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HIDDEN COIN!
SEE CONTEST DETAILS ON P.5

HOW MAPS RULE THE VIDEO GAME UNIVERSE

CANADIAN Geographic

SAVING BISON

& other species
in our threatened
GRASSLANDS



Reflecting on
Métis hero
LOUIS RIEL

Climbing 101 at
MOUNTAINEERING CAMP



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TOP: MICHELLE VALBERG/CAN GEO

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FIND THE COIN CONTEST

To celebrate the June 19 launch of the 2019 Great Trail Treasure Hunt, *Canadian Geographic* has created its own treasure hunt.

Find the new *This is Canada!* coin, which features a map of Canada, in this issue for a chance to win an amazing prize from the Royal Canadian Mint. Tell us where the coin is, and find prize details and contest rules and regulations at:

thegreattrailtreasurehunt.ca/coin

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Photo by Michelle Valberg



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Climate change up close

Sail The Northwest Passage

© S. Forsyth, M. Valberg, K. Bogner, J. Kobalenko, and S. Sporleder



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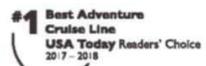
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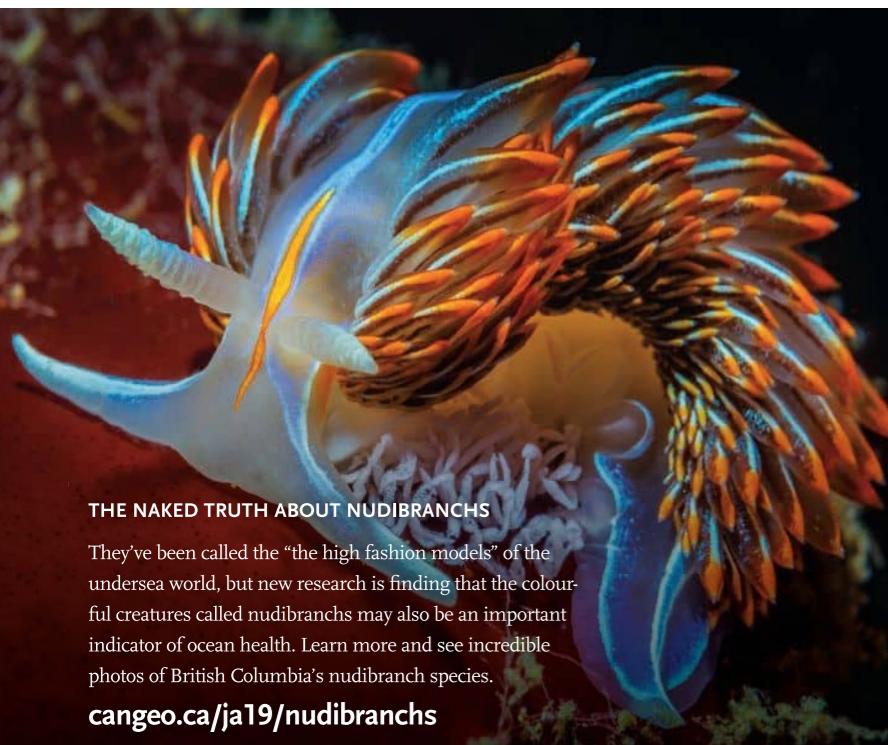
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THE NAKED TRUTH ABOUT NUDIBRANCHS

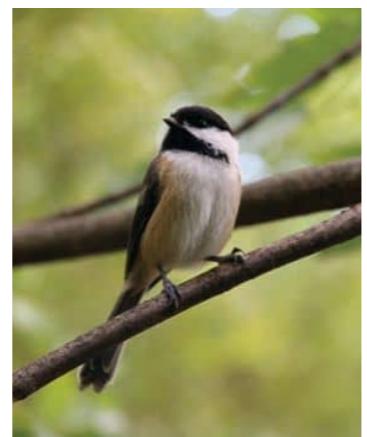
They've been called the "high fashion models" of the undersea world, but new research is finding that the colourful creatures called nudibranchs may also be an important indicator of ocean health. Learn more and see incredible photos of British Columbia's nudibranch species.

cangeo.ca/ja19/nudibranchs

BIRD ON BIRDS

Summer is a great time to spot wildlife, so we asked one of Canada's foremost bird experts, the coincidentally-named David Bird, to share 10 of his favourite birds and tips for identifying them in the wild. See his picks and the places in Canada where you can find them.

cangeo.ca/ja19/birds



EXPLORING MARS ON EARTH

Devon Island in the Canadian High Arctic is a polar desert, making it the perfect staging area for research and training for a mission to Mars. Now, a Google Earth project allows anyone to virtually explore the closest thing to the red planet on Earth.

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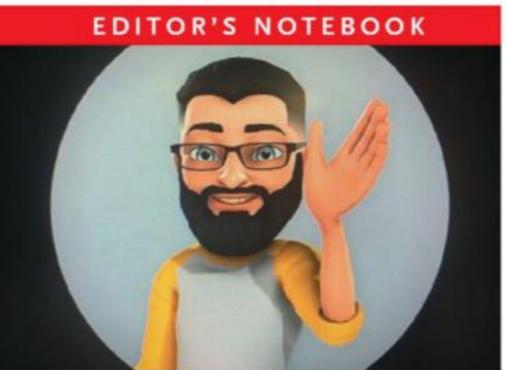


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CLOCKWISE FROM TOP LEFT: JEFF BRITNELL, JENNY CHEW, GOOGLE



Game for mapping

CONFESION: I'm a gamer (that's my strikingly lifelike Xbox avatar above). Yes, I'm a grown man. I edit a geography magazine. I appreciate literary, photographic and cartographic arts. And I love video games.

If you haven't played one lately, you're in the minority (the Entertainment Software Association of Canada reports that 64 per cent of Canadians are gamers) and you probably don't know that the aforementioned arts, and geography, are being thoughtfully combined in most games these days.

The blending of maps and video games is a story we've been keen to tell. So, when Ubisoft Quebec invited *Canadian Geographic* to Greece last fall to learn how it recreated the Aegean Sea region for its new *Assassin's Creed Odyssey* title, I dropped my controller to go.

I suspect the resulting story ("Map quest," page 42) will open eyes to how critical cartography is in video games. Montreal-based tech journalist Maxime Johnson offered a succinct example: "The map in *Fallout 76* has almost no topographic data. Since there's no step-by-step navigation, you often have to backtrack because you encounter a mountain. The game would have been more enjoyable with a better map."

Gamer or not, I'm sure everyone can appreciate that. You're also sure to enjoy the other great storytelling, photography and cartography in this issue, notably in features on grasslands (page 32), Louis Riel (page 52) and the Alpine Club of Canada's summer climbing camp (page 60). Game on!

—Aaron Kylie

To comment, please visit cangeo.ca or email editor@canadiangeographic.ca.

For inside details on the magazine and other news, follow editor Aaron Kylie on Twitter (@aaronkylie).

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PHOTO BY DAVID SAINT-JACQUES

Canadian Space Agency astronaut David Saint-Jacques glances back at Earth while conducting a 6½-hour spacewalk with NASA astronaut Anne McClain on April 8, 2019. The mission, undertaken to create an alternate path of power to Canadarm2, upgrade the *International Space Station's* wireless communications system and install equipment for a new science platform, marked only the fourth time a Canadian has walked in space.



The #ExploringEarth project uses David Saint-Jacques' from-orbit photos as scientific teaching tools. Start exploring at cangeo.ca/ja19/exploringearth.

exposure

SHOWCASING OUR PHOTO COMMUNITY



PHOTO BY MARY HINDLE

An American goldfinch perches on a sunflower in Ottawa, near the northern edge of the bird's year-round range. These vibrant, acrobatic finches are strict seed-eaters, especially favouring those from the Asteraceae family, which includes sunflowers, asters and thistles.



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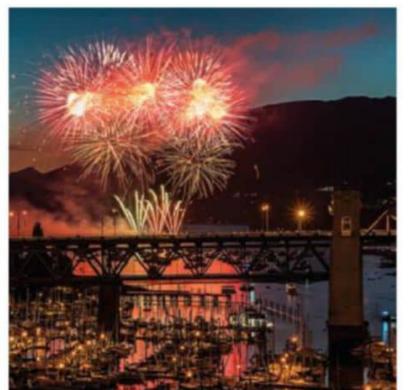
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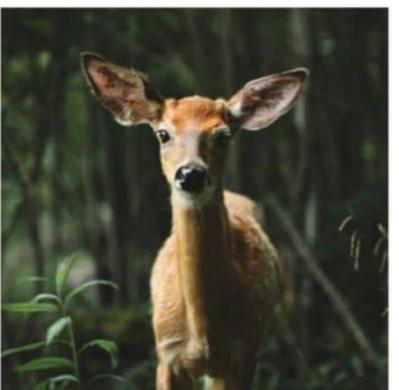
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DISCOVERY

INTERVIEW

Andrea McCrady

Canada's dominion carillonneur on keeping the bells ringing during Parliament's renovations

INTERVIEW BY KILEY BELL

From the national anthem to Leonard Cohen, Star Wars themes to Bob Dylan, Canada's Peace Tower carillon has rung out musical arrangements across Parliament Hill daily since the instrument's inauguration in 1927. Now, Dr. Andrea McCrady, the country's fifth dominion carillonneur, is faced with a new challenge — keeping the music alive while Centre Block undergoes extensive restorations over the next decade. Here, in her 11th year serving as dominion carillonneur, McCrady discusses the importance of ensuring "the voice of the nation" (as former prime minister William Lyon Mackenzie King once described the carillon) continues to ring.

On the challenges of Parliament's construction

I don't have to wear a hard hat yet, but maybe soon. Centre Block is now closed to

all but those with security clearance, so the building is very different. Sometimes it's very quiet inside, and usually only the construction workers are around. The Peace Tower elevator has always been somewhat temperamental — it dates back to a 1982 renovation. It's not something I want to be travelling alone in now, so I climb 188 steps from the Memorial Chamber up to the playing room between the upper and lower belfries of the Peace Tower. It is the lot of a carillonneur to climb towers.

On being Canada's first female dominion carillonneur

People like to say, "You're a woman, all your predecessors in the Peace Tower have been men, are you even strong enough to play that instrument?" (*The heaviest of the 53 carillon bells is 10,090 kilograms —Ed.*) At which point I say,

Andrea McCrady near the Peace Tower on Parliament Hill, where she'll continue her role as dominion carillonneur amid renovations.

"Them's fighting words!" It does not take brute strength. It takes a lot of practice and musical ear. In North America, at least half of carillon players are women. It's not quite the case in Europe, but some of the top positions there are also held by women. It's not the novelty that one might think it is — once I started teaching the carillon through Carleton University, it turned out that the majority of my students are women as well.

On keeping the bells ringing

There is a point in the next decade where the carillon will be silent. We hope only for a short period of time. Like the rest of Centre Block, the carillon and the Peace Tower are due for some major maintenance. The carillon has been silent twice before in its 92-year history: for two years from 1980 to 1982 when they were

renovating the inside of the tower, and again from 1995 to 1997, when they were renovating the tower's external masonry. Leading up to 2026, there may be a period of time when it's silent. But the House of Commons has made it very clear that the carillon will be played live on July 1, 2027, to mark the 100th anniversary of the Peace Tower and the carillon.

On making mistakes

Everything is very public on the Peace Tower carillon — from the moment I strike the key, it's live outside. I always tell my students that the most important note after you make a mistake is the next one. Just keep going. If you stop, then everybody knows you made a mistake. A musician is lying to you if they say, "Oh, I just played that perfectly." Nothing is ever perfect. It makes me nervous at times. I suffer from

McCrady sits at the practice carillon in her office in the East Block of Parliament Hill.

constant imposter syndrome — what the heck am I doing in this job? The people who came before me were such amazing players, I'm really humbled.

On becoming a Canadian citizen

There was a media feeding frenzy the moment I arrived in November 2008. I got several questions, but number one was always, "You're an American, how come an American is playing the Peace Tower?" When the previous dominion carillonneur announced his retirement, initially there was a local competition to find the next one, but no qualified Canadians applied. So, they extended the search worldwide, which is how I heard about it and won the competition. I became a Canadian citizen on Canada



Day during Canada's 150th. I had told everyone my dream was to play my program on Canada Day, descend the Peace Tower and swear in on the stage at Parliament Hill. And I did just that. 

Watch McCrady demonstrate how to play the carillon at cango.ca/ja19/carillon.



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'IT'S WEIRD SEEING A BUNNY ...

JUST KIND OF GETTING ITS HEAD RIGHT
INTO THE CARCASS OF ANOTHER
RABBIT AND CONSUMING MEAT.'

Michael Peers, a PhD student at the University of Alberta, tells the CBC how snowshoe hares in the Yukon's boreal forest scavenge meat, including the carcasses of grouse, lynx (their main predator) and even other hares. "Animals that we think are herbivores actually consume a little bit more meat than we would have otherwise suspected," says Peers.

66

The number of greater sage-grouse reintroduced to the wild in late 2018, the result of a program started in 2014 by the Calgary Zoo to boost the endangered bird's Canadian population, which has dipped below 250. The birds were introduced to Grasslands National Park in Saskatchewan and a 60-hectare conservation site in southeast Alberta.

NEON PINK

The colour of flying squirrels under ultraviolet light, as reported in a new study led by Jonathan Martin, a biologist and professor at Northland College in Wisconsin, that involved testing approximately 130 museum specimens, including two species of northern flying squirrels found in British Columbia. "Does this affect their fitness or is this just an artifact, some weird thing that happens when you live a nocturnal life?" Martin told *Victoria News*. "We don't know."



ACOUSTIC NAME TAGS

How **Valeria Vergara**, a research scientist with Ocean Wise, describes the sounds made by beluga whales to identify themselves within their pods. While belugas are known to use vocalizations including chirps, squeals and whistles to communicate in the murky waters of the Arctic Ocean and St. Lawrence River, Vergara is the first to document them using "names" and is underscoring the impacts of marine shipping traffic and noise pollution on the species.



CLOCKWISE FROM TOP: MATHIEU DUMOND/CAN GEO PHOTO CLUB; JADIN LEGATE/CAN GEO PHOTO CLUB; J. G. MARTIN/NORTHLAND COLLEGE; FROM KOHLER ET AL. 2019, JOURNAL OF MAMMALOGY

SCULPIN, NORTHERN WOLFFISH AND CUNNER

Three of the many underwater species found off Quebec's Gaspé Peninsula, the waters of which were designated a marine protected area by the Department of Fisheries and Oceans in March 2019. The 1,000-square-kilometre Banc-des-Américains Marine Protected Area safeguards the American Bank and its adjacent underwater plains from oil and gas activities, sewage discharge and grey water released from large ships.



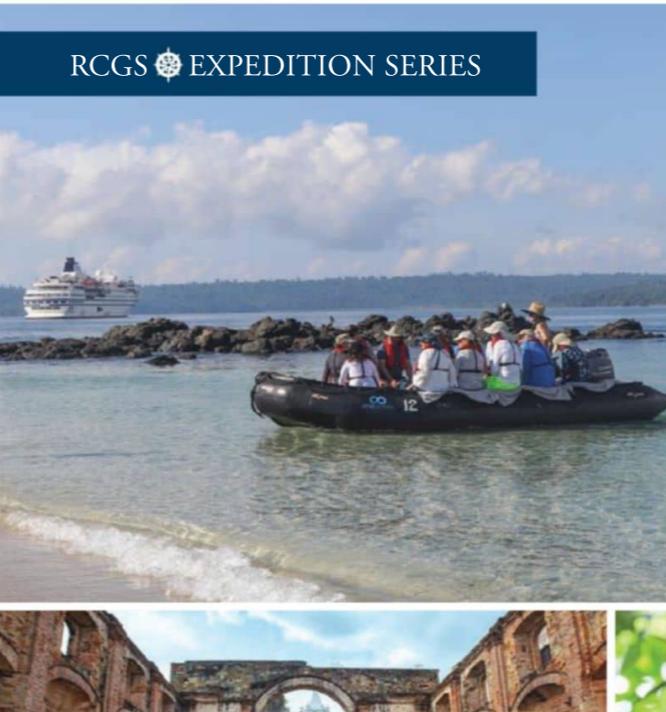
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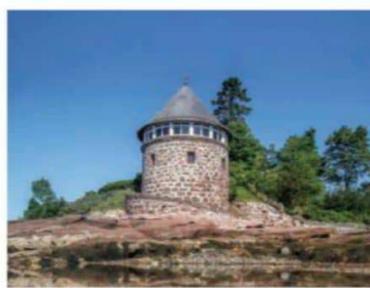
WorldwideQuest



Treasured island

New Brunswick's Ministers Island is being restored to its former glory

By Brian Owens



TWICE A DAY, as the Bay of Fundy's massive tides withdraw, a kilometre-long causeway opens up across the ocean floor, giving fleeting access to Ministers Island near Saint Andrews in southern New Brunswick.

