Nations operator training program in northern Ontario; on page 26, we shine a light on one First Nation community's effort to develop a community-based oil spill response (and prevention) centre; and finally, on pages 15 and 30, we engage with women who are finding new ways to break down barriers between Indigenous and non-Indigenous ways of learning (or un-learning, if you will).

I also want to highlight our page 10 interview with Dr. Jane Philpott, the new Minister of Indigenous Services. Minister Philpott shares her perspectives on the federal government's new approach to drinking water and wastewater, but more broadly, on the theme of this issue: self-determination. Ten years has passed since the Government of Canada signed the UNDRIP. It's an honourable journey, one that stands to define us as a nation. WC

All back issues of Water Canada are available for download at watercanada.net/issues

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PG 14

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PG 18

PAT KANE
Pat is a Yellowknife-based photographer covering Canada's far North.
COVER PHOTO

ABOUT THE COVER

Former Deline chief, George Cleary, wears a jacket made of caribou and looks out over the community while standing against a drying moose hide. Deline, NWT, is situated on the southwestern shore of Great Bear Lake.

On September 1, 2016, the Deline First Nation, Deline Land Corporation, and Charter Community of Deline were combined into one government forming the first self-governed Indigenous community in North America. For 18 years, leaders and elders in Deline had been working towards autonomous government that will run services that typically fall under territorial and federal jurisdiction, like water.

The Dene believe that there is a waterheart—the Tudze—breathing at the bottom of Great Bear Lake. The Tudze is what gives life to the everyday physical world of trees, fish, water, and human beings.

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- **APIs to drive water system change**
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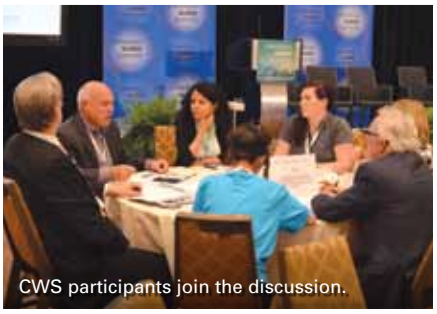


CWS participants join the discussion.

Kevin Wong and Aysha Muzaffar, Canadian Water Quality Association.

Tools for Climate Resilience

BY FABIOLA ALVARADO REVILLA

MUCH OF CANADA'S water infrastructure has been in place for many years. Infrastructure designs and associated procurement processes are based on existing climate patterns. With the effects of a changing climate, there is recognition that these designs need to be revisited to improve resiliency, safety, and protection for Canadians. Accordingly, procurement processes must be adapted to facilitate the needs of the future.

On June 2017, Water Canada and nine of Canada's leading water associations and organizations convened during the Canadian Water Summit to discuss how design standards and procurement policies could be improved to facilitate climate resilience. During two sessions, the leaders presented tangible recommendations in support of commitments to the Paris climate agreement to participants of the Water Summit. Summit goers also contributed their ideas in breakout groups focused on specific measures to enhance procurement policies and processes, and infrastructure design protocols.

A summary of the recommendations is now available in a newly released report, Built to Last: Improving Canadian Design Standards & Procurement for Climate Resilient Infrastructure.

Several cross-cutting themes emerged:

- The need to maximize the impact of investment in infrastructure given scarce funding realities, pressing water infrastructure needs, and a growing gap to meet those needs;
- Approaches to design protocols and procurement processes need to incorporate climate change resiliency objectives. There is support for outcome-based design protocols and procurement processes that take into account the life-cycle of infrastructure while paying attention to the local context;
- More data granularity is necessary to better target capital and operational expenditure in water infrastructure, and better support water decision-making; and
- Education and training are crucial in ensuring a successful integration of resiliency objectives across the water sector.

The measures detailed in the report range from broad national policy recommendations to specific technical ones. For instance, one breakout group focused on the reuse of native fill in backfill trench excavation, while another

(*Continued from page 6*)

explored ways to reach a 'safe to fail' approach to design protocols. The report delves into ways to modernize the National Master Specification and minimize the timeframe for granting environmental approvals.

Irene Hassas, who participated as a water representative with The Ontario Environment Industry Association (ONEIA) said, "It was an excellent collaborative effort by Water Canada, bringing different cleantech and water organizations together to harmonize activities, support the development of effective policies, and help our economy grow and create more jobs." WC

Fabiola Alvarado-Revilla is a PhD Candidate at the faculty of environment at the University of Waterloo.

Built to Last: Improving Canadian Design Standards & Procurement for Climate Resilient Infrastructure is available at **bit.ly/CWSBuiltToLast**

Collaborative Consent

CANADA'S RELATIONSHIPS with Indigenous peoples—and the institutions, laws, and policies governing these relationships—remain fraught with challenges 150 years into Confederation. These tensions are evident in freshwater governance in B.C. where First Nations are excluded from the major decision-making regime; yet the outcomes have a significant impact on Indigenous rights and important cultural, spiritual and economic water uses.

The POLIS Water Sustainability Project at the University of Victoria and the Centre for Indigenous Environmental Resources (CIER), published a report in September entitled Collaborative Consent and British Columbia's Water: Towards Watershed Co-Governance. In it, the authors provide a viable model for achieving a critical shift towards more equitable nation-to-nation relationships.

"Collaborative consent is about a different way of being together and building a future for Canada in which Indigenous nations assume their rightful governance role as founding nations in this country," said co-author Merrell-Ann Phare, founding executive director of the non-profit CIER and chief negotiator for the Northwest Territories in achieving transboundary water agreements in the Mackenzie River Basin. "Territorial and Indigenous governments in the Northwest Territories have been leaders in a collaborative consent approach for years," said Phare. Collaborative consent can be applied to decision-making processes at any scale, so it is relevant for provincial, federal, local, First Nations, and Métis governments, as well as water leaders, practitioners and others. According to a report that uses BC's new *Water Sustainability Act* as a prime opportunity for its use.

"It offers a way for B.C. to realize its commitments to govern according to the United Nations Declaration on the Rights of Indigenous Peoples and to develop a successful cogovernance regime for fresh water in this province." The report takes a detailed look at collaborative consent, how it differs from other collaborative and partnership processes, and includes case studies on how elements of it have been used in B.C., Canada, and internationally. WC

—Staff

Online at WATERCANADA.NET

Credit: Yellowstone to Yukon

NEWS: Supreme Court backs Indigenous rights in Peel dispute. ***bit.ly/PEEL_SCC***

Credit: David Zimmer

NEWS: Chiefs of Ontario and Premier issue joint statement, including water protection. ***bit.ly/OntFNH2O***

NEWS: B.C. and Yukon Territory embark upon a new classification system for water systems. ***bit.ly/EOCPwater***

NEWS: The PBO lays numbers to the Indigenous water infrastructure gap. ***bit.ly/PBO_ByNumbers***

Credit: Atlantic Canada artist, Alan Syliboy, alansyliboy.ca

Setting the Course

Atlantic Canada's model for an Indigenous-led water authority.

BY KATHERINE BALPATAKY

AS FIRST NATIONS are more actively deploying their own governance locally, regionally, and nationally, a growing body of Canadian leaders are advocating for the federal government to get out of the way. This is equally true when it comes to clean water.

In 2017, the Atlantic Policy Congress of First Nations Chiefs Secretariat (APC) put forward specific recommendations for an Indigenous-led water authority that would act as a hub to support First Nations communities managing their small water systems. The decentralized, full-service model would incorporate Two-Eyed Seeing—traditional knowledge, recognizing that water has a spirit and western knowledge of water treatment. With the plan in hand, the APC is calling on the federal government for the resources to launch it.

John Paul, the executive director of the APC, who has been working on water issues for over 20 years, said, "This all started when the expert panel came around the country. The government recommended that they look at options water issues and the regulatory regime for the Indigenous communities across Canada."

In 2016, the federal government, in partnership with the Assembly of First Nations, announced the creation of a panel of experts that would examine and provide options on the establishment of a regulatory framework to ensure safe drinking water in First Nations communities. It was then that the APC began formulating views on the matter.

"There were some very credible people on the panel that really looked at the range of solutions to address the issue and come up with a regulatory regime that would actually work," said Paul. "I think they made a lot of sense in what they recommended to do. It's just been a very long slog for the government to actually execute it."

As of 2018 there are still no regional or national regulations in place, despite the panel's recommendations and the government's commitment to pursue them. But the APC's work on the issue has moved forward. They have partnered with Dr. Graham Gagnon on the development of regulations based on provincial standards, and now, they believe that they have delivered a governance model with the potential to transform water and wastewater service delivery for First Nation communities in Atlantic Canada, a model that could be adopted by other regions.

Two-Eyed design

"This should be a water authority by First Nations for First Nations," said Carl Yates, the general manager of Halifax Water. "It is very important to build capacity, to take ownership and chart their destiny through their own advancement of knowledge and operational expertise."

When the APC began to look into the organizational requirements of an Indigenous-led water authority, they decided to work with a consultant to facilitate an extensive community engagement process. Halifax Water won the contract and got to work, bringing together chiefs, councilors, elders, and utility managers across Canada, as well as their own in-house expertise to provide four options for consideration and recommendations.

"It's one thing for us to lend expertise and suggestions, but we learned as well. It was very rewarding for those of us at Halifax Water who have been involved. We had our eyes opened to a greater world and understanding of the whole concept of Two-Eyed Seeing, and [the process] helps us make connections to First Nations communities, as well," said Yates.

Yates explained that Halifax Water came

Credits: Atlantic Policy Congress

(L-R) John G. Paul, executive director of the Atlantic Policy Congress of First Nations Chiefs Secretariat; Chief Sidney Peters, Glooscap First Nation, NS; Chief Matilda Ramjattan, Lennox Island Mi'Kmaq First Nation, Prince Edward Island.

Dr. Graham Gagnon, professor at the Center for Water Resource Studies, Dalhousie University has been a long standing partner of APC, having collaborated on all elements of the First Nations Clean Water Initiative.

to the table with a strong desire, and a sense of social obligation, to facilitate a process that First Nations communities would feel good about. He said the utility was also well positioned based on its own history of municipal amalgamation and adoption of small systems, starting in 1996. "We were involved in the governance aspects of the plan: How can this arms-length authority be set up, and how can it operate with the right checks and balances in place? There was a recognition that it needs a strong board and a strong regulatory framework for drinking water and wastewater." He explained that the utility's history was on their side. "We have been fortunate to come through a couple of mergers ourselves, which have involved extensive operations of small systems [...] Because the municipality is so diverse and spread out, it comes with different geography, different geology, different operating conditions, surface water, lakes, rivers, groundwater—we've touched it all. I think it's important that we came out of [the amalgamations] with a direct operating understanding of how to set up small systems for success." As part of the analysis for the APC, Halifax Water also looked at OCWA, EPCOR, SaskWater, as well as Technical Services Groups in Alberta and Ontario with First Nations experience for best practices.

When the final report was delivered, four options were presented with one recommended option: that a new Authority be constructed, owned and operated by and for First Nations communities. It recommended the Authority have a decentralized model with autonomous business units, which have a wide scope for individual plans and actions and are supported by the head office.

John Paul said, "In talking to our elders, it was clear that unless we built an institution that is Indigenous, based on our values, our culture, and our belief of Two-Eyed Seeing and the intrinsic spiritual value of water, then our workers would be just city workers." He noted how crucial the ongoing need to build trust and communicate with community members in a transparent and open manner would be to the Authority's success.

"Out of the months and months of discussion, this is what we came out with. The discussions were very heated at times, but that's part of the process. [...] It all goes back to trust. You have to trust these people to protect you. They are water protectors," he said.

Way forward

John Paul and APC have ambitions to get a decision from the newly-created Ministry of Indigenous Services before March 31st. They aspire to have the financials figured out, a regulatory regime in place, and the new water authority operating by 2022.

"I think the new Minister Philpott is a very courageous person, and she wants to get stuff done," said Paul. "I have been talking to the department about our proposal and have provided a mountain of paper that we have generated from our work. I am trying to convince her that this is the way to go. This ideology can be created in almost any part of the country, because it is consistent with our values."