The island is a national historic site best known as the former summer home of Sir William Van Horne, president of the Canadian Pacific Railway in the late 19th century, and the chance to visit his sprawling, mansion-like "cottage" called Covenhoven is what drew more than 26,000 people to the island last year.

But there is more to the story of Ministers Island than just Van Horne. The 280-hectare island is part of the traditional territory of the Passamaquoddy people, who used it as an important summer fishing camp for thousands of years before the arrival of Europeans. Loyalist settlers arrived in the late 18th century and the island took its current name from Reverend Samuel Andrews, the rector of Saint Andrews, who built a small house there in 1790, which still stands today. Van Horne

bought most of the island from Andrews' descendants starting in the 1890s and turned it into a summer retreat and agricultural laboratory. Eventually, the Van Horne family lost interest in the island, and the province finally took control of it in the 1970s.

This long and rich history is part of what makes the island such an inviting destination, says Brian Usher, executive director of The Van Horne Estate on Ministers Island, which administers the land on behalf of the province. "The story of the island is always changing," he says.

Usher's group has spent the past several years slowly repairing and restoring Covenhoven and recovering Van Horne's furniture and artifacts, many of which were sold off in the 1970s (luckily, a gigantic 3½-metre-long billiards table proved too awkward for its buyer to remove, and so remains on display). A \$2-million renovation of the huge cedar-shingled barn (originally designed by the famed Canadian architect Edward Maxwell), where Van Horne bred his prize-winning Clydesdale horses and

PHOTOS: TOURISM NEW BRUNSWICK; MAP: CHRIS BRACKLEY/CAN GEO

Covenhoven (LEFT), a sprawling 50-room cottage, and the bathhouse (TOP) are part of the Van Horne Estate on Ministers Island.

Dutch Belted cattle, is nearly complete and open to the public.

Now, the plan is to expand the activities available to visitors. The barn hosts musical performances most Friday evenings throughout the summer, and a craft beer festival is in the works for September. A heritage farm education program, featuring demonstrations by carpenters and stonemasons, as well as hands-on experiences of everything from beekeeping to farm-to-table cooking, are being developed. Usher also wants to find ways to tell more of the Passamaquoddy story of the island.

All that planned activity is not the only reason for a visit, however. For those who just want to immerse themselves in the tranquility of its quieter areas, the island is also criss-crossed with 26 kilometres of peaceful hiking and cycling trails, which are open year-round. Just make sure you check the tide schedule before you go to avoid an unexpectedly long stay.

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Two tales of tracking Jewish Canadians

How two academics pursued very different courses in their search for information on Canada's Jewish community

By Harry Wilson*



Louis Rosenberg's map of the percentage of Jews in Montreal's wards and suburbs in 1931 (LEFT). The bookplate and title page of Heinz Kloss's book (ABOVE).

WHEN LOUIS ROSENBERG created this map of the percentage of Jewish people in 1931 in Montreal's wards and suburbs, he was at least a dozen years into a long career that would be spent supporting and studying Jewish life in Canada. As the Jewish Colonization Association's director of farm settlements in Western Canada, he'd already helped persecuted members of his faith emigrate and begin new lives on the Prairies, and had started to collect information for *Canada's Jews: A Social and Economic Study of Jews in Canada in the 1930s*, his 448-page portrait of a diaspora struggling with its place in Canadian society, published in 1939.

Five years later, Heinz Kloss, a German linguist, published the results of his own scrutiny of Canada's Jews, as part of *Statistik, Presse und Organisationen des Judentums in den Vereinigten Staaten und Kanada*, which at 137 pages isn't as substantial as *Canada's Jews*. But then something needn't be sizeable to be sinister. And *Statistics, Media, and Organizations of*

Jewry in the United States and Canada, as the book that Library and Archives Canada purchased in June 2018 and unveiled in January 2019 is known in English, is certainly that.

To start, there's the "EX LIBRIS Adolf Hitler" stamped on the bookplate, indicating that the book came from the Nazi leader's own library. And then there's what it contains. Or rather, the *implication* of what it contains. With its lists of population statistics, its directories of fraternities, committees and congresses, and its inventory of publications such as the *Israelite Press*, the book represents the fate that could have awaited millions of North American Jews.

"This information would have been used by the Nazi regime, had they won the Second World War and taken administrative control of North America, as forming the base of the research in rolling out the final solution in Canada," Michael Kent, a curator at Library and Archives Canada, told CBC in January.

But how did Kloss, who produced official information for the Nazis, compile

such data in 1944? Kent believes he probably did so with the help of the Nazi sympathizers he knew in the United States, which he'd visited in the 1930s. Those same contacts may have provided him with the book's Canadian data, which came from sources such as the 1931 census.

Rosenberg also relied on the latter for *Canada's Jews*, which examined a community that was no longer facing murder by Nazis in Europe but was confronting anti-Semitism in Canada. Coincidentally, it was published the same year Canada reached what was arguably the nadir of its treatment of Jews: denying entry to 907 refugees fleeing Germany aboard the MS *St. Louis*, 254 of whom would be murdered in the Holocaust. ☀

*with files from Thora Gustafsson, archivist, Library and Archives Canada



Read more stories about the maps in Library and Archives Canada's collection at cangeo.ca/topic/map-archive.

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DISCOVERY

INFOGRAPHIC

Bridging the gap

After nearly four years, construction on Montreal's new Samuel de Champlain Bridge is complete

By Susan Nerberg

After 42 months, more than 9,000 concrete deck slabs and \$2.15 billion, Montreal's cable-stayed Samuel de Champlain Bridge is finally set to see traffic whiz across its 3.4-kilometre span. Connecting Canada's second-largest city to the south shore of the St. Lawrence River, it's one of the biggest infrastructure projects in North America and incorporates some of the largest span segments ever installed on a cable-stayed bridge. Thanks to a carefully choreographed assembly of mostly prefabricated components, the bridge went up like Lego blocks, and will last 125 years (demolition on the old crossing, which was built in 1962, will begin in 2020). Here's what went into the megaproject.



TRAFFIC FLOW

Vehicles made an estimated 60 million trips annually across the former bridge, making it one of the busiest in the country. The connection is also crucial for cross-border commerce. More than \$20 billion in trade between Canada and the United States, whose border is an hour south, passes over it each year. The new bridge features six lanes, a public-transit corridor and a bike and pedestrian path.



MANPOWER

The project employed some 1,000 workers, including welders, cement finishers, ironworkers, boat captains and sailors, carpenters, crane operators and steel erectors, whose work was overseen by around 300 engineers, project managers, administrators and support personnel.



FISHWAYS AND WILDLIFE HABITAT

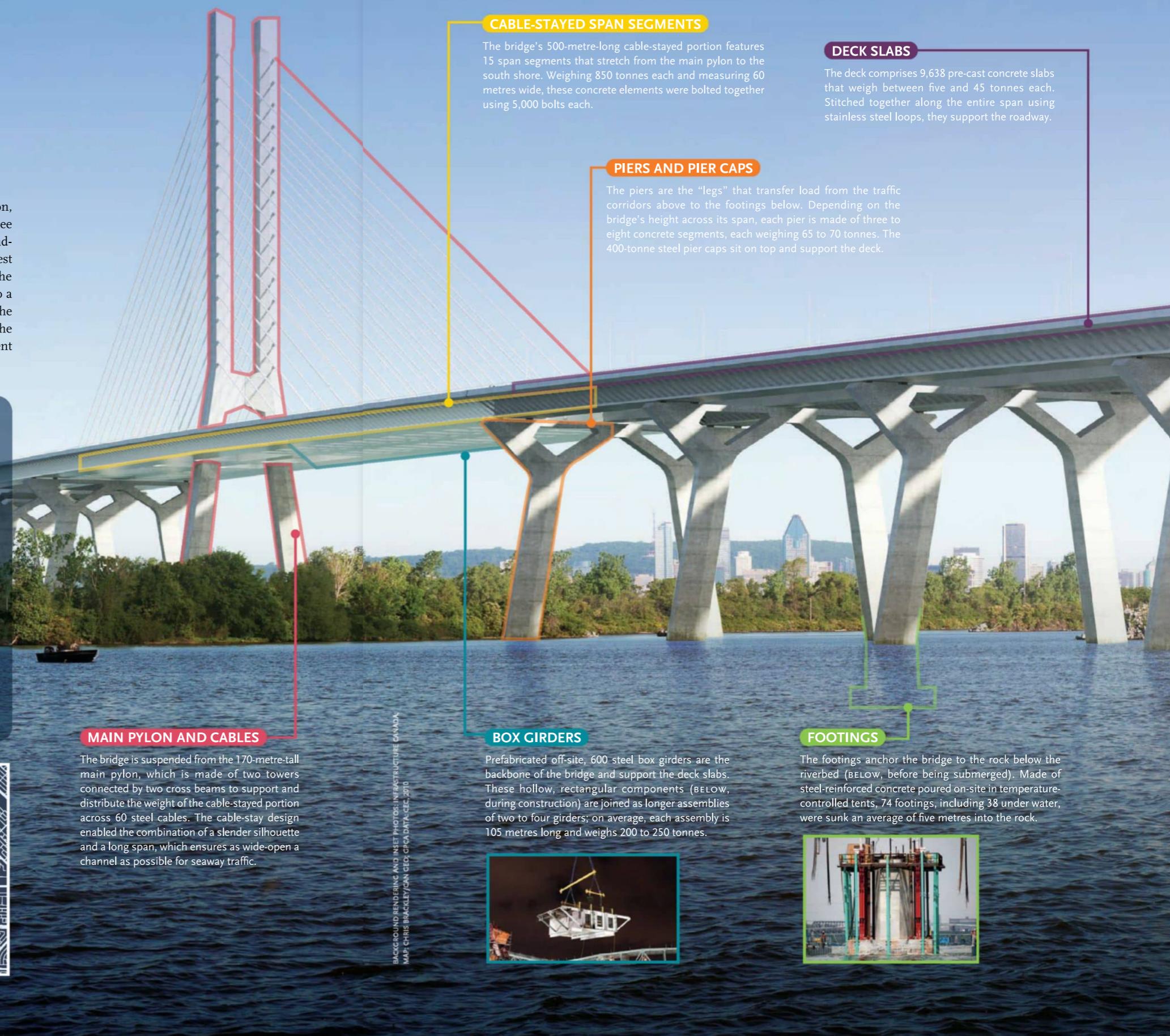
Three fishways were built to allow migrating fish to run through the work site and its temporary jetties. Underwater habitat and riparian sections disturbed by construction are being restored and expanded.



MAIN PYLON AND CABLES

The bridge is suspended from the 170-metre-tall main pylon, which is made of two towers connected by two cross beams to support and distribute the weight of the cable-stayed portion across 60 steel cables. The cable-stay design enabled the combination of a slender silhouette and a long span, which ensures as wide-open a channel as possible for seaway traffic.

BACKGROUND RENDERING AND INSET PHOTOS: INFRASTRUCTURE CANADA
MAP: CHRIS BRACKLEY/CAN GEO; CP/CANADA



CABLE-STAYED SPAN SEGMENTS

The bridge's 500-metre-long cable-stayed portion features 15 span segments that stretch from the main pylon to the south shore. Weighing 850 tonnes each and measuring 60 metres wide, these concrete elements were bolted together using 5,000 bolts each.

DECK SLABS

The deck comprises 9,638 pre-cast concrete slabs that weigh between five and 45 tonnes each. Stitched together along the entire span using stainless steel loops, they support the roadway.

PIERS AND PIER CAPS

The piers are the "legs" that transfer load from the traffic corridors above to the footings below. Depending on the bridge's height across its span, each pier is made of three to eight concrete segments, each weighing 65 to 70 tonnes. The 400-tonne steel pier caps sit on top and support the deck.

BOX GIRDERS

Prefabricated off-site, 600 steel box girders are the backbone of the bridge and support the deck slabs. These hollow, rectangular components (below, during construction) are joined as longer assemblies of two to four girders; on average, each assembly is 105 metres long and weighs 200 to 250 tonnes.



FOOTINGS

The footings anchor the bridge to the rock below the riverbed (below, before being submerged). Made of steel-reinforced concrete poured on-site in temperature-controlled tents, 74 footings, including 38 under water, were sunk an average of five metres into the rock.





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CLOCKWISE FROM TOP LEFT: SKVALA/ISTOCK; BEN POWLESS/CAN GEO; ABIN KARGARI/TECHNIKOLOR MEDIA; BEN POWLESS/CAN GEO; MAXIM FESENKO/ISTOCK; BEN POWLESS/CAN GEO; CHRIS LALONDE/PHOTOLUX



Toxin trackers

ATMOSPHERIC READINGS IN THE HIGH ARCTIC SHED
 LIGHT ON HOW FIRES AFFECT AIR QUALITY AND CLIMATE

BY JOHN BENNETT

WHEN A WILDFIRE RAGES through a forest in Northern Canada, Alaska or Russia, prevailing winds blow toxic emissions north to the Arctic. As climate change brings warmer, drier summers to the world's boreal forests, fires are getting bigger and more frequent. What does this mean for the atmosphere at the top of the world—and for the rest of the planet? Erik Lutsch, a PhD student in the department of physics at the University of Toronto, is part of a team looking for the answers.

In February, just before the sun returns to the High Arctic, Lutsch and his research colleagues fly to the Polar Environment Atmospheric Research Laboratory (PEARL) at Eureka, Nunavut. There, thousands of kilometres north of the nearest tree, Lutsch sets up the spectrometer he'll use to scrutinize the polar sunlight for chemical traces of those burning forests.

The spectrometer, the farthest north of its kind, collects high-resolution data from the infrared portion of the solar spectrum. It can take measurements well beyond the Arctic capabilities of satellites, which collect most of our atmospheric data. "The Arctic is a difficult region for satellites to measure," says Lutsch. "They generally look straight down at the Earth's surface—but snow and ice reflect sunlight and the Arctic is often cloudy, so you don't get a strong signal. Our instrument, in contrast, looks directly at the sun and provides very clear information that you couldn't get from a satellite."

Lutsch measures gases such as carbon monoxide, hydrogen cyanide, formaldehyde and ammonia, which are most abundant up to an altitude of about 10 kilometres. "These gases are associated with wildfires," he says, "and they have negative impacts on air quality."

The rooftop dome of the PEARL Ridge Lab spectrometer. The solar tracker within the dome guides light into the instrument's input window through a hole in the roof.

Lutsch and his colleagues spend most of their three weeks at PEARL working on their instruments, which will continue to operate after they leave, but they also make time to explore their surroundings. Part of Eureka's appeal, Lutsch says, is its remoteness: the nearest community, Grise Fiord, is about 500 kilometres away. "You'd think it would be quite isolating, but it's not," he says. "It's a completely different landscape, quite serene. When you're outside you hear nothing but the wind."

Lutsch's unique High Arctic data is helping researchers learn how fires affect air quality and climate. But it's also an essential link in the worldwide network of environmental monitoring by the scientists striving to understand the complex interplay of atmosphere, land, oceans, snow, ice and living organisms, and designing computer models to predict how these relationships may change in the future. ☀



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This is the latest in a blog series on polar issues and research (cangeo.ca/blog/polarblog) presented by Canadian Geographic and Polar Knowledge Canada, a Government of Canada agency with a mandate to advance Canada's knowledge of the Arctic and strengthen Canadian leadership in polar science and technology. Learn more at canada.ca/en/polar-knowledge.

ERIK LUTSCH

on the map

EXPLORING CARTOGRAPHY

Seaway celebration

At 60, the St. Lawrence Seaway remains key to continental connectivity and economies

BY NICK WALKER

On March 26, 2019, Federal Kumano exited the St. Lambert Lock across from Montreal and sailed up the St. Lawrence Seaway. The freighter, as long as two football fields, transited Lake Ontario and the Welland Canal (the western section of the St. Lawrence Seaway, proper) to Lake Erie, reaching its destination of Ashtabula, Ohio, within four days.

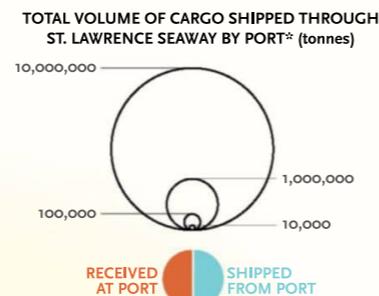
There was nothing unusual about the course, the cargo of titanium chloride or the Canadian-owned *Federal Kumano* itself, other than the fact that it was the first vessel of the 2019 season, marking the 60th anniversary of the St. Lawrence Seaway — the linchpin in the Great Lakes-St. Lawrence Seaway (SEE MAP). The megaproject, declared open on June 26, 1959, connected Montreal and Lake Ontario by a new system of channels, canals and locks, replacing an obsolete waterway built in the late 1800s and transforming the way wheat, corn, soybeans and other grains, iron products and ore, stone, road salt, cement, fuels and other products are moved between ports on the Great Lakes and the St. Lawrence and on to the Atlantic Ocean and global markets.

International and domestic politics and tensions, trade breakdowns and new alliances, booms and recessions, climate patterns and shifting global demand leave their mark in the seaway's annual cargo summaries. Tariffs imposed on Canada by the U.S. in 2018 caused steel shipments to drop, while overall tonnage hit an 11-year high, mainly thanks to a banner year for Canadian grain — the result of high demand for corn and soybeans from Europe and China, both of which had imposed retaliatory grain tariffs on the U.S. The impacts of China's March 2019 decision to boycott Canadian canola, meanwhile, are yet to be seen.

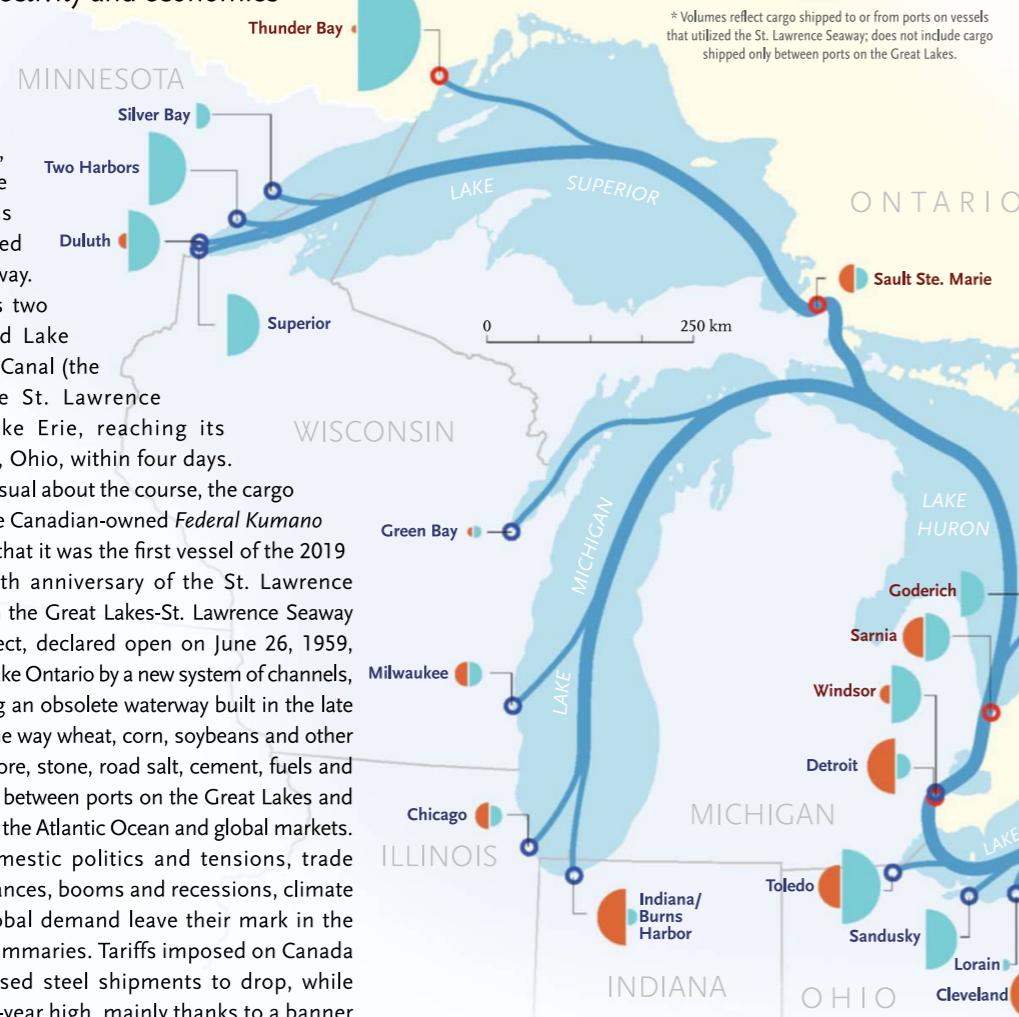
Annual transit and tonnage totals wax and wane, but North America's inland seaway remains critical to the movement of essential food products and building-block materials to and from the heart of North America. Explore the map and read on for more about our binational marine superhighway.

COMMUNITY LINKS

The entire Great Lakes-St. Lawrence Seaway connects more than 110 ports in eight U.S. states and two provinces (a selection of major ports is depicted here). The system generated \$59 billion in economic activity across the binational region in 2018 and directly and indirectly employed nearly 330,000 people.



* Volumes reflect cargo shipped to or from ports on vessels that utilized the St. Lawrence Seaway; does not include cargo shipped only between ports on the Great Lakes.



CHRIS BRACKLEY/CAN GEO; SEAWAY DATA: ST. LAWRENCE SEAWAY MANAGEMENT CORPORATION

BUILDING THEM BIGGER

The seaway's locks (15 Between Saint-Lambert, Que., and Lake Erie) accommodate vessels up to 225.5 metres long, 23.8 metres wide and with drafts up to 8.1 metres deep. As cargo capacities have been increased over the decades, ship transits have fallen. In 2018, 41 million tonnes of cargo (the most since 2007) was moved on 4,389 transits in both directions. Transits peaked in the 1960s at more than 10,000 per year, while the late 1970s saw the highest annual tonnage, at around 80 million tonnes.



CARBON CALCULATIONS

It would take 301 rail cars or 963 trucks to transport the same load as one seaway-sized vessel with 30,000 tonnes of cargo, but how do greenhouse gas emissions compare?

11.9

14.2

(19% more than ships)

75.5

(534% more than ships)

CO₂ grams emitted per one tonne of cargo transported one kilometre*

* Based on measurements taken prior to completion of ongoing seaway fleet renewal, which is predicted to push CO₂ differentials to +64% (rail) and +700% (trucks).

CARGO IN, CARGO OUT

The seaway system is served by Canadian and U.S. "lakers" transporting cargo between ports on the Great Lakes, the St. Lawrence River and Canadian coastal waters, and "salties," which are ocean-going carriers moving between North America and overseas ports. See the chart below for a breakdown of the cargo these vessels are transporting into and out of the system via the St. Lawrence Seaway, where this data is recorded as ships transit the locks.



See an interactive version of this map at cangeo.ca/ja19/seaway.



Clockwise from TOP LEFT: Brenda Peterson, whose family has ranched in Saskatchewan's grasslands for more than a century; badlands in Grasslands National Park; Samantha Fischer, a resource management officer at the park; a bison in the park's West Block.

OPPOSITE, TOP LEFT: ZACH METCALFE

Guardians of the **GRASSLANDS**

How conservationists and ranchers in Saskatchewan are working to slow the loss of an endangered ecosystem

BY KAREN PINCHIN
WITH PHOTOGRAPHY BY MICHELLE VALBERG



FORTY-FIVE YEARS AGO, Brenda Peterson, the daughter of a rancher, didn't want Grasslands National Park to exist. In 1975, standing at a packed community hearing in Mankota, Sask., the petite, just-married university student studying education, her hair a mop of chestnut curls, spoke passionately against the park. The Saskatchewan Natural History Society first proposed the preserve in the mid-1950s, and, two decades later, the provincial and federal governments were finally considering it. "I said, 'My family has looked after this place since 1911,'" she recalls. "'You think I'm just going to give it to the park? We're doing a fine job.'" But her group's protests failed. In 1981, Parks Canada and Saskatchewan signed an agreement to establish the park, and Parks Canada subsequently bought two ranches totaling 140 square kilometres in the Frenchman River area. But when conditions in the agreement about oil and gas exploration and water resource management proved to be unworkable, the

acquisition of additional park lands stopped. It wasn't until 1988 that Saskatchewan and Parks Canada revised their agreement and proceeded with establishing the park, which today is divided into the East Block and West Block and encompasses about 900 square kilometres. Almost overnight, it seemed to Peterson, parks staff posted DO NOT ENTER signs, outraging locals. "One time, they stopped my brother and said he was trespassing — on his own land," says Peterson. "The park people didn't know where the border was."

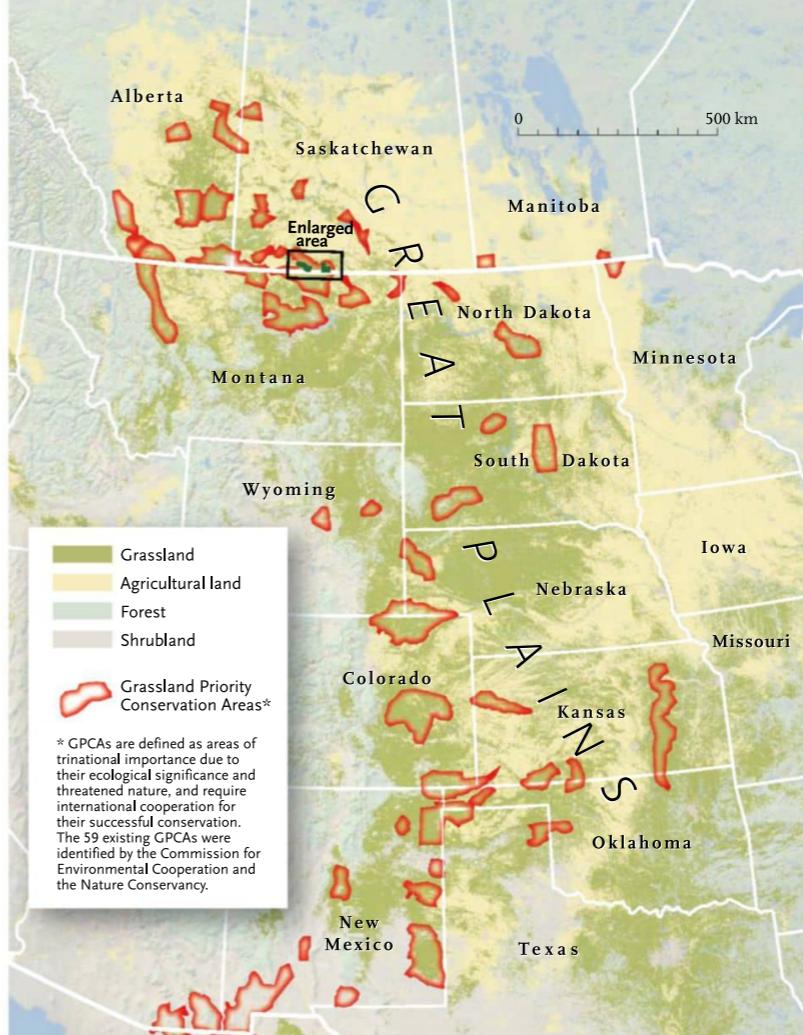
Now, sitting comfortably on horseback, Peterson, 62, overlooks her family's historical ranching lands from atop a massive ridge, the wind-whipped grass peeling down along the hillside. She squints into the sun, the horizon a sweep of greys and greens, browns and tans.

Grasslands National Park, on the west side of Saskatchewan's southern edge, represents one of the most threatened terrestrial ecosystems on the planet. For millennia, northern mixed-grass prairie

grassland, a perfectly evolved balance of short, mid and tall native grasses, banded a sweeping swath of North America, running from Alberta, Saskatchewan and Manitoba down to eastern Wyoming and northern Nebraska. But since Confederation, grasslands ecosystems in Canada have plummeted to an estimated one-quarter of their former range. It's even worse in the United States, where all but five per cent of native grasslands have been lost to agriculture and residential or commercial development. Today, 98 per cent of Grasslands National Park is critical habitat for imperilled species, including sage grouse, black-tailed prairie dogs, burrowing owls and the tiny swift fox.

Karen Pinchin (@karenpinchin) writes about business, culture, food and science. Award-winning photographer Michelle Valberg (michellevalberg.com) is a Photographer-in-Residence with Canadian Geographic.

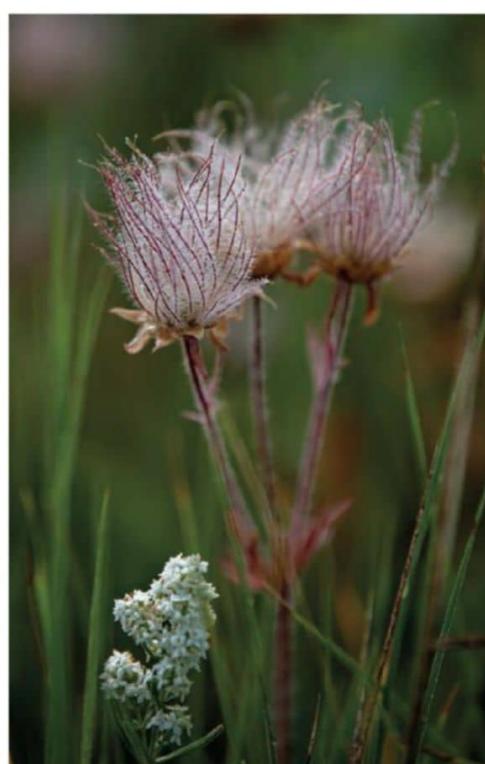
MAP: CHRIS BRACKLEY/CAN GEO; GPCA DATA: CEC 2010



For decades, community groups, biologists, researchers and park employees have raced to save this region's threatened wildlife and delicate ecosystems, claiming that human meddling — including agriculture, oil and gas development, and the introduction of invasive species — is the root of the problem. At the same time, ranching families such as Peterson's, whose cattle have grazed these rambling fields for more than a century, are frequently credited by ecologists for saving and protecting these lands.

Standing alone on the aptly named Million Dollar Viewpoint later that day, overlooking undulating grassy mountains and seemingly endless plains afire from the setting sun, I find myself wondering: once the land is broken, what does it take to fix it?

BUMPING ALONG a camel-coloured road, Samantha Fischer's pickup truck kicks up a plume of dust. Before becoming a resource management officer at



Prairie smoke wildflowers (TOP), black-tailed prairie dogs (ABOVE) and pronghorns (OPPOSITE) are just a few of the species that inhabit Grasslands National Park.

Grasslands National Park, Fischer worked as an oil and gas consultant, doing environmental assessments in Alberta. In 2013, she started a master's degree in natural resources management at the University of Manitoba, specializing in prairie birds and grasslands. She met her fiancée, a fourth-generation rancher, while working at the park, and the couple now live in nearby Val Marie.

As she drives, Fischer points out clouds of tiny songbirds flitting in the grasses



around us. "There's a chestnut-collared longspur," she says, gesturing at a blur of tiny wings, just one of the park's 26 species that are endangered, threatened or of special concern. "That's threatened."

The feeling of solitude on the grasslands, of being able to see for miles and not see a single building, is one of the remarkable things about this park, says Fischer. Instead, you might see rattlesnakes, bison (which were wiped out in the late 1800s but reintroduced to the park in 2005), black-tailed prairie dogs or dozens of rare birds. "When I first moved here and saw how many birds there were, I couldn't even understand," she says. "They were flying off the road in front of my car, and I was like, 'What is this place?'"

Since the retreat of the glaciers, Indigenous groups, including Gros Ventre, Assiniboine, Cree, Sioux, Blackfoot and, eventually, Métis, lived here seasonally, travelling in pursuit of bison and elk. Their archeological record includes campsites, vision quest sites, medicine wheels, lanes used for driving bison and more than 12,000 teepee rings. After the 1876 Battle of Little Bighorn against Lt.-Col. George

Custer and the American cavalry, Sitting Bull and 4,000 Lakota Sioux settled here. As the bison dwindled, with the last recorded hunts in the late 1880s, so did the region's Indigenous communities.