Paul explained that having both regulations and accountability in place are key to the model's success, allowing the authority to get liability insurance, but also to provide consistent education, training, and to explore leveraging private funds. Although they have not been granted official support, Paul is convinced that it is just a matter of time before the government comes around to the idea.

Speaking on the general interests of First Nations communities to take over jurisdiction and control of water systems, Indigenous Services Minister Jane Philpott said, "This is in keeping with our general approach across all sectors and our government's commitment to recognition of rights, including the right to self-determination." She added, "There is lots of evidence in other sectors that when we support communities to be able to take on self-government, or sectoral self-government—whether it be education or health—that they are much more successful. [...] When it comes to water, there are certain areas where they are working towards this. The Atlantic Region is one of the best examples. [...] We are supporting communities in their interests in developing the possibility of hubs that will take on authority for water systems."

Now that the Ministry has been granted official responsibility, Paul's requests may be answered. Paul said, "Water is a public safety issue; it's not an Indigenous issue. Whether it's an Indigenous or non-Indigenous system, it is still going to have to produce the same outcome of clean water."

He added, "I'm not going to give up. I believe this is too important not to fix. It's like our language, it's like our culture, our beliefs. This is really important to communities—having safe drinking water." WC

Katherine Balpataky is Water Canada's editor.

Credit: Dave Kamitsuru

Service Oriented

With the new federal department in place, **Minister Jane Philpott** talks about the government's new approach to First Nations' water.

BY KATHERINE BALPATAKY

What is the vision for the new department?

The Order in Council has formally announced the establishment of the Department of Indigenous Services Canada, so we are officially a department of the government. We have a mandate to address the socio-economic gaps that exists between Indigenous and non-Indigenous Canadians and to address a wide range of sectors the impact the day-to-day lives of Indigenous people.

One of the sectors that falls under my portfolio is responding to the infrastructure needs and gaps in communities, and one of the biggest infrastructure needs is water and wastewater infrastructure. This is something that as been a big priority for our government from the beginning. When the Prime Minister made a commitment in the 2016 Budget that we would make a major investment in water and wastewater and in doing so that we would make a big commitment to ensure that all long-term drinking water advisories would be ended by 2021. This is one of the top issues that we are working on and we are following it very closely to make sure that we can meet that commitment.

What progress has been made to eliminate boil water advisories thus far, recognizing that some BWAs have been eliminated, while others have been added?

We are quite pleased with the progress. There wasn't a lot of tracking done by the previous government. One of the first things that had to be done was to determine where the long-term drinking water advisories (LTDWAs) existed across the country, to try to get at the root of what's causing them, and to help communities build a plan to address these.

One of the challenges in the past is that there has not been any long-term funding. While this is something that we want to fix urgently, we recognize that sometimes it takes a year or two, or even three years for communities to make the appropriate plan and design and construction to get these drinking advisories listed and new water systems in place.

We have close to 300 projects underway; close to 300,000 people in First Nations communities; and so far we have listed 29 LTDWAs, so that's very good news. In the meantime, it became apparent to us that there were communities that didn't have drinking water advisories before, that ended up having them added. And so, under Minister Bennett's leadership, we realized that that we should not only look at communities with LTDWAs, but also those communities that were at risk of developing them. We know that during the time period, over 30 have been lifted, but others have been added, so we are not only developing an itemized, very-detailed plan for every community that had a LTDWA, but any community that has had a shorter-term drinking water advisory, because we don't want to fix the problem in some communities and then have the same number added in other areas.

> That is the spirit of our rights-based approach to a broad range of issues for First Nations.

What about progress to establish binding drinking water quality regulations for those communities—whether that be a national standard or a regional approach to regulations?

There is work being done to look at both legislative and regulatory matters that will support the commitment and be able to establish better national standards, and there is also work being done to look at regional approaches. In some regions there is a real interest in First Nations taking over regional jurisdiction and control of water systems in a regionally focused method. That is something that we do hear a little differently from community to community across the country. But certainly addressing those regulatory issues is critical in getting the job done.

Water Canada will profile some of the regional efforts to move towards self-determination when it comes to First Nations and water. Would you say that there is openness to those kinds of initiatives?

Absolutely. This is actually in keeping with our general approach across all sectors, and our government's commitment to recognition of rights, including the right to self-determination and there's lots of evidence in other sectors; when we support communities to be able to take on self-government or even a sectoral self-government, whether it be education or health, that they are much more successful.

Obviously that is the spirit of our rights-based approach to a broad range of issues for First Nations. When it comes to water, there are certain areas that are working towards this. Probably the Atlantic Region is one that is the best examples that is very encouraging. We are also seeing some work being done in Northern Ontario where certain hubs are starting to develop and we are supporting communities and their interests in developing hubs with the possibility of taking over the authority of water systems.

Is there going to be more of a concerted effort to support Indigenous operator capacity?

There has already been support provided by the departments, like the one in KO (*see page 24*). This is the kind of thing that we are very interested in hearing about from other Tribal councils doing similar kinds of work.

Now that the new department is in place, what are the differences in the way the government will administer services and funds to communities, as compared to when the responsibilities rested with INAC and Health Canada?

There are lots of differences. One is that it is essentially doubling the efforts of our government in terms of ministers, the number of departments, and so there is a

bigger focus from the government because of that. But the real reason behind this is that this is something that has been asked for a very long time, going back to the Royal Commission on Aboriginal Peoples suggested that the colonial structures of Indigenous and Northern Affairs department needed to be dismantled. It was put in place to enforce the *Indian Act*, which we know needs to ultimately needs to be repealed and so the recommendation at that time was that we needed one minister who was entirely focused on foundational work of addressing the implementation of treaties, recognizing the rights of Indigenous peoples, and focusing on supporting self-determination—some of that foundational work that is really undoing the wrongs of the past and restoring that treaty-based relationship that Minister Bennett is focused on. But at the same time, because of past government policies, there are all these terrible socio-economic gaps that exist, and so the Royal Commission recommended that until such time as First Nations and other Indigenous peoples are able to completely take on the control for the various sectors of service delivery, that there should be a department of the federal government that will continue to support communities in the delivery of programs and services.

There's no question that there is so much work to be done, but it is extremely helpful to have our new department focused entirely on these practical day-to-day realities, and to do so in the spirit of recognizing that we aim to work ourselves out of a job. Communities should increasingly take over jurisdiction in these areas, so that there will be less and less need for a department of Indigenous Services in the federal government.

What do you personally bring to the department and the water file?

I'm a family doctor by background, and worked as a family doctor for over 30 years, including working in West Africa, where we could never drink the water that came out of tap. That experience gave me an interesting perspective on what people face in less resourced settings.

As a doctor in general, I have come to realize what it takes for people to be healthy is not simply a healthcare system; it's all these issues like having a decent house to live in, a good school to go to, and being able to get clean water and healthy food. Those are actually the things that enable a person to be healthy and well. It's kind of a dream come true for me, where my entire mandate is addressing the social determinants of health. WC

Katherine Balpataky is Water Canada's editor.

Change Curves

Keeping water systems ahead of unprecedented technological change.

BY TODD WESTCOTT

CHANGE MANAGEMENT and version control are growing domains in infrastructure design and delivery, and consequently for water systems whether in design, construction, or operation. Digitalization of assets requires bigger data sets and more upfront software investments, but also provides optimized project timelines and lifecycle cost reductions.

Dr. Helmuth Ludwig, executive vice president and chief digital officer for Siemens PLM Software, said that Siemens always seek to optimize a client's product delivery. "What is the next s-curve of productivity for our customers?" said Ludwig. An s-curve defines the project deployment costs over time. Optimizing your s-curve means better, more seamless project delivery. "The next s-curve, we believe, was integrating the design process with the manufacturing process," he said. Siemens provides digitalization services for manufacturing and mechanical design industries.

"Our customers said: look it's not enough anymore just to look into productivity. It's not enough anymore just to be flexible. It's not only a question of being faster to market, and it's not only a question to get as close to 100 per cent in quality; we have to do it all together," said Ludwig. In response, IoT systems take the massive amounts of data that is generated and handled in a modern infrastructure system and create complete digital ecosystems in which the project can be precisely replicated and managed. The result of this process are digital twins.

Digital twins can be of a single infrastructure component up to a site-wide scale. They allow for project management on a scope previously unrealized, providing digital environments that allow engineers, construction managers, and any and all stakeholders to understand the ripple effects of minute changes, whether to the product schedule—its s-curve—to the financial or environmental cost, or the product lifecycle.

"We can run all sorts of analyses in the cloud based on those models," said Robert Mankowski, vice president of simulation product management at Bentley Systems Inc. The models are defined by iModel 2.0, a second wave of the company's cornerstone application that was inspired by GitHub, the web-based version control repository for computer code. "Do my scenarios calculate without errors or warnings? What are the velocities in the pipes? Do they meet my criteria in terms of minimum velocities, maximum velocities; what are the head losses? Did I just make a change, which causes the energy usage and carbon footprint of my design to skyrocket?" All of this can be tracked.

The new platform allows all project stakeholders, whether on-site, at a regional office, or internationally-located head office, to manage changes to the project at any point in the project's lifecycle. By using cloud computing, massive (really MASSIVE) amounts of data are coordinated and aligned at server farms. Project engineers are able to explore the timeline of a project as if they were time-travelling, sci-fi detectives rolling back a crime scene.

"We can have a cloud service that does the analysis and compares it to a set of rules," said Mankowski. The platform allows the end-user to take a snapshot version of the project for any time segment, so they can identify a change and search for its root cause at any previous point in the project development. "You know, I see that there's a change here in the cost of the design, or energy cost, or carbon footprint; let me go back and investigate the changes that occurred over time and find that point at which that change in one of my key performance indicators occurred."

Organizations like Bluefield Research have tasked themselves with understanding the impacts that disruptive technologies of this sort will have on the water sector. "We're going to see shifted business models: infrastructure as a service," said Will Maize, a senior analyst with Bluefield. "With improved development of asset performance management technologies, improved data logging from distributed devices, we're going to see suppliers have more information on the real-time scale of how their assets are performing." Indeed, this is the logical next step in the path described by Dr. Ludwig. "They can also leverage this into selling their assets as a rental agreement or a lease agreement and charge the utility a set fee per metre cubed that's pumped."

There are tangible benefits, whether financial, environmental, or managerial to improving project design, construction, and operation. But there are also bound to be costs. How does it change the utility's relationship with customers or technology suppliers? How will this impact governance structures and accountability? Changes will need to be made, but so long as utilities stay ahead of the curve, the benefits are clear. WC

Todd Westcott is Water Canada's content and marketing manager.

Inuit mentee Alexia Galloway-Alainga discovers, for the first time, what lies beneath the waters of Frobisher Bay.