In the 1800s, an influx of Métis and ranchers flowed into this region, which was widely regarded as Canada's last frontier, followed by waves of immigrant families. The latter were drawn by cheap land

SINCE CONFEDERATION, GRASSLANDS ECOSYSTEMS IN CANADA HAVE PLUMMETED TO AN ESTIMATED ONE-QUARTER OF THEIR FORMER RANGE.

and the promise of a fresh start offered by the Dominion Lands Act of 1872, which had been passed to encourage settlement and prevent the United States from claiming territory. The federal government encouraged these new Canadian homesteaders to "break the land" — and they did. Relations between farmers and local ranchers quickly soured, aggravated by

Meredith Hebb, a Parks Canada heritage presenter, in the park's East Block (ABOVE), also home to rocky badlands (OPPOSITE).

relentless dust storms, roaring gales and punishing winters. Grasslands' dry, inescapable winds evaporate water from this land faster and in greater quantities than the sky provides it, leaving it drier than almost any other place in Canada. Without

grass to hold it down, soil simply dries out and blows away. "I leave to each and every Mossback [farmer] my perpetual curse," wrote one veteran rancher in his early 1900s will, referring to the tension between the two groups. "As some reward to them for their labours in destroying the Open Range. By means of that most pernicious of all implements, the plow."

Within decades of opening the grasslands to widespread agricultural development, it was clear the government had made a big mistake, wrote historians D.M. Loveridge and Barry Potyondi in *From Wood Mountain to the Whitemud: A Historical Survey of the Grasslands National Park Area*, their 1977 survey of the proposed national park. "Its initial victim, the small ranchers, had to



pay the price a second time, during the [droughts of the] 1930s."

Herein lies the astounding irony, says Fischer. "What makes this place cool is that it was preserved because it was a working landscape," she says. "Ranching is the reason that these huge tracts of native prairie stayed in this area." Still, it took decades for relations between Parks Canada and locals such as Peterson to thaw. Starting in 1984, Parks Canada began buying lands from private landowners using a willing-seller-willing-buyer policy; if a rancher or farmer wanted to stay on his or her land, Parks Canada would wait until they were ready to sell. Parks Canada now owns 96 per cent of the West Block and 61 per cent of the East Block; private landowners hold the remainder. In 2001, Grasslands formally became a national park, and in 2009, the Royal Astronomical Society of Canada declared it a Dark-Sky Preserve, one of only 22 across the country. This remains one of the largest, quietest and darkest protected places in the world.

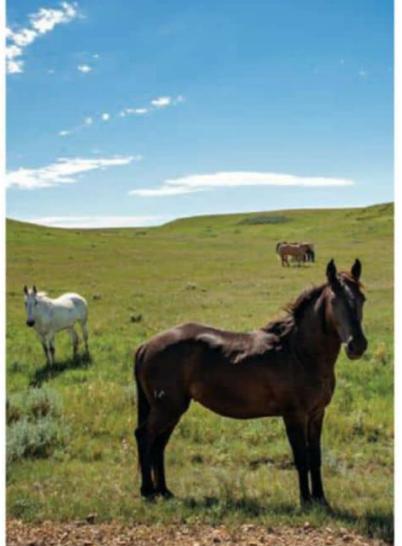
LATER THAT AFTERNOON, I join Fischer and Shelly Larson, a Parks Canada visitor experience manager, for a half-hour hike up 70 Mile Butte, on the West Block's westernmost edge. As we ascend, a ceiling of pebbly clouds drifts over the mottled, sweeping valleys below. From the top, viewed from the strangely level summit, the horizon seems to

on privately owned land. "All this grass has roots that go down so deep that it's storing immense amounts of carbon," says Fischer, a pack slung over her shoulders. "If you plow that up, all that carbon is released, all that potential storage, and all that stability from flooding... there's an intrinsic value to this landscape, and if we don't protect it, it's not going to be here."

Larson, who works primarily in the West Block, married into a prominent ranching family from the area. Her work is about protecting this land, she says, not preserving it in amber. She points out the nearby Two Trees day-use area in the distance, using its large trees — unusual on the grasslands terrain — as a landmark. As it builds additional infrastructure and tourist facilities, Parks Canada is trying to develop visitor-friendly areas and interpretive sites on already disturbed land; Two Trees was once a privately owned homestead.

"If this hadn't been farmed, this wouldn't be a park today," says Larson, as we descend, our view a crumbling valley of bearpaw shale. A handful of

WHAT MAKES THIS PLACE COOL IS THAT IT WAS PRESERVED BECAUSE IT WAS A WORKING LANDSCAPE. RANCHING IS THE REASON THAT THESE HUGE TRACTS OF NATIVE PRAIRIE STAYED IN THIS AREA.



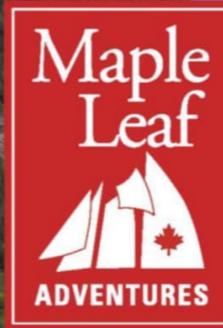
verdant farms sprawl in the distance, mostly growing forage for the region's \$5-billion cattle industry. In the distance, the south-flowing Frenchman River, part of the Missouri River system, weaves a meandering trail. Walking along a path beaten to bare rock, small, bushy pasture sage lines our way, a natural border for a carpet of wispy June grass beyond.

IN 1994, almost two decades after she spoke out against the park, Brenda Peterson and her husband reached a deal with Parks Canada. They traded their family's land inside the park for land outside, on its northern edge. "Time heals," she says. "The park wasn't going to leave, so it was wise to grow our ranch with the park as a neighbour."

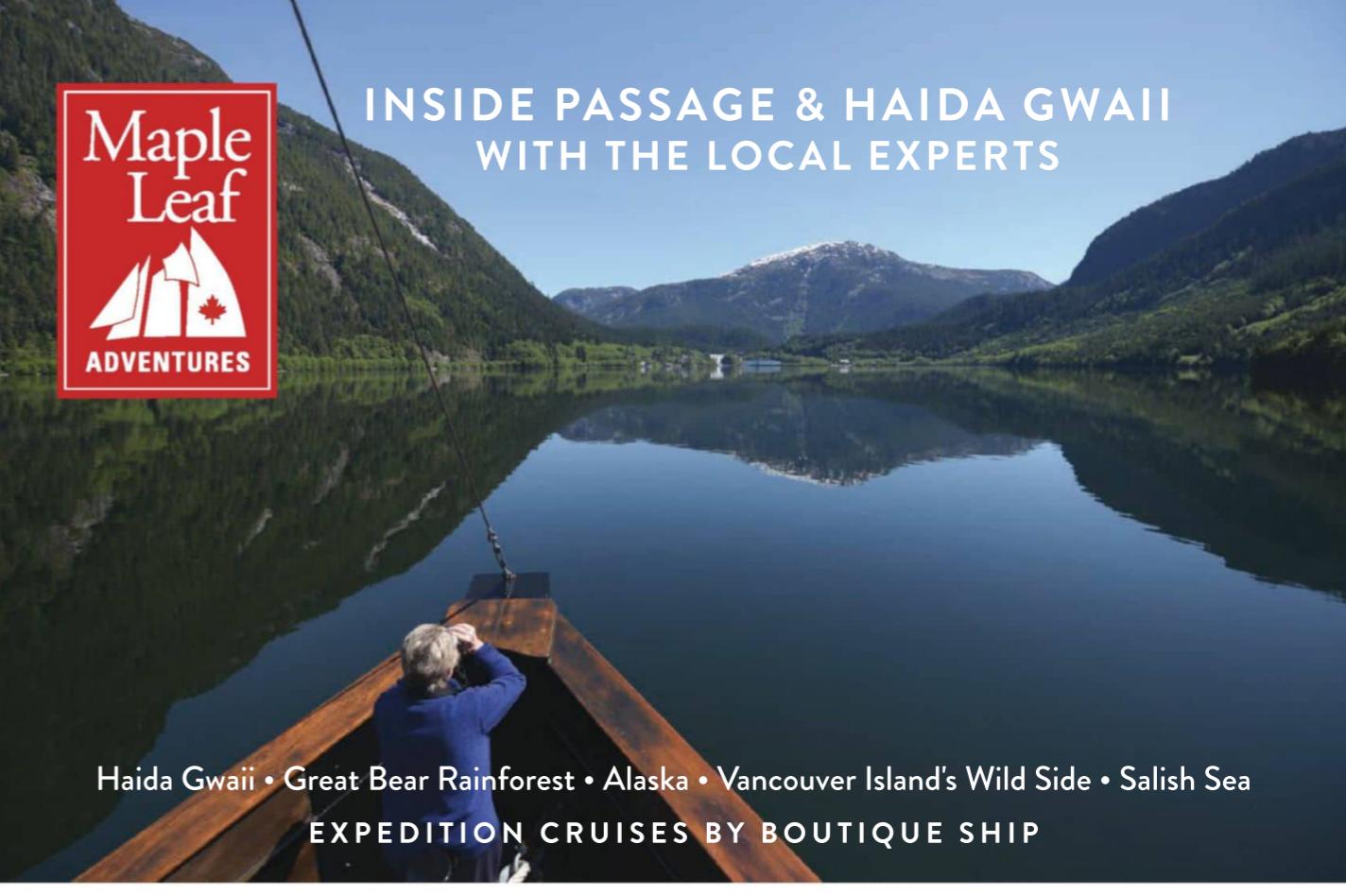
TIME HEALS. THE PARK WASN'T GOING TO LEAVE, SO IT WAS WISE TO GROW OUR RANCH WITH THE PARK AS A NEIGHBOUR.

early spring and very late fall, are part of the park's management plan. But unplanned fires — sometimes caused by people, the rest of the time by lightning — are frequent here; Peterson says they fought one last year for 10 days. "The first day of the fire we were here, the campground was full," she says. "We got it, but boy, what a fire. It burnt three miles wide and eight miles long."

See more images of Grasslands National Park at cangeo.ca/ja19/grasslands.



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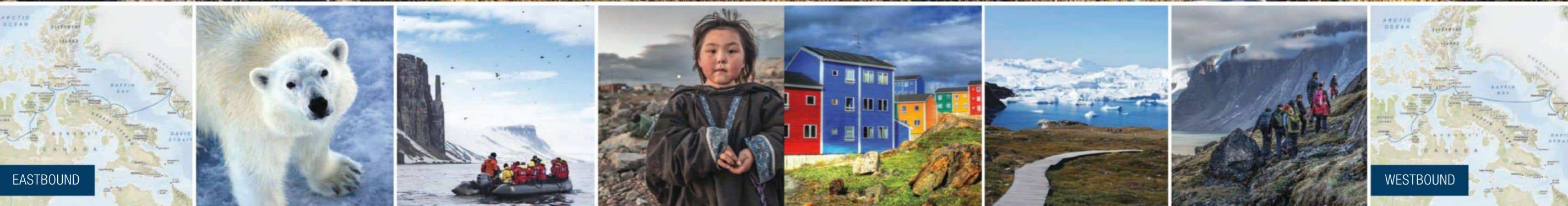
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A scene from the made-in-Canada video game *Assassin's Creed Odyssey*, which showcases the detail with which the landscape was recreated using real-world maps.

—MAP— QUEST

Exploring the amazing cartographic connections behind video games

BY AARON KYLIE



“ I wisely started with a map, and made the story fit. ”

—J.R.R. Tolkien



Odyssey recreated the Aegean Sea region, complete with fifth-century trireme warships (THIS IMAGE), and the game's map (OPPOSITE RIGHT) was designed to appear very similar to a real map of the area (OPPOSITE LEFT). A key difference? Urban areas (pink) are much larger than in reality.

G

UIDE KASSANDRA steps off a reconstructed trireme warship onto a wharf at the Port of Piraeus in Athens, Greece. The wooden vessel with bronze ram at the bow is powered by 170 oarsmen. Such ships were commonplace in the fourth to seventh centuries BC at the port, which has served Athens since ancient times.

Kassandra, decked out as a fifth-century mercenary, doesn't break character to reveal her last name. She walks along a series of straight, cobblestone streets, passing wooden carts filled with bundled sacks, a blacksmith tending his anvil and ladies making rope amidst the sounds of lapping waves, the distant ringing of buoy bells and gulls squawking. As she reaches the city's marble district, artisans re-enact shaping slabs of white marble into statues of celebrated warriors. "They truly are masters of their craft," says Kassandra.

"Thank you, Kassandra," quips Benjamin Hall, as a crowd watching Kassandra's tour on a big screen behind him in a meeting room at the Wyndham Grand Athens hotel breaks into laughter. Like Jim Carrey's Truman Burbank in the 1998 film *The Truman Show*, Kassandra has no clue she's the main character in a simulated reality. Today Hall, the Canadian-based world director of the video game Kassandra stars in,

Assassin's Creed Odyssey, is playing puppeteer with an Xbox One controller.

"The Piraeus was built using the Hippodamian style of urban design, the grid layout that's very common today in North America," says Hall. He's the mastermind behind this historical fiction game's recreation of ancient Greece circa 431 BC during the Peloponnesian War, and is showcasing the extraordinary efforts his Ubisoft Quebec team went to in designing the world, its cities, its architectural styles and its map — which at a glance appears identical to a real chart of Greece — for a group of journalists.

"We tried to accurately depict many of the different cities, villages and sanctuaries of the world," says Hall, "but in a way that makes it interesting and fun and easy to learn to play." To do so, he and his team create sets of basic maps for such areas and then drop them into their virtual world.

Maps have long played a critical role in video games, whether serving as the primary user interface, a player reference tool or both. This virtual cartographic world (and its remarkable Canadian connections), however, remains widely unheralded, even as mapping has become increasingly important to many games.



"SOMETIMES THE MAPS represent the actual locations, sometimes made up places, but they always contain a graphical language specifically designed to fit the overall tone of the game," wrote Spanish architects Enrique Parra and Manuel Saga in "Cartography in the Metaverse: The Power of Mapping in Video Games," a blog published in March 2016.

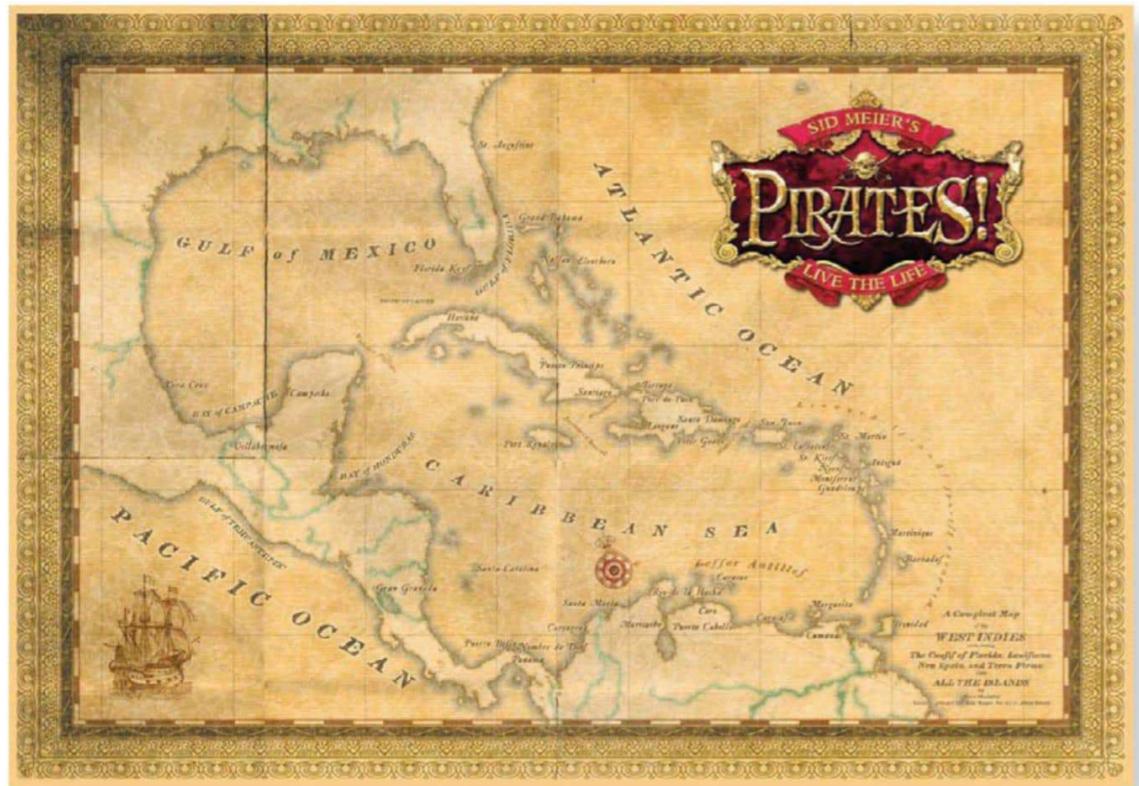
Maps have long played a critical role in video games, whether serving as the primary interface, a player reference tool or both.

"Someone who has experience in video games also has experience in how their spaces are represented," the article concludes. "This brings cartographic and architectural language closer to the general public than ever before."

Be they old-school two-dimensional environments (think *Pong*) or modern 3D worlds, spatial awareness in a virtual realm is a necessity for playing most video games. And as games advanced from

PREVIOUS SPREAD, OPPOSITE PAGE AND MAP THIS PAGE: UBISOFT; MAP THIS PAGE, LEFT: CHRIS BRACKLEY/CAN GEO





their infancy in the 1970s, so too did the need for players to be able to understand their simulated environments.

In the earliest days, many gamers filled the void of in-game wayfinding by creating their own maps. And even as designers began to include basic maps in games, players continued to create their own charts. Some 40,000 such cartographic creations for more than 2,000 games are collected on VGMaps.com: The Video Game Atlas.

The site's Edmonton-based founder, Jonathan Leung, 39, points to user creations such as those for *Super Metroid* and *Castlevania: Symphony of the Night* as particularly impressive, noting they're more useful than in-game maps. Why? They convey in great detail the entirety of the small segments of two-dimensional space players see in a style similar to that of a mall directory map.

Most experts acknowledge the charts in the titles above among the industry's early mapping milestones. Other cartographic evolutions in gaming often occurred in conjunction with new

genres, such as the early role-playing games, or RPGs, of the 1990s.

"The original *Pirates!* [designed by Sid Meier, a Canadian] was very interesting because it came with a physical map that you had to use to take in-game measurements to actually understand where you were," says Konstantinos Dimopoulos, 40, a self-described game urbanist and designer who's just completed the manuscript for his book *Virtual Cities: An Atlas & Exploration of Video Game Cities*.

Based in Athens, Greece, Dimopoulos has a PhD in urban planning and geography and a master's degree in urban and regional planning, making him uniquely qualified to share insights on mapping in video games. Dimopoulos's list of games with revolutionary mapping approaches is akin to a reader's list of classic literature: *Final Fantasy*, a 1987 RPG that was one of the first games to incorporate a map of its world similar to a real-world map; real-world location games such as 2000's *Deus Ex*, the most recent sequels of which are produced by Eidos-Montréal

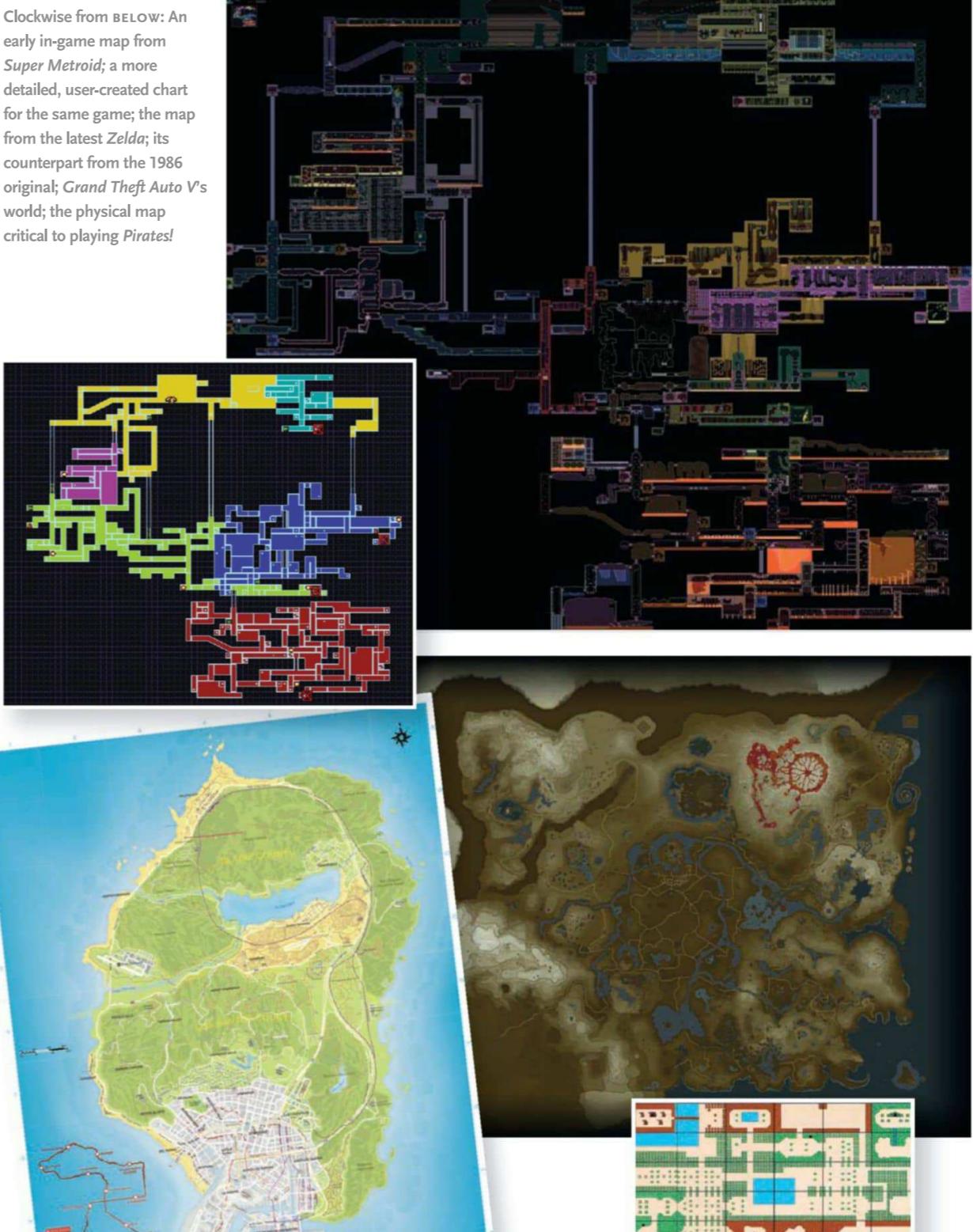
and contain detailed site-plan maps of each level; and so-called sandbox games, where players can move nearly unfettered in large 3D worlds, such as the *Grand Theft Auto* series, which was first released in 1997 and sees players use GPS-like navigation to pinpoint their location and allow them to plan routes from point to

'The original *Pirates!* was very interesting because IT CAME WITH A PHYSICAL MAP that you had to use to take in-game measurements to actually understand where you were.'

point. He also highlights Meier's strategy game *Civilization*, where players could customize their map of Earth as they built their own civilization.

Dimopoulos is particularly fond of Nintendo's *Zelda* series, an early RPG famed among cartography-crazed gamers since the original debuted in 1986. "The latest *Zelda: Breath of the Wild* is interesting in the way it guides you around the

Clockwise from BELOW: An early in-game map from *Super Metroid*; a more detailed, user-created chart for the same game; the map from the latest *Zelda*; its counterpart from the 1986 original; *Grand Theft Auto V*'s world; the physical map critical to playing *Pirates!*



Aaron Kylie (@aaronkylie) is editor-in-chief of Canadian Geographic.

map," he says, noting that players can use the map for traditional navigation, including adding custom markers, but also to search out and explore intriguing geographic shapes. "It's amazing how they've applied Lynch's ideas on mental map creation in a non-urban environment," says Dimopoulos in reference to noted American urban planner Kevin Lynch.

He's similarly impressed with the aforementioned *Assassin's Creed* series. "They've managed to more or less convincingly reconstruct everything from London to ancient Athens to Florence," he says. "They're *really* good at that."



"WE MUST COME together now for the glory of Athens!" implores Greek statesman Perikles to a toga-clad crowd of about a dozen as guide Kassandra looks on.

"Glory for you!" barks a bystander hurling a tomato toward the stage. The glorious monuments of the Acropolis, the building of which were led by the real Perikles, loom in the background.

"The Parthenon is glorious, Perikles, but at what cost? How many triremes could we have built instead?" counters Kleon, an Athenian general at Perikles' side.

The scene plays out atop the Pnyx, a rocky outcropping in central Athens that's regarded as one of the earliest and most important sites in the creation of democracy. It's just one of 50-plus real-life historic sites recreated in painstakingly accurate detail for *Assassin's Creed Odyssey*.

The action RPG for home consoles, released by Ubisoft Quebec in October 2018, nabbed numerous best-of-2018 video game award nominations. (Its fore-runners have combined to sell more than 125 million copies since the original debuted in 2007.) Beyond its renowned

historical reconstructions, the franchise is also famed for its open-world environments. *Odyssey* has recreated an approximately 250-square-kilometre area of the Aegean Sea region.

"The maps are the most important thing," says Hall about creating any video game, a comment echoed by most game designers. "One of the physical objectives," he continues, "was to create a game world that had a recognizable footprint from a bird's-eye perspective, from the unmistakable hand-shape of the Peloponnese to the cove of Salamis to the peninsula of Attica to the trident of Macedonia."

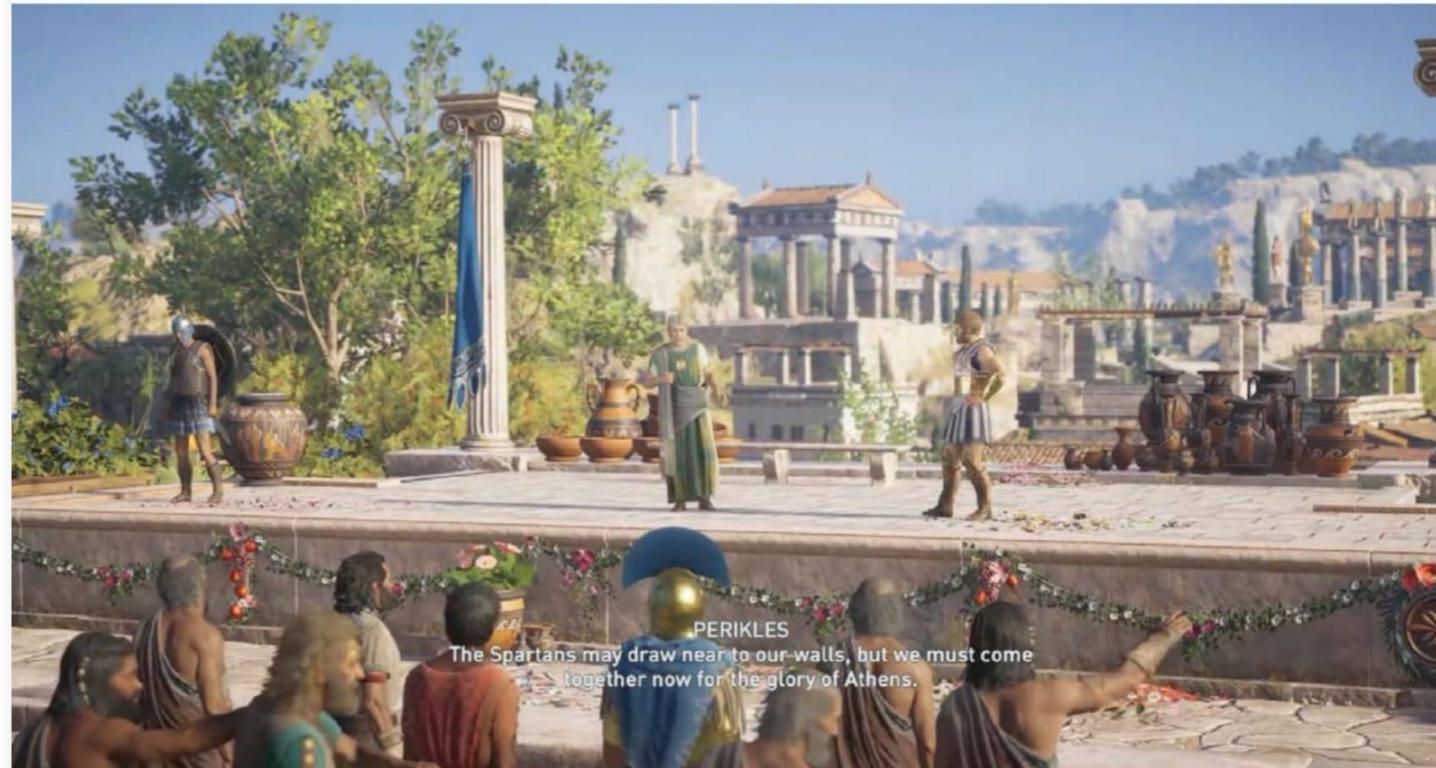
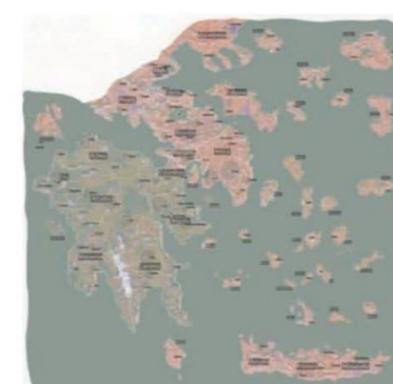
As real-world cartographers do, Hall and his team made informed cartographic generalizations to strike a balance between realistic replication and the map's purpose, in this case to be "playable" in the game's context. The result? By and large, the footprint of cities in *Odyssey*, while accurately reproduced, appear at a relatively larger scale than rural areas. It's essentially a mash-up of two different scales at once.

"We needed to play about with scale," says Hall. "We've got a world that's much smaller than real life, but we want to still recreate a sense of depth and scale. And to make distances shorter so that players enjoy getting around."

To create the basic topography, Hall's team used digital elevation model mapping data from NASA. As the group — which includes terrain, landscape and architecture artists — refined its work, they relied on Google Maps, Google Earth, ordinance survey maps and historical maps. They also worked with a staff historian to define themes for various regions based on historic data for wealth, trade, population, leadership, allegiance and wildlife.

"From there, we drew paper maps of each region, with a rough notion of key landscape, cities, forts, sanctuaries and wildlife," explains Hall. "This data was then worked on to create basic terrain layouts, which formed the very foundations of our world."

The paper maps are then shared with the rest of the game's developers,



An *Assassin's Creed Odyssey* scene set at the Pnyx in Athens (ABOVE). A series of draft maps used to build the final world map for the game (OPPOSITE).

including writers so they can develop storylines based on them. The overall map then goes through a variety of drafts as it adapts to the competing needs of the design team before it's finalized.

"We work very hard to try to make an authentic world, but it is a video game," says Hall. "We have to make choices: technical, artistic and level-design choices. It's not historical recreation. It's an imagination of that."



"MAPS MADE FOR video games are not the same as maps in real life. But you will probably use the same skills reading them," says Simon Dor, 33, a professor of video game studies at the Montreal campus of l'Université du Québec en Abitibi-Témiscamingue.

Dor, who wrote his PhD thesis on the history of strategies in real-time strategy video games and his master's thesis on *StarCraft*, a military sci-fi franchise that

debuted in 1998, says that video games are overlooked for the map-reading skills they impart.

"You have to know how to read a map in order to better understand a space. Some video games rely a lot on maps, and you have to be able to read them to play. That can be applied to real life."

While players intuitively learn some cartographic basics from video games, Dor notes that the cartographic knowledge transfer from games to real-life technological applications is even greater. He points to drone manufacturers who are hiring user interface designers from the gaming world to build UI systems for drones. These

are critical for understanding where the drone is and what it is seeing on a control screen. And real-world location games also reinforce real-world geography. "If you play a game that represents Europe throughout history, for example," says Dor, "you will know most of the countries because of your experience in the game."

Lynn Moorman, a professor in the department of earth and environmental

sciences at Calgary's Mount Royal University, concurs. She explored how people were interpreting geographical concepts from real-world digital maps in her PhD thesis and found that people "used the same navigation strategies exploring Google Earth as they do in video games."

'One of the objectives was to CREATE A GAME WORLD that had a recognizable footprint from a bird's-eye perspective.'

Moorman identified four specific areas of overlap between Google Earth and video games, including understanding content at different scales when the scale keeps moving, spatial orientation, top-down versus oblique perspectives and "dimensional transformation," where a user reimagines a two-dimensional environment on a screen as a three-dimensional space.

Coincidentally (or perhaps not?), in March 2018, Google made its Maps interface available to game developers



who want to use its real-world geography, geometry and 100 million 3D building and landmark footprints. Now game studios can import Google Maps data directly into a Google-based gaming software and tweak or add elements as desired.

The move followed the runaway success of the augmented reality mobile game *Pokémon Go*. The app, which spawned a craze of gamers of all ages roaming their

local communities in packs in search of virtual Pokémons, or “pocket monsters,” after its release in July 2016, was the first game built on such technology. It combined Google Maps and virtual reality and has since been downloaded 800 million times. Now *The Walking Dead: Our World* (zombie chasing), *Ghostbusters World* (ghost stalking) and *Jurassic World Alive* (dino hunting) have joined *Go* as some of the most noteworthy augmented reality mobile games using the same system.