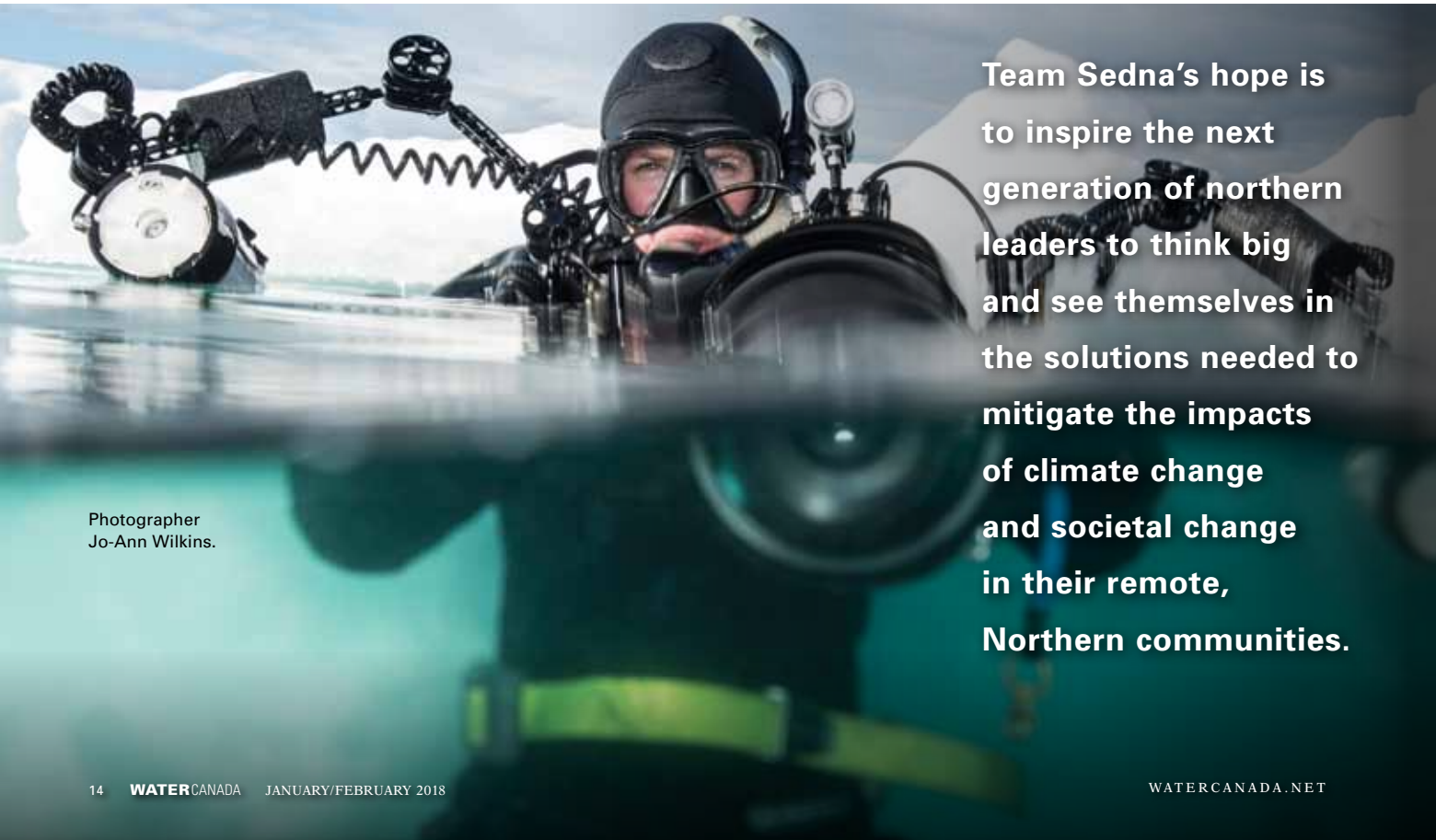
All Photos: sednaepic.com – Amanda Cotton

Sedna's underwater photographer Jo-Ann Wilkins at work in the emerald green waters of Frobisher Bay, Baffin Island, Nunavut.

(L-R): Sedna's Veronica Ryl, Inuit mentee Alexia Galloway-Alainga, and Jo-Ann Wilkins deploy a newly-assembled underwater robot.

Pack ice in Frobisher Bay, Nunavut.

Sedna's sea women and their Inuit advisors pose after a day of snorkelling and scuba diving in and around pack ice in Frobisher Bay, Baffin Island, Nunavut. Front Row L-R): Veronica Ryl, Renata Rojas, Becky Kagan Schott, Aaju Peter, Susan R. Eaton. Johnny Issaluk, Mary Ellen Gucciardi, Kitrina Godding, Urszula Tokarska. Back Row (L-R): Stephanie Gandulla, Joanna Lentini, Amanda Cotton, Kristin Gates, Jo-Ann Wilkins.



Photographer Jo-Ann Wilkins.

Team Sedna's hope is to inspire the next generation of northern leaders to think big and see themselves in the solutions needed to mitigate the impacts of climate change and societal change in their remote, Northern communities.

Katujjiqatigit | Working Together

The all-female Sedna Epic Expedition brings a changing ocean to eye level for coastal Inuit communities. BY SUSAN R. EATON

BANK TO THE LEFT, bank to the right. Tethered to diver propulsion vehicles, the women flew through emerald-green arctic waters at six kilometres per hour, dodging sculpted ice formations off the northern coast of Labrador. They soon discovered that snorkelling in pack ice is a contact sport. After several star-inducing head bumps, the team's dive physician determined that helmets would be standard gear for future expeditions. When wardens at nearby Torngat Mountains National Park advised that they spotted a few polar bears heading towards the divers, wildlife spotters on the mother ship and dive zodiacs doubled their vigilance.

This was to be the first of two all-female, proof-of-concept snorkelling and scuba diving trials completed in preparation for the Sedna Epic Expedition's snorkel relay of the Northwest Passage. During the trials, Team Sedna conducted snorkel relays, collected scientific data, and gained invaluable experience in this harsh and unforgiving environment.

The expeditions took place in the icy waters of northern Labrador, Nunavut, the Davis Strait, western Greenland, and Iceland and involved 40 participants: ocean explorers, scientists, artists, journalists, educators, students, and medical and scuba diving professionals, ages 16 to 58. These women hailed from Canada, the United States, Mexico, and New Zealand.

In the summers of 2019 and 2020, the Sedna Epic Expedition will mount a 3,000-kilometre snorkel relay of the Northwest Passage—a world-first—to bring global attention to the impacts of climate change on sea ice in the Arctic. Preparation for this monumental undertaking has involved several years of logistics and team-building exercises, with the support of the Royal Canadian Geographical Society, Arctic outfitters, scuba equipment manufacturers, scientific organizations, and Inuit leaders.

Engaging local communities

In July and August 2016, Team Sedna collaborated with Inuit advisors and community leaders to deliver a hands-on ocean outreach program for Inuit youth, girls, and Elders of Iqaluit (most of whom were non-swimmers). Bringing the ocean to eye level, the outreach involved showcasing invertebrates and small fishes housed temporarily in aquariums, running workshops to build and fly underwater robots equipped with video cameras, and leading snorkel safaris to explore what lies beneath the waves of Frobisher Bay.

"The Sedna Epic Expedition is an exciting vision," said Graham Dickson, the owner of Arctic Kingdom, an expedition partner and dive outfitter with offices in Toronto and Iqaluit. "Sailing through the Northwest Passage is a challenge, much less swimming through it," said Dickson, also a Fellow of the RCGS and master dive instructor with 20 years' experience leading excursions in the Arctic.

The Sedna Epic

According to Inuit legend, Sedna is the Inuit goddess of the sea, and she's the mother of all marine mammals. She will be with the snorkellers as they record the impacts of climate change in the Arctic. Assisted by diver propulsion vehicles (also known as scooters), the women will undertake a 100-day snorkel relay, travelling from Pond Inlet, Nunavut, to Tuktoyaktuk, Northwest Territories. En route, they'll conduct oceanographic research and deliver their innovative ocean outreach program to Inuit and Inuvialuit communities situated along the Northwest Passage, with a focus on empowering girls and young women in ocean careers.

Inuit and Inuvialuit societies are matrilineal in structure, with a long tradition of female community leaders. Team Sedna's hope is to inspire the next generation of northern leaders to think big and see themselves in the solutions needed to mitigate the impacts of climate change and societal change in their remote, Northern communities.

Working together

Johnny Issaluk, a community leader and skilled hunter from Iqaluit, is one of Sedna's esteemed Inuit advisors. A recipient of the Queen's Diamond Jubilee Medal in 2012 for his contributions to

Sedna's Dive Safety Officer Jeffrey Gallant and Inuit Advisor Aaju Peter are triumphant after her first snorkel excursion ever, in Frobisher Bay.

Inuit mentee Alexia Alainga-Galloway displays her newly-assembled underwater robot in Iqaluit, Nunavut.

Sedna's maritime archaeologist Stephanie Gandulla and teammate wear helmets to navigate pack ice in Frobisher Bay.

All Photos: sednaepic.com—Amanda Cotton

improving Inuit health and community well-being, Issaluk has won numerous medals in traditional Inuit games. Issaluk named the Sedna Epic's 2016 expedition Katujjiqatigit, an Inuktitut word that means fighting together or working together.

"Sedna was involved in teaching self-worth and self-healing within the community," he said. "We need role models to come into the communities. Sedna made a difference to a lot of kids. Anything that helps Inuit get tools under their belt is a form of reconciliation."

A tropical scuba diver before joining the team, he described the Sedna Epic as an eye opener.

"I learned a lot about diving in cold water and team work," said Issaluk. "It was very interesting to dive at home, and to encounter marine life I'd never seen before."

"From the very beginning, the Inuit were explorers," he said. In the winter, the Inuit crossed the frozen ocean via dog sled, and in the summer, they explored the Arctic via kayak.

Selected as a Canada 150 Ambassador by the Government of Canada, Issaluk proudly wears the logo, which celebrates 150 years of confederation in Canada. While describing himself as pro-Canadian, he nonetheless acknowledges how colonialization adversely impacted many generations of Inuit, including his parents and siblings. "For me, Canada 150 is more about the next 150 years," he said, citing the educational and athletic opportunities that he's had.

Mary Ellen Gucciardi, an educator from Toronto, is also one of Sedna's advisors. A consultant in alternative education and First Nations, Métis, and Inuit studies, Gucciardi has led several educational exchanges to Nunavut, developing community partnerships and immersing teachers and students alike in environmental stewardship and Inuit culture in the Arctic.

"One of the imperatives for educators is to create culturally responsive curriculum for First Nations, Métis, and Inuit," said Gucciardi. "Sedna engaged in community, with community. We mentored Inuit girls and young women and they became part of Team Sedna."

Pointing to Sedna's multiplier effect, she said, "Sedna's sea women returned home with a new understanding and perspective of the Arctic and of the Inuit. Every woman on the team left Nunavut changed—that's what relationship does. None of this can take place with emails." She added, "These relationships are still being fostered today."

Iqaluit-based Alexia Galloway-Alainga, 20, is one of ten young northern women who Team Sedna mentored in the summer of 2016. An accomplished Inuit throat singer, Galloway-Alainga is enrolled in her third year of social work studies at Carleton University in Ottawa.

Galloway-Alainga grew up boating and hunting on the water and snowmobiling on sea ice in the winter. She has lost more than one close family member to drowning, so the prospect of leaping off a fishing boat into Frobisher Bay was emotionally challenging.

"Snorkelling was a big step for me, but I was surrounded by amazing women, role models who I look up to," she said. "I had a leak in my dry suit the first time I snorkeled, but continued anyways!"

Galloway-Alainga also assisted with delivering Sedna's underwater robot and touch aquarium outreach program to youth in Iqaluit. "I eat seal; I eat fish," she said. "Inuit youth now understand how small sea critters are essential to the Inuit way of life and the marine food chain."

The Sedna Epic is currently scouring the world for an expedition vessel suitable to transit the Northwest Passage during the summers of 2019 and 2020. Sedna's sea women will reunite in August 2018 to continue building relationships with Inuit communities and to gain more cold-water immersion training in Nunavut and western Greenland. WC

Susan R. Eaton is the founder and leader of the Sedna Epic Expedition. She is a Calgary-based geoscientist, journalist, and conservationist.

Nestlé Waters Canada helps communities through science, support, and stewardship

Water Monitoring & Data Sharing

Identifying and managing for potential future risks to groundwater supply is essential to Nestlé Waters Canada's business. We apply rigorous testing and monitoring programs conducted by hydrogeologists, ecologists, biologists, and third-party technical reviewers to ensure the quantity and quality of the source water, now and for the future. All data is shared publicly with local government, First Nations, universities, conservation authorities, interested stakeholders, and posted on our website. We are the only spring water bottler in Canada that employs a full-time hydrogeologist.

Disaster Recovery & Relief

In times of disaster, communities often need fast access to clean drinking water, and unfortunately, 2017 was a tough year for many Canadian communities. In May, the Central Okanagan area in British Columbia was affected by a series of water quality advisories due to flooding, so Nestlé Waters donated over 100,000 bottles of water to hospitals supporting the B.C. interior. When persistent rainfall and heavy snowmelt flooded Enderby, B.C. in May, Nestlé Waters responded by donating over 2,000 cases from its distribution Centre in Chilliwack. In total, we donated over 625,000 bottles of water to flood and fire relief efforts in B.C, and flood relief in Ontario in 2017.