It’s even more evidence of the convergence of real-world cartography in video games.



BACK IN ATHENS, Kassandra is climbing steps toward the Propylaea, the monumental entrance to the Acropolis. Notably, she’s following the Sacred Way, the ancient Greek road connecting Athens to Eleusis, home of one of the nation’s most famed religious sites.

“What we created was as authentic as possible,” says Ubisoft’s Hall, “so that players could actually take the same

The enormous statue of Athena atop the Acropolis, as seen in *Assassin’s Creed Odyssey* (ABOVE). A screenshot from Google Maps-based game *Pokémon Go* (LEFT).

journey as people who would have done it in the fifth century.”

As Kassandra passes through the gateway, an enormous bronze statue, the Athena Promachos (Athena who fights in the front line), emerges in front of her, the legendary Parthenon in its shadow.

“And from the top, you get one of the best views of the city,” says Hall, as he manipulates Kassandra’s climb to the statue’s top. Kassandra turns south toward the Aegean. The game pans up toward a soaring eagle, then sweeps slowly across the expansive city and around toward the vista of rugged mountains, rolling seas dotted with postcard islands and a glowing sun slipping toward the horizon.

The view is as real as the maps used to create it.

Watch Ben Hall, the world director of *Assassin’s Creed Odyssey*, explain how the game’s map and world were created at cangeo.ca/ja19/gamemap.

TOP: UBISOFT QUEBEC; BOTTOM: POKÉMON GO

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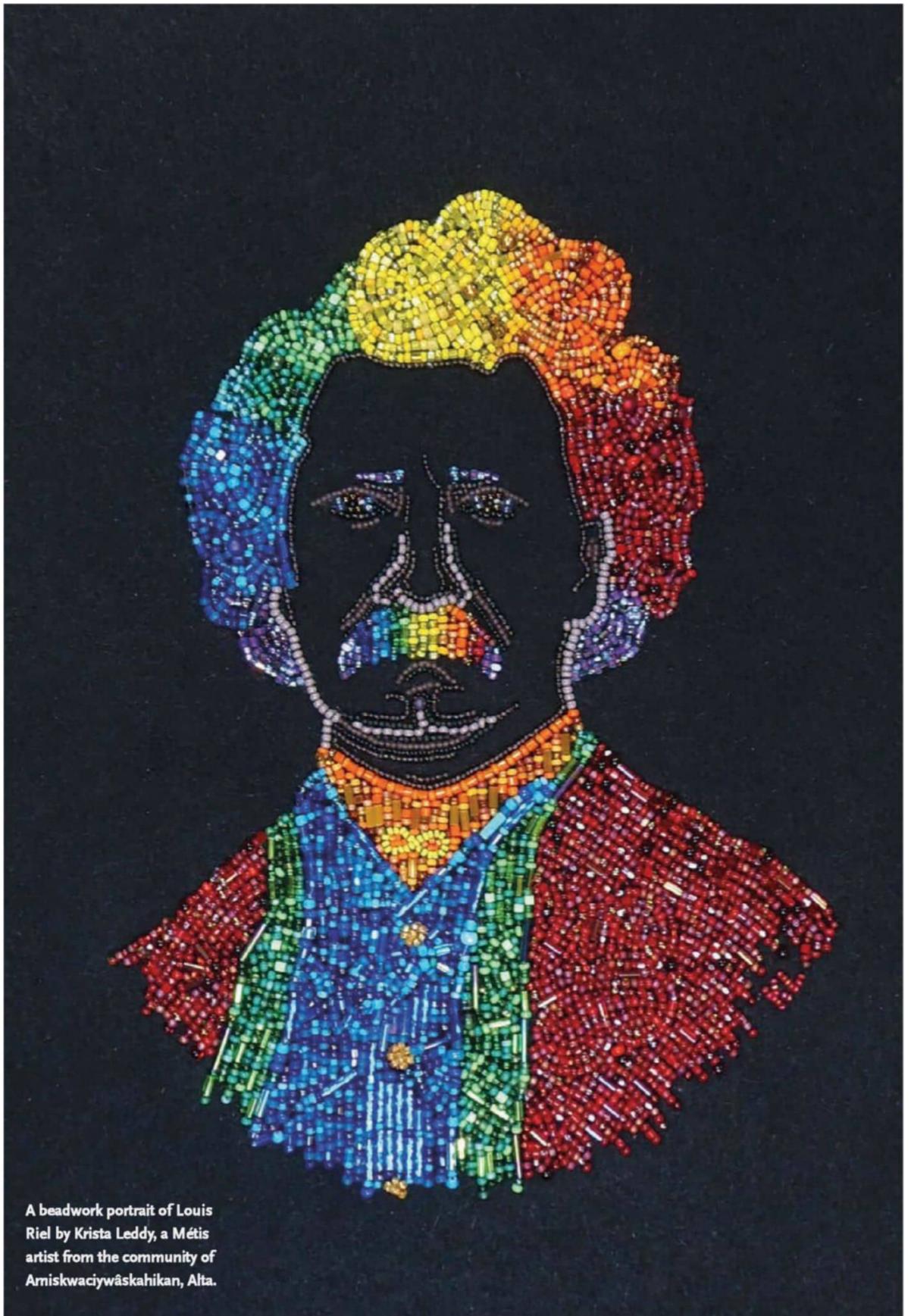


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A beadwork portrait of Louis Riel by Krista Leddy, a Métis artist from the community of Amiskwaciwâskahikan, Alta.

BEAD WORK PIECE: ART DIRECTED BY SHAUN VINCENT

HERO. HERETIC. NATION BUILDER.

A celebration of the real Louis Riel, Métis leader and Manitoba founder, on the 150th anniversary of the Red River Resistance and the 175th of his birth

BY DARREN O'TOOLE
WITH ORIGINAL BEADWORK BY KRISTA LEDDY

SHORTLY AFTER THE 110TH commemoration of Louis Riel's execution, I was asked to MC the official unveiling of a controversial statue of the Métis leader on Nov. 30, 1995, on the campus of what is now the Université de Saint-Boniface in Winnipeg. Sculptor Marcien Lemay's naked, bound, contorted and confined Riel spoke to the leader's inner conflict and suffering as a martyr. Surrounding the figure are walls designed by architect Étienne Gaboury engraved with Riel's famous words, "I know that through the grace of God I am the founder of Manitoba." The statue and its walls originally stood on the grounds of the Manitoba Legislative Building, but after Métis protested Lemay's depiction as insulting both to Riel and to his people, it was replaced with artist Miguel Joyal's depiction of Riel, in which he appears more statesmanlike, assertively brandishing the *List of Rights* that was to form the basis of the Manitoba Act in 1870.

These two sides of Riel—martyr and statesman—make it challenging for me to write about him. His radical political thoughts after a religious epiphany in 1875 have always made me uncomfortable. And to write on Riel the man means

dealing with that side of him. As a Métis law professor and social scientist, I've always tried to avoid the "great man" historical narratives on Riel. It's almost as if people can't help but unconsciously cast Métis history in terms of Christian narratives: "Strike the shepherd, and the sheep will be scattered; I will turn my hand against the little ones."

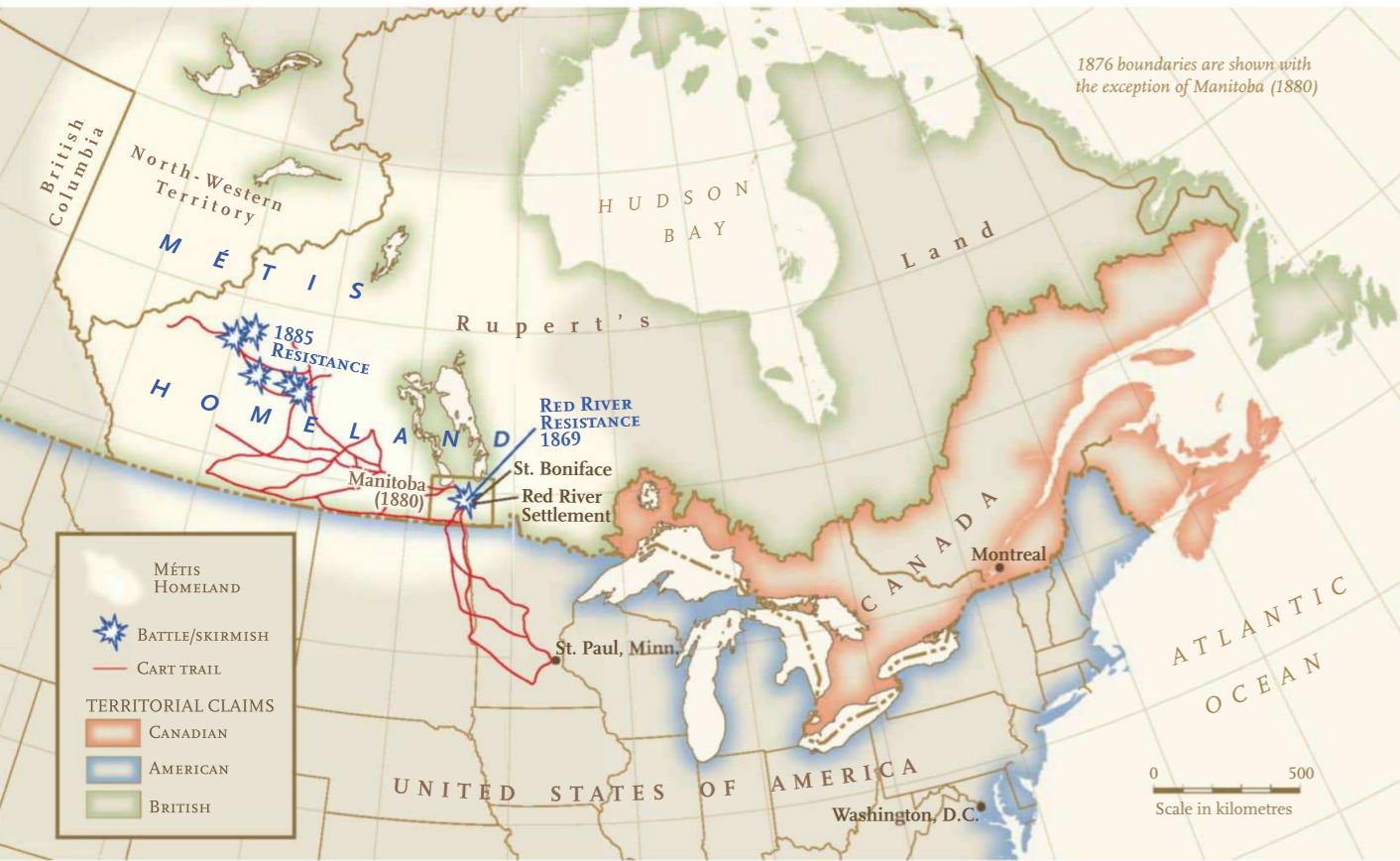
Riel was, at the same time, Lemay's visionary prophet of the New World and Joyal's hard-nosed political pragmatist and founder of Manitoba. As Anishinaabe author Basil Johnston wrote of the cultural hero Nanabush, "he could be generous or miserly; he could be true or he could be false; loving or hating. As an Anishinaabe, Nanabush was human, noble and strong, or ignoble and weak." The same is true for Riel—if we are to embrace him, we must embrace him in his entirety, not simply laud those aspects of him that are comfortable or convenient.



RIEL WAS AN ATYPICAL MÉTIS. He was born in 1844 in St. Boniface in the Red River Settlement (now Winnipeg) in what was then known as Rupert's Land.

While the average Métis would have never even seen an eastern Canadian city, such as Montreal, Riel left his birthplace when he was 13 to train as a missionary at the Collège de Montréal, along with Quebec's future political and business elites. In 1865, he left the college to begin a clerkship with lawyer Rodolphe Laflamme, a radical member of the Parti rouge who took two political stances that left an indelible mark on Riel's vision of the Northwest (encompassing the North-Western Territory and Rupert's Land, which were not yet part of the Dominion of Canada): anti-Confederation and annexation of Canada to the United States. On June 12, 1866, Riel and Marie-Julie Guernon signed a marriage contract, but her parents refused to approve of her marrying a "bandit," an oblique reference to his mixed ancestry. A week later, Riel left Montreal for Rupert's Land, but before returning to St. Boniface in the Red River Settlement, he lived in Minneapolis and St. Paul, Minn. These were cities that his fellow Métis were actually familiar with, as they plied their transportation trade along the well-worn Red River cart trails.

When Riel finally arrived in St. Boniface on July 26, 1868, at the age of



23, things began to quickly change in the Red River Settlement, where approximately 10,000 Métis formed the majority population. Hudson's Bay Company owned the North-Western Territory and Rupert's Land, but the westward expansion of the United States threatened Prime Minister John A. Macdonald's vision of Canada, and Macdonald began to assert dominion over the region. This threatened the independence of the Métis, and they began to form mounted patrols, led by Riel, to stop federal surveyors. While it's often portrayed as little more than squabbling over the boundaries of private lots, it was really

about the Métis opposing Canada's premature exercise of sovereignty over the Northwest, sparking the beginning of the Métis uprising in 1869-70 known as the Red River Resistance. A common refrain from the local population then, and one that we still hear today from Indigenous Peoples, was that the people were not consulted.

Prompted by the federal government's actions, Riel formed a Provisional Government on Dec. 8, 1869, and drafted a *List of Rights* for the Métis a few months later with the help of representatives from local parishes, and together they appointed three delegates to negotiate the entry of the Northwest into the Canadian federation. Among the delegates was Father Joseph-Noël Ritchot, a local Roman Catholic priest who received instructions from President Riel to negotiate a Métis land claim, Section 31, of the Manitoba Act. Just before the Manitoba Act received royal assent in May 1870, tensions in the Red River Settlement reached a tipping point. Thomas Scott, a member of the Canadian Party, a small group of English-speaking Protestants, had tried several times to

overthrow Riel's government and was charged with insubordination and treason. He was executed by a firing squad on Riel's orders.

Between 1873-74 Riel was elected to federal Parliament three times, and three times the majority of sitting MPs voted to oust him for his role in the Resistance and the execution of Scott. When the Liberal government finally granted Riel amnesty in 1875, it was on condition he accept banishment from Her Majesty's Dominions for five years. Riel chose to exile himself in the United States, where his thoughts returned to rogue ideas of the American annexation of the Northwest and anti-Confederation, while becoming anti-liberal and embracing ultramontanism,

Darren O'Toole is a descendant of the Bois-Brûlé (*wisaakodewinini*) of the White Horse Plains in Manitoba and teaches Aboriginal Law and Indigenous Legal Philosophy at the University of Ottawa. Krista Leddy is a proud Métis woman whose family comes from St. Albert and Lac Ste. Anne, Alta.

**'I KNOW THAT
THROUGH THE
GRACE OF GOD,
I AM THE
FOUNDER OF
MANITOBA.'**

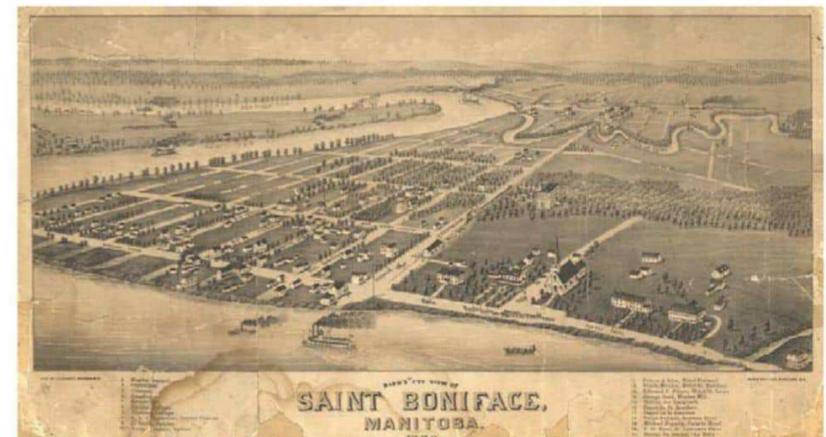
FROM TOP: LIBRARY AND ARCHIVES CANADA/PA012854; COURTESY CORDON GOLDSBOROUGH; MAP: CHRIS BRACKLEY/CAN GEO



Louis Riel (seated, centre) and members of his Provisional Government in 1870 (ABOVE); A bird's-eye view of St. Boniface, Man., as it looked in 1880 (RIGHT).

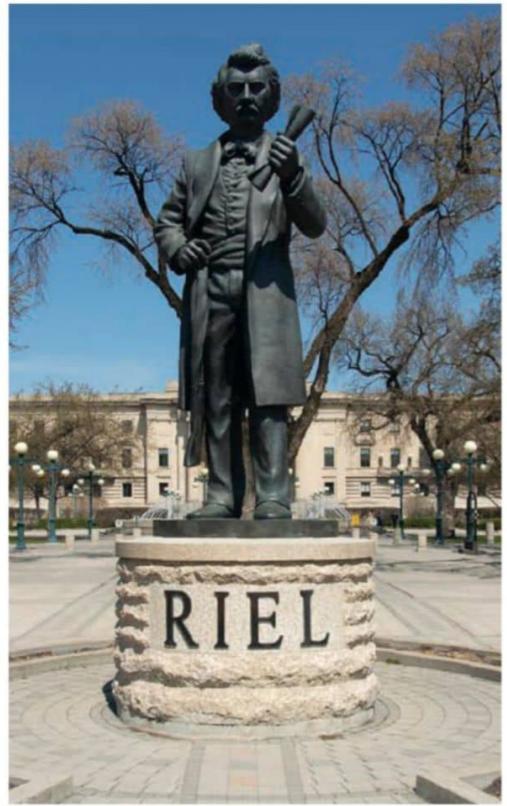
a conservative movement that sought to make the Catholic Church dominant in the affairs of the state. While attempting to convince U.S. President Ulysses S. Grant to threaten to invade Canada if it did not respect the terms of the Manitoba Act, Riel underwent a religious experience in St. Patrick's Church in Washington, D.C., on Dec. 8, 1875, in which he said God revealed to him that he was the prophet of the New World and the Métis were God's last chosen people.

In Riel's revelation, he was shown that Europe had declined and the corrupting influence of liberalism in Italy would see the Holy See of the Catholic Church transferred to Montreal for 457 years, then to St. Vital, Man., for 1,876 years, at which point the Second Coming of Christ would occur. As God's last chosen people, the Métis, who were as yet a young, small and fragile people, had to prepare for their future role.



view, the particular moral quality of Indigenous Peoples might be termed their "voluntary simplicity," or their willingness to live a simple lifestyle.

If the 1.4 million acres of land granted to the Métis in the 1870 Manitoba Act were roughly one-seventh of the surface area of the original postage-stamp province, Riel claimed compensation for two-sevenths (which included British Columbia)—one-seventh each for the Métis and First Nations. Should Canada accede to these demands, Riel said he would bring immigrants from 10 nations



in Europe and grant each of them their own province. If Canada refused to cede to Métis land claims, Riel would invite German immigrants in the United States to invade Ontario, Quebec and the Maritimes, compensating them with what is now northern Ontario. Riel wanted to erase the Canada-U.S. border from Lake Superior to the Pacific Ocean and bring French and French-Canadian immigrants to Manitoba. Furthermore, he would move all the First Nations and Métis in the United States to Rupert's Land where they would intermarry with European immigrants to bring about nine new Métis peoples, in addition to the already existing Métis canadien in Manitoba.

**IF WE ARE TO
EMBRACE RIEL,
WE MUST
EMBRACE HIM
IN HIS
ENTIRETY.**

While Riel's vision of immigration may seem open in some ways, it was closed in many more. Riel notably supported the United States' 10-year ban on Asian immigration because he believed they did not yet have any moral quality to contribute. While he saw the abolition of slavery as moral progress, he stereotyped the moral state of blacks as being that of obedience and a warm-hearted disposition and did not want to grant them anything. While he did invite American Jews to create a "New Judea" in British Columbia, it was conditional on them converting to Christianity. Riel's geographical segregation didn't end there—all nations east of the Rockies and isolated on Vancouver Island were Catholic, while the three Protestant and Jewish nations were grouped together west of the Rockies on British Columbia's mainland.

For Riel, keeping the Northwest within the Canadian federation or annexing it to the United States were both legitimate options and, in either case, he foresaw a great legislative union of Canada, the United States and Great Britain. Even with regard to French immigrants and French-Canadians coming to Manitoba from the U.S., not all were automatically

Miguel Joyal's statesmanlike depiction of Riel (LEFT) at the Manitoba Legislative Building, and Marcien Lemay's tortured Riel (RIGHT) at the Université de Saint-Boniface.

welcome. He was clear that French-Canadians would have to renounce their nationality, intermarry with Métis and First Nations and assimilate into the Métis nation. Riel also specified that the French-Canadians who came to Manitoba to increase the Métis flock would be "chosen offspring only" (or *que des rejetons choisis*). Although Riel wasn't clear on what he meant by this, he undoubtedly intended that some representative body of the Métis of Manitoba would select immigrants and that staunch Catholicism would be a necessary condition of acceptance. It was only in this way that the Métis canadien, as a new, regenerated people could prepare themselves for their role as a chosen people and receive the Holy See.

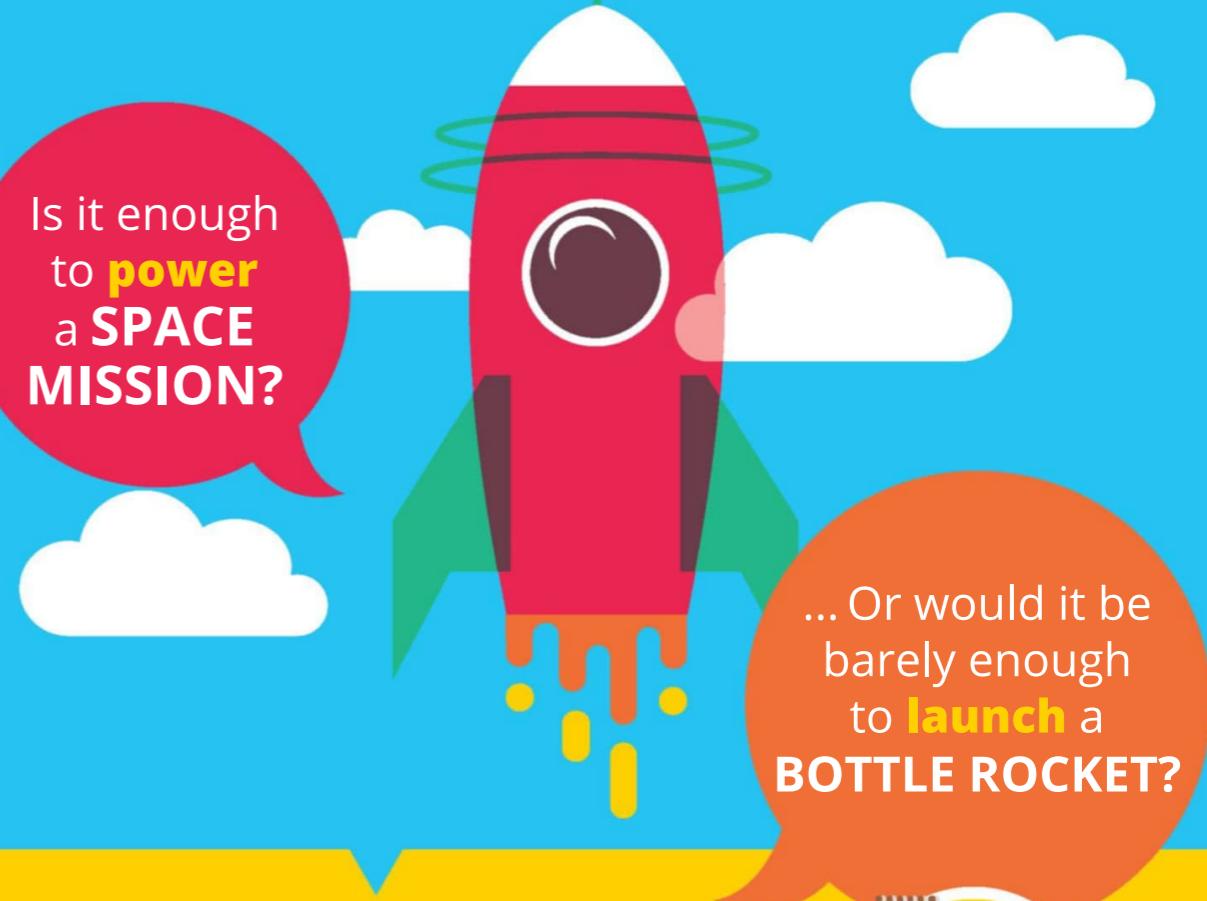


I HAVE A PICTURE of my father from about 1939. He is visiting his grandmother, Christine (Justine) Richard and great-grandmother, Marie-Rose Larocque,

DUNCAN HASKELL/CANGEOPHOTO

..... How does **YOUR** energy use stack up?

Is it enough
to **power**
a **SPACE
MISSION?**



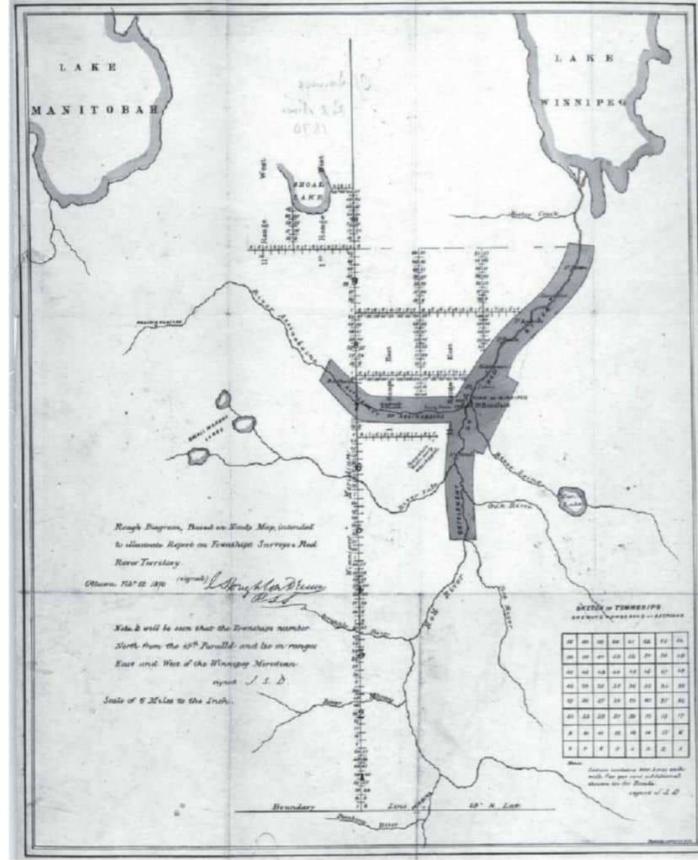
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in St. Eustache, Man., a well-known Métis community. Born in 1865, Larocque would have been five years old by the end of the Red River Resistance. Section 31 of the Manitoba Act granted the Métis 1.4 million acres of land “towards the extinguishment of the [or share of] Indian Title to the lands in the Province.” Larocque was among the many Métis who were supposed to receive land scrip, a document that could be redeemed for land, under Section 31, but whose scrip ended up in the hands of speculators. It is an incredibly complex issue, entangled in questions of law, history, political

economy and colonial expansionism of the nascent Canadian State. However, Section 31 would not have found its way into the Manitoba Act had it not been for Riel’s insistence on obtaining some kind of land base for the Métis. While this is part of Riel’s legacy, he could not have put forward a land claim settlement without a broad base of support among his people.

In Ojibwe cosmology, *ojichaag* (the “soul”) travels west after death, while the *jiibay* (“spirit” or “ghost”) remains with the corpse. It was the student association at the Université de Saint-Boniface that lobbied to have Lemay’s statue erected on campus grounds in 1995. Riel himself was a former student (then St. Boniface College), and his mortal remains were buried in the St. Boniface Cathedral cemetery next to the university, after the Canadian State hanged him for treason on Nov. 16, 1885. It was almost as if we were welcoming Riel’s *jiibay* back home to where his mortal remains are buried, perhaps to finally rest in peace. ☀

It is Lemay’s Riel of whom I hesitate to write, as if to leave the man his dignity

Clockwise from LEFT: A land survey map of the Red River Settlement in 1869, before Rupert’s Land was transferred to Canada; A scrip coupon; (from left) Robert Richard O’Toole, Marie-Rose Larocque, an unknown child and Christine (Justine) Richard.

by sparing him the shame of witnessing his humiliation at the hands of the Canadian State again. But the act of exhibiting Riel as an exposed, tortured man represents something profound about the Métis people. For it is also we as a people who have been stripped of our dignity—stripped of our lands, of our homes, of our history, of our culture and languages and sometimes our mental health. And yet, the walls that surround Riel’s tortured figure—the institutional walls of a prison or an asylum—put the Canadian State on public display. For this is what Canada did to Riel; this is what Canada has done to us as a people. And it must not be forgotten, hidden or denied. ☀

Explore places of significance to Riel and the Métis in Winnipeg at cangeo.ca/ja19/riel.

CLOCKWISE FROM LEFT: WYMAN LABERTE / FLICKR [CC BY SA-2.0]; SASKATCHEWAN ARCHIVES BOARD GENERAL, E1 / PUBLIC DOMAIN; COURTESY DARREN OTTOLE



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WELCOME TO CLIMBING CAMP

Camaraderie, conversation and conservation are key at the Alpine Club of Canada's annual General Mountaineering Camp

BY LESLIE ANTHONY
WITH PHOTOGRAPHY BY PAUL ZIZKA

A group of campers descends from a climb to Mount Wiser during the 2018 Alpine Club of Canada's annual General Mountaineering Camp in British Columbia's Monashee Mountains.

A SCATTER OF PEOPLE, a heap of gear, a helicopter, someone plucking a Spanish guitar in the background and singing like an angel... all swathed in a veil of wildfire smoke as a gentle rain patters down. It's day one of week six of the Alpine Club of Canada's 2018 annual General Mountaineering Camp and the big swap is underway — 36 people flying out with baggage, garbage, empty gas cylinders, blisters and sore muscles, and the same number flying in with an even larger load including food and other camp supplies.

Steeped in the history and heritage of alpine exploration, the GMC has been set in a different remote mountain locale each summer since its inception in 1906 — when almost 100 ACC members climbed and explored British Columbia's Yoho Pass, wore their Sunday best to evening meals and bunked in canvas tents. These days, \$2,000 per person will get you space in a modern tent, top-shelf guiding and instruction and outrageous gourmet meals. This year's edition of the 112-year tradition is at Hallam Glacier in the Monashee Mountains north of Revelstoke, B.C., three bumpy hours from town to the staging area at which we're now gathered.

From here, the pilot expertly navigates through thick smoke by shadowing valley walls and streams to camp, set high on a moraine near the toe of the glacier. Passengers debark into a marvel of modern wilderness technology, featuring solar panels, rudimentary plumbing, propane kitchen appliances and showers, a portable drinking-water treatment plant, sinks with bladder pumps, comfortable latrines and large tents for cooking, dining, storage, drying and even a library. The rocky surroundings are constellated by some 30 roomy nylon tents for campers and staff. Though occupying a similarly stark setting, it makes Everest Base Camp look like a low-tech ghetto.

In contrast, the glacier hanging above the area mesmerizes on a Himalayan



scale, its fractured blue depths exacerbated by the melting snows of late summer. Ringed by mountains, Hallam Glacier requires a 1,200-metre vertical climb before you even think of attacking its surrounding peaks. My body quivers at the thought of how much pain that might entail, while other campers sali-

THE STORM HITS around 2 a.m.: spectacular lightning, driving rain, howling wind, little sleep. Nonetheless, by 6 a.m. the dining tent is buzzing with folks who can't wait to get at it. It's weird to see so much enthusiasm at a time of day when most of us are zombies awaiting our caffeine fix — but it's also contagious.

Safety ropes have been fixed in places where exposure is an issue and suddenly 'situational awareness' becomes key. At some spots a fall could be fatal.

vate at the prospect. As with the GMC's five previous one-week occupants, our group is an eclectic mix of ACC veterans, high-functioning mountaineers and relative novices like myself.

The intimidation I feel is real, but I'll get over it. After all, challenging oneself is the point of mountaineering.



Clockwise from OPPOSITE: The staging area near Revelstoke, B.C.; a waterfall behind camp; Iceberg Lake; a storm hits at 2 a.m.

been fixed in places where exposure is an issue and suddenly "situational awareness" becomes key. At some spots a fall could be fatal.

Eventually hands-on rock climbing is required, and we rope up as a team. After Milner ascends and sets an anchor, we follow, 10 metres apart. The rock remains

Leslie Anthony (@docleslie) is an author and editor who specializes in science and environmental journalism. Paul Zizka (@paulzizkaphoto and zizka.ca) is an award-winning mountain landscape and adventure photographer.