Community Engagement

Nestlé Waters Canada's employees play an active role in the communities where we operate. In Hope, B.C., for example, we have partnered with the Hope Mountain Centre to engage with children and give them a stronger connection to the outdoors. By supporting the Friends of Mill Creek in the Grand River watershed, we also support high school students to improve efforts to undertake fisheries and stream rehabilitation work, including stream bank reconstruction, stream bed re-grading, tree planting, culvert replacement, and farm fencing repair. For the past ten years, Nestlé Waters has also partnered with Engage and Change to deliver Summer Survival Kits for the homeless and those in transition in the Greater Toronto Area.

"Year after year, Nestlé Waters Canada continues to help our organization undertake initiatives in the sub-watershed that maintain and protect Mill Creek as a cold-water stream. In addition to its financial support, they have been generous with people, in terms of representation on our Advisory Board and participation in the enrichment program for the students."

Don McKay, President, Friends of Mill Creek

Nestlé Waters CANADA

For more information, visit **nestle-waters.ca**

Resetting the Relationship

Ensuring safe water for all First Nations.

BY IRVING LEBLANC

OPPOSITION TO THE federal government's attempts to introduce regulations for water and wastewater has been persistent ever since the government set out to engage with First Nations on a draft *Safe Drinking Water for First Nations Act* (SDWFNA) in 2009. Put into force on November 2013, the enabling SDWFNA has had continued resistance from First Nations opposed to the manner it was introduced. There was no free prior and informed consent in its development. It did not respect First Nations inherent and Treaty Rights related to water. And as it was introduced in the Senate, the Act did not identify the resources required to implement the regulations once they were enacted.

Assembly of First Nations (AFN) resolutions have been passed that called for the repeal of the SDWFNA including Resolution 26/2017. Response recently came from the newly formed Indigenous Services office proposing "a path forward on the Safe Drinking Water for First Nations Act through First Nations led engagements on the Act." In support of this, 2017 SCA Resolution 15/2017 "First Nations led Engagement Process for Safe Drinking Water Legislation" was passed. This now provides First Nations the opportunity to revisit the 2006 Report of the Expert Panel on Safe Drinking Water for First Nations recommendations which were largely ignored by the government in place at that time.

One of the most important recommendations from this report was the "federal government must close the resource gap." The report further stated that "First, and most critically, it is not credible to go forward with any regulatory regime without adequate capacity to satisfy the regulatory requirements."

Closing the resource gap

Closing the resource gap has been challenging for the current and previous governments. Budget 2016 stated, "While some progress has been made, significant gaps remain. Budget 2016 proposes to address health and safety needs, ensure proper facility operation and maintenance, and end long-term boil water advisories on reserves within five years by investing

First, and most critically, it is not credible to go forward with any regulatory regime without adequate capacity to satisfy the regulatory requirements.

an additional $1.8 billion over five years, starting in 2016–17."

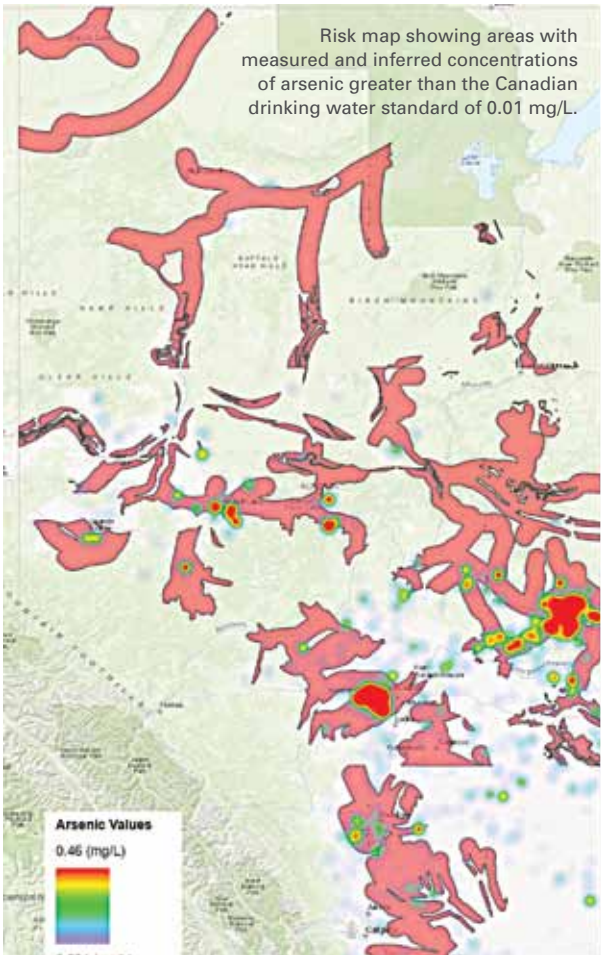
The bellwether has been the number of Drinking Water Advisories (DWAs) reported on Health Canada's website. In November 2015, the Government of Canada committed to end long-term drinking water advisories in First Nations communities by March 2021. As of October 31, 2017 there were 100 long-term drinking water advisories and another 47 short-term drinking water advisories for a total of 147 DWAs. In an article in the March/April 2017 edition of Water Canada, 130 DWAs in 85 First Nation communities was reported. This is not including B.C. or the Saskatoon Tribal Council. As of January 31, 2017, there were 21 advisories in effect in 19 First Nations communities in B.C. As of November 30, 2017, there were 18 Boil Water Advisories and three Do Not Consume advisories for a total of 21 Drinking Water Advisories in effect in 18 First Nation communities in B.C.

At the December 2017 AFN Special Chiefs Assembly, Minister of Indigenous Services Jane Philpott addressed the delegates and reported that there is plan for each of the Drinking Water Advisories. It is reassuring to know that the federal government has a plan in place to eliminate all drinking water advisories during the current mandate of the Prime Minister.

On December 7, 2017 The Office of the Parliamentary Budget Officer released the report "Budget Sufficiency for First Nations Water and Wastewater Infrastructure." The report stated that the "PBO has constructed a range of estimates of the cost of improving W&WW systems on First Nations reserves to the point where residents can enjoy drinking water and wastewater services comparable to non-First Nations communities of comparable size, and which would eliminate long-term boil water advisories by 2020." The important conclusion from the PBO report is that the "estimated capital and operating and maintenance (O&M) cost are considerably more than the actual and planned Aboriginal governments' funding for First Nations W&WW infrastructure." With respect to the O&M funding the government has also committed to review its O&M Policy with support from the AFN.

Looking ahead we remain hopeful that significant changes and appropriate resources will start to be realized as the plans to address the DWAs are implemented and First Nations led process for safe water begins. First Nations have for far too long suffered from lack of safe drinking water and proper sanitation. It is time to reconcile this injustice and set the path forward and deliver on the commitment for provision of safe water for the next seven generations. WC

Irving "Bing" Leblanc, P.Eng. is the director of housing, infrastructure, and emergency services with the Assembly of First Nations.



Credit: Integrated Sustainability Consultants

Risk map showing areas with measured and inferred concentrations of arsenic greater than the Canadian drinking water standard of 0.01 mg/L.

Cold Lake, Spruce Grove, and the surrounding regions of Slave Lake and Red Deer are some of the affected areas.

Poison Well

Chasing arsenic in Alberta's groundwater.

BY JON FENNELL

ABOUT ONE IN THREE Canadians obtain their drinking water from groundwater. As a clean water source, groundwater is usually unspoiled from human activities, and although there is a cost to drill, complete, and equip water wells to gain access to this water, groundwater is arguably one of the safest supply options available. But the virtues of groundwater cannot be taken for granted. Consider the largest human poisoning event in history, where millions of people in Bangladesh and West Bengal were unknowingly exposed to toxic levels of arsenic in their groundwater, starting back in the 1980s.

Here in Canada we are not immune to such exposures. A little-known fact is that parts of Newfoundland and Labrador, Nova Scotia, New Brunswick, Quebec, Saskatchewan, Alberta, and British Columbia have naturally elevated concentrations of arsenic in their groundwater. However, there is limited knowledge about why this occurs. To help answer this question in Alberta, a collaborative research effort was launched in 2013 to understand where groundwater has been impacted by arsenic, and to identify the source and cause of this phenomenon.

"We supported this study as part of our 2013 Water Resources Sustainability Program to better understand the state of our rural groundwater and raise awareness in rural communities that may be at risk," said project coordinator Vicki Lightbown of Alberta Innovates. "Our intent was to support public health agencies by taking a holistic look at this issue and providing options for risk management, including household treatment." In addition to reviews of toxicology and abatement methods, high risk areas were identified and mapped to help focus public awareness campaigns regarding the importance of monitoring and mitigating rural drinking water, if needed.

> Our intent was to support public health agencies by taking a holistic look at this issue and providing options for risk management.

Correlating patterns

To do this the team first assembled information from various government agencies (health, agriculture, and environment), which was then collated into one comprehensive, unified database. Spatial analysis of over 40,000 well records, with up to 40 water quality parameters each, was then conducted followed by statistical analysis to identify correlations between various chemical attributes of the groundwater, geological conditions, and human development activities. The analysis identified distinct areas in the province with arsenic values well beyond safe levels for human consumption, namely then regions surrounding Slave Lake, Cold Lake, Spuce Grove, and Red Deer.

The most unsafe levels of arsenic were found in water wells completed between 15 and 80 metres below ground level. Elevated concentrations were also associated with certain naturally softened sodium–bicarbonate waters with PH values in a narrow range of 7.5 and 8.5 and total alkalinity values between 300 miligrams per litre and 800 miligrams per litre as calcium carbonate (CaCO3). While some of the arsenic hot spots exhibited notable correlations with iron, barium, and molybdenum, others revealed more of a correlation with selenium and chromium.

Nature's hand

A comparison of the arsenic hot spots with underlying geology and various human development activities identified weathering of naturally occurring arsenic-bearing minerals as the source and cause. Instead of the activities one might expect to be influencing groundwater, like agriculture, oil and gas, coal mining, and waste management facilities, there was a significant correlation between elevated arsenic and buried channel aquifers eroded into organic-rich marine shales and coal-bearing deposits. The arsenic risk map generated as part of this effort was presented to various Government of Alberta agencies to assist with continuing efforts to protect Alberta's rural public.

The lesson to be shared from all of this is that public health agencies need to be aware of the potential issues regarding off-the-grid drinking water systems, because nature can deal some nasty cards. Equally, rural residents cannot take for granted that water in their wells is safe to consume. They need to check, confirm, and monitor regularly. Thankfully there are economical home systems that can treat out things like arsenic, but owners still need to be vigilant on maintenance of those systems. In the end individuals providing their own water cannot abdicate responsibility for ensuring that it is safe and clean for themselves and their families. WC

Jon Fennell is the lead hydrogeologist for Integrated Sustainability Consultants, who were hired to resolve the source and cause of arsenic in Alberta's groundwater.


AdEdge's arsenic and iron removal system.


The building housing the AdEdge treatment system.

All Photos: AdEdge Water Technologies


AdEdge H2Zero Backwash Recycle System.


Training of the AdEdge treatment system using the PLC.

Arsenic and Iron Removal for the Resort Village of Kannata Valley, Saskatchewan

In November 2009, AdEdge Water Technologies, LLC was selected among other vendors in a Tender by the Resort Village of Kannata Valley (RVKV) to supply an arsenic, iron, manganese and turbidity treatment system for their community in Silton, Saskatchewan. Prior to selection, AdEdge worked with its local representative, the Water Clinic on piloting the system that was chosen. The water system currently uses one 132 gpm artesian well that serves potable water to 260 connections. Several options were considered based on the need to remove the 1.7 – 2.14 mg/L iron and arsenic from 31 ppb to below the new MCL of 10 ppb. An AdEdge AD26 oxidation/filtration system was selected as the best overall approach to simultaneously remove both contaminants while having a small footprint. Work was closely coordinated with the RVKV and its consultant to design and permit the treatment system. Following award, all appropriate permitting documents were prepared and submitted to the Province for approval with the permit granted in January 2010. The AdEdge scope of work included system design, supply and start-up assistance. The packaged AD26 system utilizes an NSF 61 Certified manganese dioxide media (AD26) that is excellent for co-contaminant removal. The technology was selected based on overall cost, the small footprint, and simplicity of operation.

The AdEdge AD26 arsenic treatment train consists of one skid mounted triplex packaged treatment systems with three vessels in parallel to treat up to 150 gallons per minute (gpm). A design filtration rate of 3.98 gpm/ft2 was chosen to allow for filtration of the high level of contaminants including turbidity in a range of 6.34 – 12.0 NTU. The AD26 automated system equipped with a PLC, automated butterfly valves, and control panel is integrated with chlorine addition and monitoring for process control and disinfection purposes. The system also includes air wash and complete backwash recycle, providing a treatment system with zero discharge. The system is pre-engineered, pre-piped, and skid mounted for ease of installation and operation. A continuous free chlorine monitor on the system allows the operator to maintain desired disinfection residual in the distribution system. The AD26 technology has been deployed successfully by AdEdge on many high arsenic, iron, and manganese wells to date rated up to 15 MGD and also on 5 full-scale EPA arsenic demonstration projects.

Installation was completed and the system was officially started up in August 2010. Since operations began, the system has consistently met all the EPA MCLs for arsenic, iron, and manganese. Arsenic in the treated water has been recorded consistently below detection (<2 ppb) and Turbidity to 0.014 NTU. Monitoring and periodic sampling of the system is performed by the site's certified operator in accordance with the operating permit. ■

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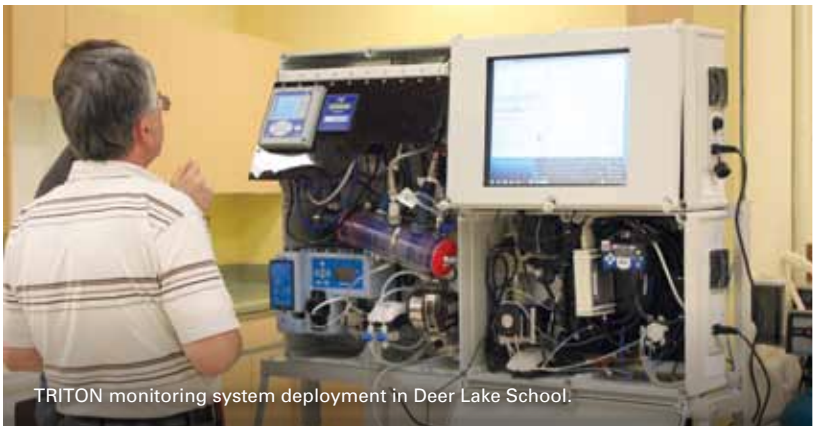
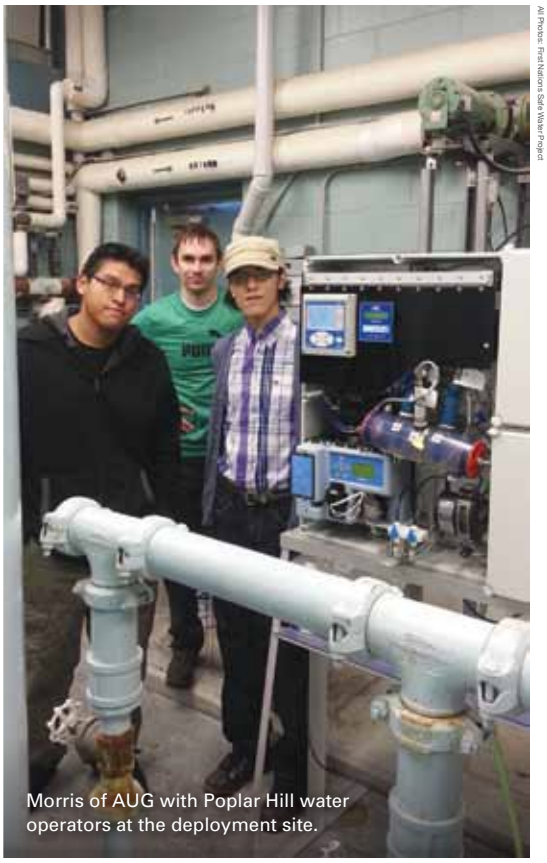


TRITON monitoring system deployment in Deer Lake School.

Keewaytinook Centre of Excellence in Dryden, Ont.



Morris of AUG with Poplar Hill water operators at the deployment site.

All Photos: First Nations Safe Water Project

Distant Support

First Nations-led, provincially certified training and support for operators.

BY HANNAH SONG

THE SAFE WATER PROJECT'S journey began in 2015 in the Keewaytinook Okimakanak Tribal Council's communities with the intention to end and prevent Boil Water Advisories (BWAs) in northern Ontario First Nations communities. The Safe Water Project is a First Nations initiative involving three integrated components: (1) provide training and certification to local water operators; (2) offer operational support to local water operators as they pursue certification; and (3) deploy proven Canadian-made technology to monitor the quality of drinking water on a continuous real-time basis. Within the first year of its implementation, the project has removed three long-standing BWAs in First Nations communities, out of six project sites.

Earlier this year, the project was implemented in 14 additional First Nations communities in Ontario. Along with its expansion, the project was also endorsed by the Assembly of First Nations' 2017 Resolution 51, with support for the project to "minimize and prevent boil water advisories and to empower First Nations communities to effectively manage their own water systems through training, education, and the deployment of technology to treat water." With this support, a project that began as a single tribal council's pilot project has now evolved to include numerous tribal councils and communities as a First Nations-led initiative.

Building capacity

The Keewaytinook Centre of Excellence offers provincially-certified training programs to the water operators, and A.U.G. Signals Ltd. provides a technology designed to monitor drinking water quality, empowering First Nations communities to develop, implement, and maintain their own water systems.

The project was developed with the remoteness of the communities in mind. Current practice for testing drinking water quality relies heavily on manual and random sampling that gets taken to certified laboratories that are quite distant, followed by a long waiting period to get the results back. This lag time can be detrimental to communities, as they continue to use their drinking the water. The turnaround period is even longer for remote communities.

The First Nations Safe Water Project addresses this shortfall by deploying a drinking water surveillance system that monitors water in real-time and warns the water operators through an early warning

system if trending data detects anomalies. A.U.G. Signals Ltd., the technology provider, provides technical training and support to the water operators with further maintenance service of the water quality monitoring technology for sustainability of the project.

Take for example the Poplar Hill First Nation, a community of about 500 located 120 kilometres north of Red Lake and only accessible by air and winter road. Prior to their involvement in the Safe Water Project, operators had to rely on third parties to analyze the water quality with a long turnaround time. However, through implementation of the Project, operators were able to gain access to data to monitor the water quality and training to take reflective actions based on the warning signs. This proved to be critical on one occasion, when the water monitoring unit detected an anomaly in chlorine dosage. The operator received a warning message and was able to take the necessary corrective actions to bring the chlorine level back up and avoid a possible BWA.

Slate Falls First Nation is another that has benefited. Located 122 kilometres north of Sioux Lookout, the community is currently undergoing construction of a new water treatment plant. Taking this matter into consideration, we decided to deploy a water monitoring unit in a temporary location until the construction is completed. Through early deployment, the Slate Falls First Nation community was able to shorten the adaptation period of the water quality monitoring system and allow for a smoother transition when installing the additional component in the newly built facility.

Having access to safe drinking water is a right and we imagine a society where all the First Nations communities in Canada will have full capability to control and maintain safe drinking water. WC

Hannah Song is part of the First Nations Safe Water Project team.

Credit: April Bencze

λáx̌vḷsλn̓ts Mímáλuala | Standing Together

The Heiltsuk Nation pursues First Nations-led response and control to oil spills.

BY KATHERINE BALPATAKY

OCTOBER 13TH, 2016, at approximately 1:00 a.m. the rain was pouring down on the north coast of British Columbia. An oil barge and its supporting tug ran aground on a reef near Gale Creek, Bella Bella within the boundaries of the Great Bear Rainforest. Many hours passed before the spill response teams arrived on the scene, and by 9:30 a.m.—with the Coast Guard and first responders watching—the distressed barge sank and began leaking streams of shimmering black diesel fuel.

For the Heiltsuk Nation First Nation, the impacts of the spill were devastating. Standing on the shore, members of the community wept as they watched the diesel pour onto the shores of the ancient village site of Q'vúqvai and onto kelp beds and clam gardens that their ancestors had stewarded for millennia.

"That day changed everyone's life. Everyone was grieving," said Heiltsuk Chief Councillor Marilyn Slett. "Gale Creek is where we harvest food for the community. It's the site of one of our ancient tribal groups. It's where our people go for ceremonial practices." The event had a polarizing for the community. During the event and the year that followed, Chief Slett said that the government refused to cooperate with community members by providing answers as to what events led to the accident that occurred within their territory. "We needed to conduct our own investigation into what happened for our community members," she said.

When the investigation report was

Left: The Nathan E. Stewart barge after it sunk.

Right: Visual evidence of the diesel spill in an area known for its abundant marine biodiversity.

released over a year later, it noted that the barge had run off course. First responders' comments documented the scene as one of confusion and "chaos." For example, they were ill-equipped with vessels and equipment to get into the affected area, radio communication broke down, and they lacked instructions about how to deploy the boom or use the oil spill response materials; there was a great deal of uncertainty over who had authority to do what; and to make matters worse, the wind and tide posed challenges. The barge was sinking, and they had lost control.

As early as 2010, the Heiltsuk had joined a coalition of First Nations, commercial fishing, and environmental groups who called on the federal government to ban oil tankers from the region. They warned that it was only a matter of time before a ruinous spill would occur. As the Heiltsuk have never surrendered their rights to the territory, they defend that they were never consulted about the Nathan E. Stewart barge transporting oil within the area. They responded to the spill by taking legal action to recover damages suffered by members for loss of commercial harvesting of marine resources and infringement of their rights. However, they also want to take matters in their own hands should the next spill occur by putting a truly world class marine oil spill detection and response system in place.

> When the Nathan E. Stewart oil spill happened last year, we experienced first-hand what passes for a "world class" spill response.

World class spill response

"When the Nathan E. Stewart oil spill happened last year, we experienced first-hand what passes for a 'world class' spill response," said Chief Slett. "We waited for hours for a team to arrive, only to have them deploy defective equipment, in unfamiliar conditions, without safety gear or training for volunteer responders. As our community's economy, environment, and way of life hung in the balance, we

All Photos: April Bencze

Community members of the Heiltsuk First Nations protest oil tanker traffic in their territory.

promised ourselves this would never happen in our territory again."

In a report commissioned by the Heiltsuk entitled, Creating a World-Leading Response Plan, the nation has put forward a plan for how a newly-created Indigenous Marine Response Centre (IMRC) that would improve marine safety and safeguard the marine environment; and unlike typical spill response for the central coast, the IMRC would proactively respond to a wide variety of marine incidents that could lead to damages before a spill occurs. The study estimated that this kind of response model could enable response crews to reach 100 per cent of incidents in the study area within five hours or less, travelling at 30 knots from Bella Bella.

> Heiltsuk have been protecting our territory since time immemorial. This proposal is a natural evolution of that work, and builds on the best available local knowledge and technology.

It's a persuasive argument, given that approximately three incidents occur per month in the area, with 80 per cent of all incidents to date having occurred within Heiltsuk Territory. At the time of writing, the community suffered an additional blow when the Jake Shearer, carrying 3.5 million liters of diesel, came dangerously close to another spill.

Stewards of the water

"Heiltsuk have been protecting and stewarding our territory since time immemorial," said hereditary Chief Harvey Humchitt. "This proposal is a natural evolution of that work, and builds on the best available local knowledge and technology. We look forward to implementing this with the support of all other levels of government and our neighbours. We do this not only for Heiltsuk, but for all who travel within and through our territories."

When the Heiltsuk commissioned the report, the involved experts in marine safety and engineering to ensure that it was consistent with the priorities outlined in the federal government's 2016 Canada's Oceans Protection Plan (OPP). In particular, the IMRC plan shares the OPP's focus on Indigenous-led responses and dedication to "a world-leading marine safety system that improves responsible shipping and protects Canada's waters, including new preventive, and response measures."

Chief Councillor Slett personally delivered a copy the report to Transport Canada offices, and spoke to Minister Garneau on Monday, November 28, 2017 when it was delivered. At that time,

environment. The recommendations are based on the likelihood and distribution of various types of marine incidents on the central north coast and best spill response practices around the world. Specifically, the report recommends that the IMRC would be located in Heiltsuk territory where 80 per cent of incidents in the study area occur; it would be staffed by trained crew familiar with the local

Garneau expressed interest in the report. Now, they wait.

The report states that an initial $11 million would be needed to launch the Response Centre. If received by January 1st, 2018, their hope is to have the IMRC base operations, fleet, and crew up and running by summer 2018. Water Canada reached Transport Canada by email for an update on the status of the decision. Media relations officer, Julie Leroux offered the following response:

"The Government of Canada has received a copy of the report and we will review it as part of our commitment to create a world-leading marine safety system. Collaboration with Indigenous peoples is vital to protecting Canada's coasts and waterways, and the Government of Canada wants Indigenous peoples to play an active role in marine safety.

Through the Oceans Protection Plan, the Government of Canada is committed to working with North and Central Coast First Nations, including the Heiltsuk, to ensure a meaningful role in emergency response and waterway management that protects all communities and livelihoods, while addressing concerns about marine shipping. Measures taken as part of the Oceans Protection Plan will help guard against marine incidents like the Nathan E. Stewart. For example, The Canadian Coast Guard will create 24/7 emergency management and response capacity within the Regional Operations Centre in Victoria to better plan and coordinate effective response during an incident. In addition, the Coast Guard will establish six new radar stations, modernize emergency response equipment, increase tow capacity—including tow kits on existing large vessels and two leased towing vessels capable of towing commercial tankers and container ships—and establish a new emergency response depot in Port Hardy.

With pending investments in tow kits, the acquisition of two large rescue tugs, and the opportunity to work with Indigenous peoples to set appropriate response standards and capabilities, there will be even more capacity to respond to incidents like the Nathan E. Stewart on the coast."

On November 26, before Transport Canada could finish its review of the report, another fuel barge, the Jake Shearer, ran aground within the territory. Thankfully, a nearby tug was able to assist with a tow and pull it out of distress.

"We'll be relieved to see this vessel out of Heiltsuk waters, and we intend to make sure other vessels like it are regulated out of our waters for good," said Chief Slett. "Indigenous communities bear the highest risk from marine shipping incidents, and it's time for our deep local knowledge and stewardship ethic to drive marine emergency response in the region." WC

Katherine Balpataky is Water Canada's editor.

Credit: Beth Lorimer

Participants taking to the woods for a walking reflection at the Crieff Hills Retreat and Conference Centre south of Guelph, Ont.

Nibi, Gizaagi-igo
Water, we love you
Gimiigwechiwenimigo
We thank you
Gizhawenimigo
We respect you

Nibi Nagamowin
(The Water Song)
by Doreen Day

Water Song

Unlearning colonial geographic boundaries towards alignment with watersheds and reconciliation.

BY BETH LORIMER
AND DODIE FERGUSON

WHEN I FIRST LEARNED the Anishinaabe Water Song, I realized that I had never expressed those sentiments to water in that way, as if I was talking to another being, a friend, or a relative. The words are simple, but they convey a powerful relational connection.

In Canada, we tend to take our relationship with water for granted. We believe, incorrectly, in its abundance. We are told that our natural resources are our country's greatest strength and that freshwater is a resource to be managed and sold to keep the economy strong. By regarding water solely as a resource or a commodity, we forget its sacred properties and distance ourselves from water and the watersheds that sustain us.

Wherever we live, we are part of a watershed. However, our identity is typically not shaped by that geographic area. We identify ourselves by political boundaries—a municipality, a province, or a territory—which bear no resemblance to the natural flow of water across the land. In some cases, political boundaries have been drawn right down the middle of rivers or lakes, separating communities supported by that body of water from one another. These political boundaries were imposed on the landscape by colonial powers that ignored watershed boundaries and the way of life of Indigenous peoples. When maps were first drawn by colonial powers, they erased Indigenous presence from the land by removing Indigenous place names and, with them, the knowledge of land and water in those names.

Indigenous peoples were the first watershed protectors, and in many Indigenous teachings, water is considered spirit and a relative. At the heart of reconciliation is decolonization, a re-centering of Indigenous perspectives in all areas of society, including the environment. Activist Syed Hussan said, "Decolonization is a dramatic re-imagining of relationships with land, people, and the state. Much of this requires study. It requires conversation. It is a practice. It is an unlearning."

To Cowessess First Nation Member

Credit: Raven Cook

Chasity Delorme, Cowessess First Nation moderates a panel on threats to the local watershed in Treaty 4 Territory in Regina, Sask.

Credit: Beth Lorimer

Grandmother Dorene Bernard (centre, in black) with participants at the Reconciliation in the Watershed workshop at the Tatamagouche Centre in Nova Scotia.

Credit: Beth Lorimer

Participants offer tobacco in gratitude for the waters of Lake Wascana as part of a water ceremony in Treaty 4 territory (Regina).

Credit: Beth Lorimer

Workshop participants mapping their local watershed at the Tatamagouche Centre in Nova Scotia.

Dodie Ferguson, decolonizing the watershed extends beyond the colonial structures that created First Nations in Canada. Indigenous people recognize that all manners of life rely on water and that its security is part of the interconnected and cyclical world we inhabit. Ferguson emphasizes an often-repeated Indigenous concept: Our present-day use of water resources is a mere point in time. We should always keep the security of current resources in mind, not for our present-day use, but for that of future generations on the land we call Turtle Island (North America.) Treat the spirit of the land and water with respect and it will continue to support and care for us.

This process of unlearning is the focus of KAIROS Canada's Reconciliation in the Watershed program. A series of workshops were held across the country this fall, hosted by local partners and Indigenous leaders, that invited participants to explore ideas of decolonization and learn about their watershed. Through ceremony and discussion led by Indigenous women, participants were introduced to Indigenous perspectives on water and the environment.

At the beginning of the workshop, participants were invited to examine a series of maps of Canada and North America. One map shows political boundaries, another the five oceanic watersheds of Canada, another overlapping territories of Indigenous peoples, and so on. The maps are intended to shift our perspective and reveal different ways of understanding the place we call home.

As watersheds in Canada continue to be threatened by resource extraction, pipeline development, industrial pollution, agricultural activity, climate change, and more, the need for collective learning and action is critical. In the coming year, KAIROS Canada will continue to facilitate these conversations across the country, bringing together Indigenous voices with those who are concerned about watersheds and all the life they support. Water is the ultimate connector, as educator Denise Nadeau asserted: "It connects us to specific places, people and creatures we have not seen, life that is far away from us and life that came long before us." We each have a responsibility to honour that connection and become better relatives of water. WC

Beth Lorimer is the Ecological Justice Program Coordinator at KAIROS Canada. Dodie Ferguson was raised on Cowessess First Nation in the Qu'appelle River Watershed of Southeastern Saskatchewan within a strong, intergenerational agricultural family. She is a member of the Cowessess First Nation Lands & Resources Committee and an active member of the Canadian Union of Postal Workers (CUPW), currently serving on CUPW's National Human Rights Committee and as a facilitator of labour education programs in the Prairie Region.


The 672-megawatt run-of-the-river Mactaquac Generating Station.


Credit: Canadian Rivers Institute

They Be Dammed

Advancing the science on dam renewal.

BY ANNE LEVESQUE AND GORDON YAMASKI

THERE ARE TENS OF THOUSANDS of large hydro dams in North America, built in the 1940s and 50s, that are nearing the end of their service lives. Governments and power utilities are faced with big-cost decisions about what to do with these dams in the future.

Should they be rebuilt, refurbished, or decommissioned so the river returns to a natural state? No matter what the decision, it is a mammoth undertaking and usually contentious decision. Decision-makers must consider a wide range of potential economic, environmental, and social outcomes and impacts.

"It's an emerging field of study, dam renewal and removal," said Canadian Rivers Institute, science director, Dr. Allen Curry. Curry is the principal investigator of the Mactaquac Aquatic Ecosystem Study (MAES) on the iconic St. John River in New Brunswick. The study was commissioned by the provincial energy utility, NB Power, to inform the utility's options for the Mactaquac Generating Station, a 672-megawatt run-of-the-river hydroelectric facility that was built in 1968 and is fast approaching the premature end of its service life.

NB Power engaged the scientists at Canadian Rivers Institute to design a large, multidisciplinary aquatic ecosystem study, making it the first comprehensive study of a large dam renewal or removal project at this scale in the world. Curry and his team at the University of New Brunswick in Fredericton are developing a hub of scientific expertise that can provide energy utilities around the world with the methods, models, and scientific advice they need for infrastructure reviews and future environmental impact assessments. At the same time, the project attracts students from around the world which results in improves science-based decision-making of dam decisions globally. The CRI-developed approach intends to improve the scientific basis for decision making and the accuracy of environmental effects predictions by improving our understanding of the effects of dams in complex river systems. While this type of approach has not been used before and is not required under existing regulations, the CRI hopes that it can become standard practice in this rapidly growing industry.

"In multiple phases, we are gathering baseline river data related to biodiversity, fish passage, sediment buildup, and modelling changes to flows and consequences to the river ecosystem under a series of options such as removal, rebuild or technological upgrades," Curry said.

"This comprehensive approach allows us to predict how a river will react and make science-based advice for improving the desired option. That could mean designing and installing more effective fish passage through the reservoir during a rebuild, or predicting the return, or not, of native fish and other species with flow restoration after a removal. In a lot of ways, we are setting the stage for what's going to be tens of thousands more of these similar decisions that are going to take place."

Jeff Duda, a research ecologist with

the U.S. Geological Survey's Western Fisheries Research Centre, said there are more than 80,000 large hydro facilities in the National Inventory of Dams that are nearing the end of their life in the United States alone.

"We're talking an estimated billions of dollars to address our fleet of aging dams. In the U.S., national estimates are billions, if not tens of billions of dollars," Duda said.

Duda, who also serves on the science advisory board of the MAES project, said the research and expertise being developed in reservoir science at CRI will prove invaluable as more and more utilities are faced with tough, expensive decisions. "As a case study, I absolutely think the studies CRI is doing to determine the potential outcomes of dam renewal at Mactaquac, and the degree that decisions will be informed by the scientific studies, this whole process is very much something that could be used as a guide by other large dam projects worldwide that are having to evaluate what to do with a dam that is approaching the end of its design life," he said.

After three years of study, Phase One of the MAES project—involving the assessment of the key baseline environmental conditions and description of the environmental challenges and opportunities of the renewal or removal options—is now wrapping up.

NB Power decided in December 2016 to refurbish the existing facility under the newly-added Life Achievement Option, extending its lifespan until 2068. Curry said the refurbishment route was the most complicated of all four options in terms of sustaining a healthy St. John River, noting the St. John is the most diverse fish community on the eastern seaboard, home to 55 species of fish, including at least three invasive species and several species of concern.

He added that it's exciting for CRI scientists to be at the forefront of this important, emerging field of study, but what's most exciting for him is the legacy of the expertise being developed through this work at CRI. "While developing the science, we are also developing the specialists who will fill the jobs required to manage utilities' review processes, conduct impact assessments for regulators, and advise and oversee future removals, rebuilds or constructions," says Curry. "That's the really exciting part for me, and that's the vision behind what CRI is all about: making every river a healthy river, and training the next generation of first-class aquatic scientists who will make it happen." WC

Anne Levesque is the Canadian River Institute's Executive Director. Gordon Yamaski is CRI's Mactaquac Aquatic Ecosystem Study Project Manager.

Getting approval for onsite solutions to treat high-strength wastewater.

BY TRISH JOHNSON, ANNE EGAN, AND SIMRAN CHATTHA

WHEN YOU TALK ABOUT onsite water systems, most people think of septic tanks that cottagers use to treat wastewater. In practice, onsite systems have much greater versatility. Since some systems can treat flows in excess of 10,000 litres per day, industry and businesses are starting to turn to onsite systems as they look for cost-effective solutions to treat high-strength wastewater.

"Unserviced land is significantly less expensive than serviced land," said Michael Varty, director of environment at WSP Canada. "More and more, we are seeing low-density industrial parks making use of onsite wastewater systems. At the same time, fast food franchises are expanding into rural areas. Combined with the surge of craft beer and other similar business, there is a noticeable demand for these systems."

While this trend continues to gather speed, it remains challenging for the onsite industry to implement solutions. In Ontario, systems under 10,000 litres per day are regulated under Part 8 of the Ontario Building Code as administered through the local municipality, Health Unit, or Conservation Authority. Larger systems are regulated by the province's Ministry of the Environment and Climate Change (MOECC). This leaves a void for small-to-medium scale, non-residential wastewater systems. The Building Code provides little direction for buildings that fall into this category, said Varty. "For this reason, some regulators take a conservative position with respect to high-strength wastewater. They fall back to policies that are outdated, and that can cause challenges for the approvals process."

Collaborating for change

The Ontario Onsite Wastewater Association (OOWA) and WaterTAP's

Change Leaders Lab are working with the Government of Ontario to improve the approvals process and make space for onsite solutions. On September 21, 2017 the two organizations partnered with stakeholders to discuss challenges and the ways in which approvals could work efficiently and effectively for both government and industry.

As a next step, a representative of the MOECC suggested establishing a working group to collaboratively address ongoing concerns, including:

Clarifying the approvals process: The differences in the two approval systems can create inconsistencies in the process, and there are times when independent coordination with both systems is required. Additionally, the information applicants may be asked to provide in an application can vary depending upon with whom they speak.

Providing more information during the pre-consultation phase: Feedback on a project's design often comes after the application has been submitted, which causes delays in getting final project approval. If there is a clearer understanding of the information required during the pre-consultation phase, issues can be addressed earlier, helping to make the approvals process more efficient.

Streamlining approval timelines: Currently, the MOECC is working towards approving all onsite applications within a 12-month period. This timeline does not include the pre-consultation phase, which can add several months to the process. While the proposed one-year standard of service would be an improvement, it is still a lengthy process.

OOWA, WaterTAP, and the MOECC hope to establish a working group to address these concerns in the winter of 2018. An update on the progress of these efforts will be shared at OOWA's Annual Conference taking place from April 15–17th, 2018 in Huntsville. WC



Trish Johnson leads WaterTAP's Change Leaders Lab. Anne Egan is president of OOWA's board of directors. Simran Chattha is a content writer and strategist with WaterTAP.

We love hearing from you! Tweet us **@CanadianWater**

APPOINTED

KRISTA DERRICKSON

Krista Derrickson was recently appointed to the Environmental Operators Certification Program (EOCP) board of directors. Derrickson is a member of Westbank First Nation (WFN), and the manager of utilities at WFN. WFN is one of B.C.'s largest First Nation purveyors of water with more than 6,000 water connections on its two inhabited reserves. Derrickson held the operator/environmental officer position at WFN for just over seven years (2002–2009) before moving to Vancouver to take a position with Indigenous and Northern Affairs Canada (INAC). There, she worked on training programs for operators who work for First Nation communities throughout B.C. Derrickson helped create new training courses and managed the Circuit Rider Training program.

DIANA QING TAO

Diana Qing Tao has been appointed the new president of the Canadian Water and Wastewater Association (CWWA). Tao has 15 years of experience in the fields of wastewater, water resources, and environment, both domestic and international. She specializes in the evaluation and optimization of sanitary and combined sewer systems for wet weather management, including the controls of overflows, inflow and infiltrations, and sewer backups, notably in Winnipeg, Man., Ottawa, Ont., and San Francisco, Ca. As a senior hydraulic specialist, she masters the application of most hydrological and hydraulic software. As the director of business development at Tetra Tech, Tao is in charge of strategic planning, client management plans, market development, sales and marketing, communication, and information management.

MEHRAN ANDALIB

Stantec welcomes Dr. **Mehran Andalib** to lead the firm's wastewater engineering practice in the Northeast and Midwest U.S. and Eastern Canada. Based in Boston, Ma., Andalib is an industry leader in process analysis and optimization for municipal and industrial wastewater treatment plants, resulting in more advanced and environmentally sound operations. He brings more than 15 years of experience optimizing process and technical operations for wastewater treatment plants. Andalib's work include evaluation, diagnosis, monitoring and automation systems, mathematical modelling, and research and development.

Joining Stantec as a senior principal, Andalib is an expert in biological nutrient removal processes, mathematical modelling of biological processes, dynamic simulations, and process automation and biofilm processes. He is a registered professional engineer and a board certified environmental engineer.

DEPARTED

L-R: Ambassador for Climate Change, Jennifer MacIntyre, and Minister of Environment and Climate Change, Catherine McKenna

Jennifer MacIntyre, Canada's first female ambassador for climate change, has stepped away from her post due to a death in the family. Minister **Catherine McKenna** issued a press statement to acknowledge MacIntyre's departure and her contributions to the country.

Minister McKenna said, "I want to thank Jennifer for her amazing service. She was a very effective climate ambassador and a strong support for our government's efforts to promote climate action and clean growth in the global arena. Climate diplomacy is extremely important and we will be seeking a replacement for this position in due course."

A career diplomat, Jennifer was previously Canada's Ambassador to the Swiss Federal Council with concurrent accreditation to the Principality of Liechtenstein. The Government of Canada will seek to fill the role of Ambassador in due course.

AWARDED

TREVER ANDREW

Trever Andrew received the **Victor M. Terry** Operator Award from the B.C. Water and Wastewater Association for his demonstrated excellence in the industry. Andrew is a Water Treatment level 1 operator at Adams Lake Indian Band and a former graduate in Water and Wastewater Technology from at Thompson Rivers University. He is also the founder, developer, and CEO of Séwllkwe Tracking Solutions delivering a app which can track, graph, and document a variety of water data.

KATHERINE MINICH

EDGAR TOVILLA

Ryerson University is pleased to announce the two inaugural recipients of the Bruce Fellows in Canadian Freshwater Policy: **Katherine Minich** and **Edgar Tovilla**. Through a very generous donation, the Geoffrey F. Bruce Fellowships are designed to fund research focused on freshwater governance and policy in Canada. Each year $25,000 is awarded to fund up to two graduate student projects and Masters and Ph.D students can receive up to two years of funding.

Minich is an Inuk-born researcher who is from the community of Pangnirtung in the Nunavut Territory is investigating how to bring an Indigenous-based approach to improving freshwater stewardship and policies between the federal government and the Inuit.

Tovilla is a Ph.D student in Environmental Applied Science and Management at Ryerson University, who is researching how the public and private sectors can develop more integrated water policies that improve Ontarians' drinking water, wastewater, and stormwater systems.

For more information visit *bit.ly/RyeGeofBruce*.

SHOWCASING LEADERS IN WATER INNOVATION

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All Photos: Emily Nail (kemilynicolenail)

Kelly Drennan, Fashion Takes Action.


(L-R) Luigi Caccia, ItalDenim; Roger Williams, River Blue; Alex Penades, Jeanologia.

WEAR 2017, Toronto, Ont.

Hosted by Fashion Takes Action, the World Ethical Apparel Roundtable is the only sustainable business conference in North America to focus on the apparel and textile industries. WEAR recognizes that the global apparel and textile industry is an important one, both in terms of environmental impact and business revenue.

"At WEAR we know that sustainability is a process. There is no perfection but there is forward momentum. We envision a place for apparel and textile brands looking to improve and expand their sustainable reach to get together and really explore how we're going to actually 'do' sustainable fashion," said **Kelly Drennan**, FTA founding executive director.

This year's program included a water session, hosted by the makers of the documentary film River Blue. **Kathleen Talbot**, vice president of operations and sustainability of Reformation, a clothing brand that aims to challenge the status quo in the fashion industry, delivered the keynote.

Talbot's presentation was followed by a panel discussion about fashion's deep water impacts with **Alex Penades** of Jeanologia, **Roger Williams**, director of River Blue, **Luigi Caccia**, prsident of ItalDenim, and **Maria Westerbos** of the Plastic Soup Foundation.

All Photos: Pat Morrow


(L-R) Peter Horsethief, Living Lakes Canada's Kat Hartwig, Dr. Christopher Horsethief.


Chief Alfred Joseph, Akisqnuk band of the Ktunaxa Nation welcomes participants of the Water Data Hub Dialogue to the traditional territory at Copper Point Resort in Invermere, B.C.

Water Data Hub Dialogue Invermere, B.C.

On November 29 and 30, residents, guests, and water experts gathered in Invermere, B.C. to discuss current water monitoring initiatives and water data storage hubs used in the province Canada, and in the United States. The goal was to identify next steps towards developing a collaborative water monitoring framework and data hub for the Columbia Basin.

Hosted by Living Lakes Canada, A Water Data Hub Dialogue: Cracking the Code in 3D focused on two days of learning, sharing, and creative brainstorming amongst scientists, government, industry, community groups, First Nations, and technology experts with the goal of moving toward integrating the region's water knowledge through freely accessed open source data and applied decision making.

Shuswap Band Chief **Barb Cote** and Akisqnuk First Nation Chief **Alfred Joseph** of the Ktunaxa Nation for welcoming us to their shared Traditional Territory. A full proceeding of the dialogue including speaker presentations, breakout session brainstorming, survey results, and next steps will be available January.

Credit: BLOOM


Attendees at Sawdust City Brewing inspect the on-site treatment system.

BLOOM/Sawdust City Brewing Gravenhurst, Ont.

On September 29, more than 40 people gathered at Sawdust City Brewing Company in Gravenhurst, Ont. to recognize Sawdust as a provincial leader in water stewardship and to celebrate the installation of an innovative on-site wastewater management and treatment system. **Michael Fagan**, senior VP of BLOOM said, "What was amazing about this event is we had everybody here in the craft beer ecosystem—the industry association, craft brewers, hop growers, technology/solution providers, regulators, politicians, academia, media, and non-profits. They all heard the same message—everyone needs to be pointed in the same direction if we're going to effect change and increase adoption of innovative water solutions."

Toronto Global Forum Toronto, Ont.

More than 3,500 global industry leaders in the energy, infrastructure, manufacturing, finance, and environment sectors converged on the annual Toronto Global Forum, hosted by the International Economic Forum of the Americas. This year's theme of Redefining Globalization focused on the companies, technologies, and innovations that are changing the way business is conducted. This year's forum included a panel addressing the "global water crisis." Moderated by **Robert Sandford**, EPCOR Chair for Water Security, United Nations University Institute for Water, Environment and Health, the session explored the role of finance in redirecting water expenditures towards long-term solutions. Speakers included, **Gary White**, co-founder/ CEO of Water.org; **Usha Rao-Monari**, CEO of Global Water Development Partners, Blackstone Portfolio Company; **Galen Welsch**, co-founder/ CEO of Jibu; **Daniel Shemie**, deputy managing director, Water Funds with The Nature Conservancy; and **Samir Ibrahim**, CEO/co-founder of SunCulture.

All Photos: WaterTAP

Indra Maharjan of the Ontario Clean Water Agency speaks on creating environments that are conducive to innovation at World Water-Tech North America.


Thouheed Gaffoor of EMAGIN demystifies AI at Water Innovation in Action.


(L-R): Jeff Moeller and Melissa Meeker (WE&RF) with Dr. Peter Gallant and Rick VanSant (WaterTAP) at World Water-Tech North America, after signing an MOU.

Ontario Water Innovation Week Toronto, Ont.

From October 30 to November 3, WaterTAP hosted the second annual Ontario Water Innovation Week (OnWIN), convening water innovation leaders in Toronto, Ont. to share effective strategies and best practices, build networks, address barriers, and solve water challenges. This year's OnWIN included some 15 events and started with local focus, including several workshops, the Ontario Municipal Water Symposium, and the Water Innovation in Action conference.

The week culminated with the annual World Water-Tech North America, an international summit which brought together utilities, investors, and water tech leaders for two days of learning and networking. Highlights included workshops on net zero utilities and lift-cycle costing for water infrastructure; aspiring young innovators of the FIRST LEGO League, who worked on a hydraulics-themed robotics challenge; and inspiring remarks from the Hon. **Chris Ballard**, Hon. **Michael Chan**, and Hon. **Reza Moridi**. At the close of the week, WaterTAP signed an Memorandum of Understanding with the Water Environment and Reuse Foundation, becoming the first Canadian partner of its LIFT program.

OnWIN events attracted nearly 1,000 participants from 13 countries. Next year's OnWIN is tentatively scheduled for the week of October 22, 2018.

(L-R) Lisa Turnbull, chair of Latornell; Kim Wheately, Grandmother and Anishinaabe consultant; Kerry Ann Charles, a steering committee members from Cambium Aboriginal.

(L-R) Leona Dargis, motivational speaker and "agvocate" and Kim Wheately.

(top L-R) Nelson Switzer, Steve Paikin, Eric Hodgins. (bottom L-R) Ellen Schwartzel, Kim Wheatley, Rob de Loë.

All Photos: Latornell

Latornell Conservation Symposium Alliston, Ont.

Engaging over 760 conservation, Indigenous, academic, and business leaders, the 2017 Latornell Conservation Symposium focused on succession, the nature of change. Keynote speakers, including Anishinaabe Grandmother and consultant **Kim Wheatley**, agricultural advocate **Leon Dargis**, and **Kathryn McGarry**, Minister of Natural Resources and Forestry, dealt with the breadth of competing and sometimes complimentary interests that must be accounted for in land-use and watershed planning.

In addition to the extensive range of technical sessions, networking activities, and exhibitors, this year's event presented a lively discussion between **Ellen Schwartzel** from the Environment Commissioner of Ontario's office, **Nelson Switzer** of Nestlé Waters, **Kim Wheatley**, **Eric Hodgins** of the Regional of Waterloo, and **Rob de Loë**, moderated by TVO host **Steve Paikin**. de Loë encouraged the participants of the event to take advantage of the opportunity to provide input to the Ontario regulator of water permits to improve allocation across the province.

Theresa McClenaghan, Elizabeth May, and Marc Gaden.

The group met with Minister Catherine McKenna to discuss the proposal.

The Great Lakes St. Lawrence Collaborative.

All Photos: Patrick Doyle

Great Lakes-St. Lawrence Parliament Hill Days Ottawa, Ont.

The Great Lakes and St. Lawrence Cities Initiative, in partnership with the Council of the Great Lakes Region, the Great Lakes Fishery Commission, and Freshwater Future, held the second annual Great Lakes-St. Lawrence Parliament Hill Days in Ottawa, Ontario on November 21 and 22, 2017.

The same day that the U.S. Senate pledged its support of continued funding of the U.S. Great Lakes Restoration Initiative (GLRI), the groups met with MPs, staffers, and Minister of Environment and Climate Change **Catherine McKenna** to request Canadian federal support for a collaborative strategy to assess and accelerate Great Lakes and St. Lawrence protection.

The groups presented their Collaborative Vision and Framework Document to the Minister of Environment and Climate Change (see WC November/December for a description) and introduced the idea of a Great Lakes-St. Lawrence Task Force on the Canadian Inter-parliamentary.

Later that month, McKenna travelled to Toronto to announce $44.84 million for the Great Lakes Protection Initiative, which is part of the $70.5 million of new funding allocated for freshwater protection in Budget 2017. McKenna said, "**Mark [Fisher]**, it's funny, just last week we said that we were going to do something together. I don't think you and the Great Lakes St. Lawrence Collaborative expected that it would be quite so quick."

National Water and Wastewater Conference
St. John's, Nfld.

From November 5 to 8, the Canadian Water and Wastewater Association (CWWA) in conjunction with the Canadian Association for Water Quality (CAWQ)—which presented its water quality symposium—hosted leading industry practitioners. The conference began with a warm reception at The Rooms, the province's largest public cultural space, where attendees met and mingled, enjoying food inspired by traditional Newfoundland and Labrador cuisine (cod).

The conference proper was launched with a keynote address by **Dianne Saxe**, the Environment Commissioner of Ontario, who drove home the urgency of responding to climate change. Many discussions could be overheard throughout the week reflecting on the severity of the problem and how the water sector could respond. And respond they did, raising several thousand dollars, enough to send three operators to help the Caribbean islands rebuild their water infrastructure after the disastrous storms in summer 2017.


Mohamad Vedut, EMAGIN and Robert Haller, CWWA.

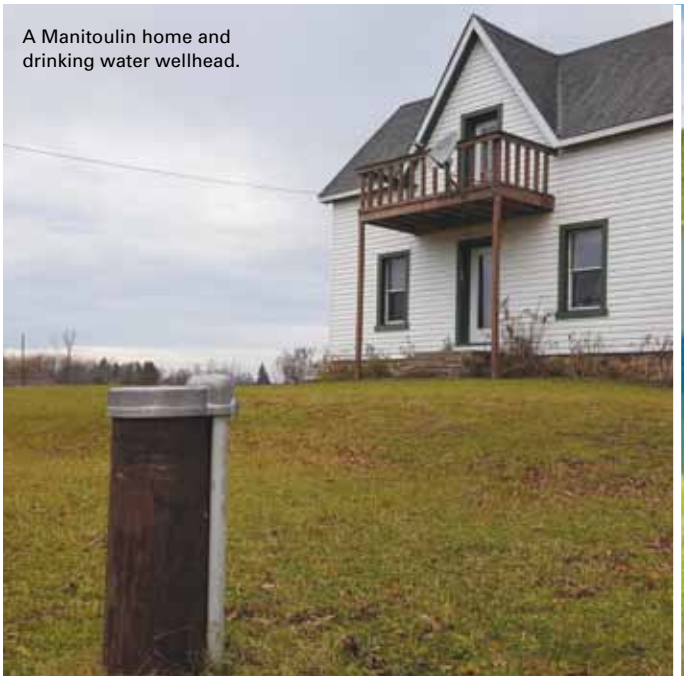
Credit: Water Canada

Water Canada's **Todd Westcott** moderated a well-received panel on communications in the sector that featured excellent insights from industry notables: **Rob Renner**, Water Research Foundation; **Mary Ann Dickinson**, Alliance for Water Efficiency; **Mike Darbyshire**, Alberta Capital Regional Wastewater Commission; and **Peter Vanrolleghem**, Laval University and Water Environment Federation.

NWWC featured over forty sessions on topics ranging from First Nations issues to biosolids, from infrastructure assessment to digital security. On the last night of the conference, attendees were treated to Rally in the Alley, participating in time-honoured Newfoundland traditions like being screeched in.

IWDA Planning Workshop
Vancouver, B.C.

The International Water Decade Alliance is a Canada-wide consortium of research institutions and related organizations that plans to jointly host the international secretariat for the new water decade (2018-2028). On November 6-7, the partner organizations and Water Canada participated in a workshop to discuss how the IWDA will serve as a platform for global dialogue on water challenges, generate new knowledge, synthesize existing scientific research to support UN member states, and engage the general public. Dr. **Zafar Adeel** of the Pacific Water Research Centre, Simon Fraser University, chaired the workshop.



Credit: Jeff Wahl

A Manitoulin home and drinking water wellhead.

Credit: I Live Here

Manitoulin Island is a Canadian lake island in Lake Huron, in the province of Ontario. It is the largest freshwater lake island in the world

Invisible Problem

Making the case for Total Dissolved Solids testing.

BY JEFF WAHL

IF A GLASS OF WATER is held up and it is colourless, crystal clear, and has no odour, would you think there is anything unsafe about the water? Total Dissolved Solids (TDS) are completely dissolved in a water supply and generally invisible to the human eye, and they aren't tested when Ontario well owners send in water samples for a Health Unit bacterial test.

In essence, TDS are comprised of inorganic salts and small amounts of organic matter. TDS are typically one or more of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, chloride, sulphate, and nitrates. They can be found in drilled or dug wells and can be influenced by agriculture, sewage, or road salts.

According to the Canadian Drinking Water Guidelines (CDWG), when TDS levels exceed 500 milligrams per litre (or 500 parts per million), the water is not recommended for drinking. While TDS may not lead to health problems, a high concentration of TDS can be used as an indicator of other harmful contaminants, such as iron, manganese, sulfate, bromide, or arsenic. This is especially true when the excessive dissolved solids are added to the water as human pollution, through runoff and wastewater discharges.

TDS are a nuisance and costly, as they can contribute to scaling in hot water tanks, boilers, tea kettles, steam irons, and plumbing fixtures, and can shorten the service life of these systems.

In the Prairie provinces, groundwater tends to have high levels of dissolved solids, because of high amounts of calcium and magnesium in the ground. In Saskatchewan, the natural levels are so high that the province chose to set its own guideline of 1,500 parts per million.

In my own hometown of Manitoulin Island, Ontario on Lake Huron, the water quality of groundwater varies by region and test results have seen TDS levels range from 50 to 17,200 parts per million. In one region of the Island, in a concentrated five-kilometer area, there were recorded levels of 5,530, 7,620, 11,502, and 17,119 parts per million. These water samples would pass the Ontario Health Unit test for bacteria, even though they fail the national recommendations.

My point is that, people trust a health unit test, whether it's part of a real estate sale or routine water testing. They are often completely unaware of the potential for dissolved solids to be present in levels not recommended for consumption.

Although there are many fast, easy ways to test for TDS—using a portable hand-held meter, taking a sample to a water treatment dealer or lab—it's not commonly done. There is even the old DIY trick of freezing a water sample, and then looking for white flaking or as discoloured white ice. This is easily spotted in ice cubes as they will shrink in size and leave white flakes in the tray.

TDS can be an indicator of other water quality problems. Testing should be regulated. WC

Jeff Wahl is the owner of Wahl Water, a water treatment company in Manitoulin, Ont.

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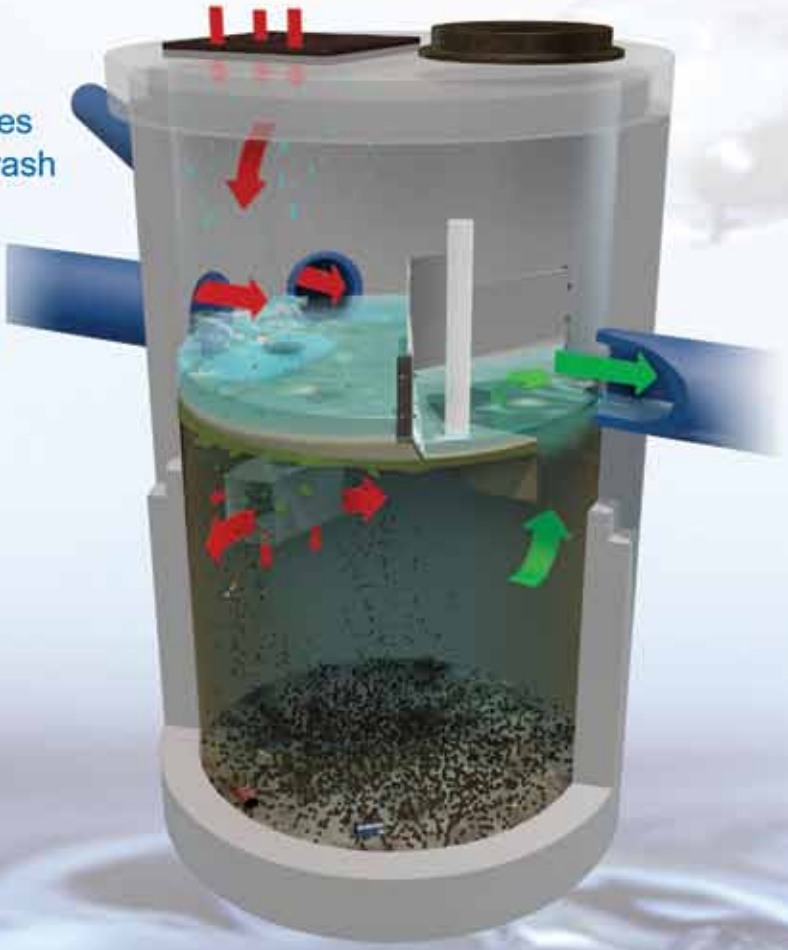

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