MAP: CHRIS BRACKLEY/CAN GEO; 2018 SENTINEL2 IMAGE: ESA

greasy from last night's rain, but it doesn't take long to clip around the first protective bolt and move upward. At the top, we spend an hour hiking over a steep ridge to Iceberg Lake, unsurprisingly dotted with icebergs calving from a rapidly retreating glacier. On the ice proper, we rope into teams, donning crampons and ice axes for walking. At the glacier's headwall the real clinic begins, as we practise setting and retrieving ice screws and self-arresting falls down a snow slope with the axes.

As per mountaineering dogma, we turn around at 1:30 p.m. Each group returns sore but in good spirits and lounges outside the tea tent. Snacks and beer and stories spark the familiar camaraderie of

the mountains — one of the reasons so many ACC members attend these camps year after year.

At dinner — a raucous but delicious affair — we meet our Association of Canadian Mountain Guides leaders for the week. The all-star crew includes climbing legends Helen Sovdat and Ian Welsted; Matt Mueller, an Alberta Parks public safety specialist; Paddy Jerome, a former Parks Canada visitor safety specialist; and Cyril Shokoples, past ACMG president and chief instructor of the

Campers hike through a grassy basin where views of the nearby sights include (left to right) Bombay Peak, Mount Wiser, Mount Joy and Iceberg Lake.





Clockwise from top: Campers cross a temporary bridge en route to camp after a day afield; Mark Lehtonen harvests ice from Hallam Glacier for water; the chefs' tent just before dinner service; ropes drying; a group shot of week-six campers.



Canadian Forces Search and Rescue Technicians for the last quarter century. Shokoples introduces the GMC storytelling tradition, donning a feather-adorned Tyrolean hat for the task and relating how a visiting National Geographic TV crew once went out at noon with a guide for some quick shots only to find themselves still on the mountain at midnight. This tale of media sandbagging prompts much laughter around the room — and not a little bit of worry from myself.

Afterward, I take my first crack at communal dish duty, an industrial enterprise of several hours requiring six people to execute washing, disinfecting, rinsing and drying. By the time I get to my tent I'm asleep before I can pull the zipper down behind me.

THE NEXT DAY, groups that signed on for big objectives wake at 4:30 a.m. and leave camp within the hour. With bruised feet from my shakeout climb in rental plastic mountaineering boots, I've decided on a lighter day of hiking around camp in my own well-broken-in footwear.



The climb to the Hallam's high moraine starts just behind camp and heads straight up. At the top, the trail meanders upward through the preternaturally green meadows of "Waterfall Alley," a chunk of bucolic lushness in an otherwise stark alpenscape. Here, water braids thinly over at least four differ-

'Mountains breed curiosity.'
The curious are environmentally conscious, **consciousness begs information and information fosters concern.'**

ent kinds of rock, highlighting the multifarious folding and buckling the Monashees are famous for. Heading up a gully, I stick close to the shaded wall to avoid rockfall, then traverse onto the moraine. The trail, marked by rock cairns, now steepens significantly. At the top cairn, the view to Hallam Glacier is stupendous. Far below, poppyseeds dot its toe — a crew of University of Alberta students on an outdoors course practising crevasse rescue.

Campers start the long descent from Hallam Peak (LEFT), the stunning spire of which is an unmistakable local sight (RIGHT).

I can also see across the valley to Iceberg Lake and the route traversed the day before. Such constantly evolving perspectives of mountains are one of the best features of travelling in them.

On the way down, I meet another lone traveller. David Hik is a terrestrial ecologist from Simon Fraser University and long-time ACC member teaching a module for the University of Alberta course. He's scouting places to bring the students and we sit on a rock to watch a ptarmigan family and talk ecology; climate change — whose effects are starkly visible here in melting glaciers, lowering water tables, wildfire smoke and changing ranges of plants and animals — dominates our discussion. The only comfort we take is knowing that when it comes to climate awareness, this is a classroom *par excellence*: "Mountains breed curiosity," says Hik. "The curious are environmentally conscious, consciousness begs information and information fosters concern."

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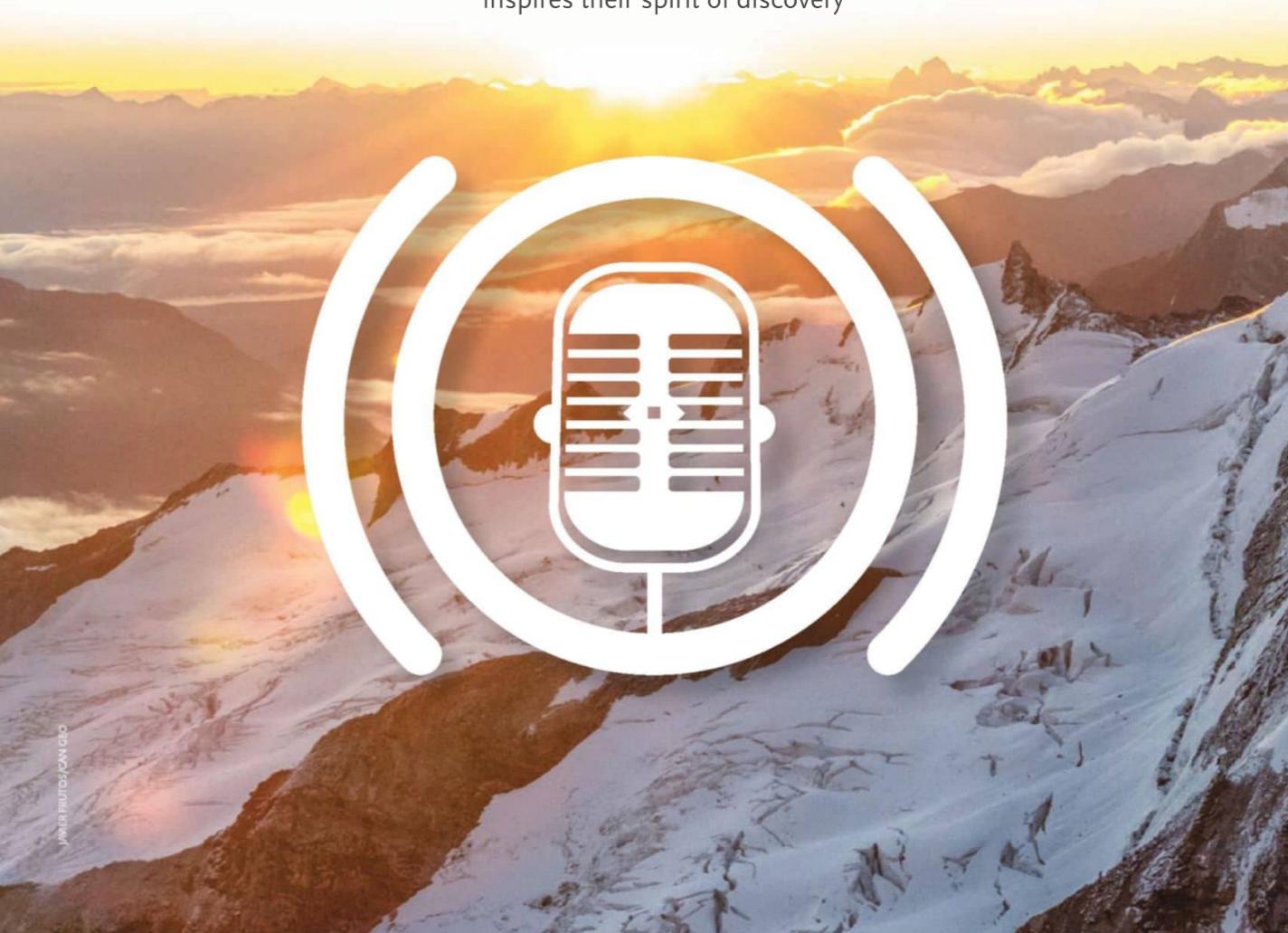
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Back at camp, as climbers return, reports of conditions come with them: crews aiming for the big peaks above Hallam Glacier couldn't solve the "The Riddle," a reticulation of crevasses on its rapidly melting surface, and had to turn back; another group that struck out for Wiser Peak is moving slow and won't be back before sundown.

It's all grist for the guides in figuring out the next day's offerings.

STILL NURSING blackened toes, I've signed onto something moderate—a climb to the 2,400-metre-high Bombay Peak. Though the first night's thunderstorm briefly cleared out the smoke, the province's abundant wildfires—including new ones sparked by the storm—have made themselves known again. A blood-red sun hangs in a thick gauze of smoke that worsens as the day wears on.

Sovdat and amateur guide Peter Findlay lead my group up the same rock step I'd climbed previously. Despite involving a larger group—including the extended Hamilton family of seven from Barrie, Ont.—the climb goes quicker than the first day, and we gather at the top to angle up a tumble of slick, heavily glaciated

rock. As we scramble up a tricky section someone yells "Goat!" and we gaze up to see a huge male perched on a promontory, ears twitching away flies, staring us down in curiosity. Even when we close to within 20 metres it doesn't move, as if it knows our route will take us around him. Rob, the 73-year-old father of the Hamilton clan who has suffered two heart attacks and stole the storytelling show at dinner the first night with a spirited "In reality, I shouldn't be here" soliloquy, now seems as comfortable on this rock as the goat.

We climb onto a balcony abutting glacial ice, then step onto its surface. This glacier is dirty and heavily crevassed, so we follow these laterally until we hit a main gully we can head up without much worry. The higher part of the glacier surrounds Mount Joy, little more than a tiny *nunatak*, or exposed peak, from this distance, but we're heading in the opposite direction, toward the col between Bombay and Wiser peaks.

Near the end of the slog, Sovdat punches through collapsing snow into a small crevasse, gingerly reversing her steps and poking around to find a more solid route. We skirt the crevasse and, a few tired steps later, step off the ice and collapse onto the rock of the col. Sovdat

A climber stops to take in the stunning views on the descent from Bombay Peak.

checks her watch for the time. "Four hours—that's great time," she says, surreptitiously re-energizing the group. From there, it's 20 minutes along a spectacular ridge to the summit of Bombay and impressive views in every direction—though we can see little more through the smoke than the fractured glacier we've just climbed.

At dinner that evening, more stories are shared. When it's the guides' turn to reminisce on previous GMCs, Sovdat tells the story of her first, when they hiked in 20 kilometres but the helicopter carrying their gear didn't show up because the pilot got lost. The group spent the night out around a fire, but in the morning, despite little sleep, everyone still wanted to climb. "These people were all so keen, so committed and so strong," she says, "that I wanted to capture that energy. I knew I wanted to be a part of this world."



See more photos from the Alpine Club of Canada's 112th annual General Mountain-eering Camp at cangeo.ca/ja19/gmc.



It's official!

The Royal Canadian Geographical Society celebrates its new headquarters with an official VIP opening



"This is the most important moment in The Royal Canadian Geographical Society's 90-year history."

That's the kind of statement that might raise eyebrows in geography circles around the nation. After all, in the last five years alone, the RCGS has been part of the team that discovered the wreck of Sir John Franklin's long-lost

HMS *Erebus* on the Arctic Ocean bed, published the groundbreaking *Indigenous Peoples Atlas of Canada* in collaboration with Canada's major national Indigenous organizations, and grew its cross-country education network to 23,000 teachers and volunteers.

But RCGS CEO John Geiger did not speak lightly during the official opening of the Society's new permanent home at 50 Sussex Drive, Ottawa, on May 13, 2019 — an event that marked one year since the RCGS moved into the elegant glass-walled building overlooking the Ottawa River and began to animate it with public talks, workshops and exhibitions.

'This is the RCGS realizing its potential to become the locus of what it means to be Canadian.'

host of other Society VIPs. All echoed the fact that the headquarters — a.k.a. Canada's Centre for Geography and Exploration — is the key to the organization's ability to continue making strides in its mandate to make Canada better known to Canadians and to the world.

Standing in the building's Main Gallery, surrounded by panoramic views of the river and Quebec's Gatineau hills, the prime minister spoke of his government's

efforts to put a price on climate change-causing pollution, its investments in nature conservation and creation of new marine protected areas, and its emphasis on getting Canadians to explore their national parks.

"Of course, we are not alone in this work," he said. "The Royal Canadian

Geographical Society is a leader in teaching about and protecting our environment; it's enough just to look at the work being done here to help young people learn more about climate change and energy-efficient technologies.

The inauguration today consists not just of celebrating the opening of a new building, but the opening of a new chapter." As a former teacher, he said, the work of the RCGS is near and dear to his heart.

Trebek, who was making his first public appearance in Canada since news broke in March about his stage-four pancreatic cancer diagnosis, said that he has been overwhelmed by the support of his Canadian friends and fans, and

TOP AND OPPOSITE, RIGHT MIDDLE: ANDREW LESSARD/CAN GEO; ALL OTHER IMAGES: BEN POWLESS/CAN GEO.



was relieved to have completed the last of his chemotherapy treatments just days before visiting 50 Sussex. "And now today I'm here for this very special dedication with the prime minister of Canada. Hey guys — my cup runneth over! Things don't get any better than this place."

The event moved into the Alex Trebek Theatre, where Geiger announced that "effective immediately," the Society's long-running annual Geographic Literacy Award had been renamed the Alex Trebek Medal for Geographic Literacy. And, he said, come May 27, the RCGS would for the first time be able to host its Canadian Geographic Challenge national student competition at its own headquarters.

Johnny Issaluk, an actor on AMC's *The Terror*, Inuit Games athlete and coach, Inuit cultural ambassador and Nunavut-based Arctic explorer, was invested as the newest RCGS Explorer-in-Residence, and Roberta Bondar presented the Society with a pair of special

gifts: a crew mission patch that flew aboard the Space Shuttle *Discovery*

Canadian," he said. "It is the filter through which teachers can come and a place for students, but also a place where whoever is ruling in this capital city can come in a completely non-partisan way and know that *this*, even more than Parliament Hill, is the sacred heart of Canada."

—Canadian Geographic editors

This is the latest in a series of articles about 50 Sussex, the new headquarters of the RCGS and Canada's Centre for Geography and Exploration. For more, visit cangeo.ca.

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Your feedback

Peel protectors

In "Return to the Peel," (May/June), the head of the Klondike Placer Miners' Association is quoted as saying that the situation in the Peel Watershed was "blown out of proportion ... by international environmental groups who leapt into the debate with little understanding about the region." This is not true.

Statements like this are part of a trend wherein proponents of resource extraction claim people opposing their plans are not local, or are taking direction from outside of Canada. It is a tactic designed to dismiss the legitimacy of organizations working to protect Canada's environment. It also denies the agency of First Nations who have spent decades advocating for protection of their land.

The campaign was led by the Yukon chapter of the Canadian Parks and Wilderness Society and the Yukon Conservation Society, in partnership with First Nations who have traditional territory in the region: Na-Cho Nyak Dun, Tr'ondëk Hwéch'in, Vuntut Gwitchin and Teetl'it Gwich'in. The fact that the Peel watershed is now an international issue is due to the efforts of many dedicated people with more than a "little understanding" of the region. We are proud of our partnerships, and the resulting protection for the Peel.

Chris Rider (executive director, CPAWS Yukon) and Mike Walton (executive director, Yukon Conservation Society) Whitehorse

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Comments may be edited for length and clarity.

EXPLORE podcast

On April 11, Canadian Geographic launched the EXPLORE podcast (cangeo.ca/explore and soundcloud.com/cangeo), a weekly series of conversations with Canada's greatest explorers hosted by broadcast journalist David McGuffin. Here's what our followers had to say about EXPLORE on social media.

I love this podcast, unequivocally. And I'd love to hear my friend and RCGS Fellow Mark Terry interviewed.

Michael John Long
Toronto

These podcasts have proven to be time well spent. Really enjoy the little personal touches you uncover about each guest, such as the allure of crayons [for Roberta Bondar].

—@cmobrien



COVER VOTE

How we chose this issue's cover



Three plains bison graze on wild Saskatchewan grasslands on the cover options presented for this issue. We provided only one species and landscape, but the subtle differences brought out our followers' artistic sensibilities. They weighed in on photo composition and the stance of the shaggy mammals, compared the depth and colour palettes of the landscapes and discussed how certain lights seem to accentuate the animal's power. In the end, 53 per cent of votes went to the head-on bison — a shot Canadian Geographic Photographer-in-Residence Michelle Valberg captured in 2018.

For a story about the most endangered ecosystem in the world, perhaps no animal evokes more of a sense of history and hope for recovery than the plains bison, which disappeared from these grasslands for 120 years, until a reintroduction program brought them back to Grasslands National Park in 2005. Let's hope there are more such success stories to tell of the grasslands in the future.

Not already receiving our cover vote email? Visit cangeo.ca/newsletter and sign up for the Canadian Geographic newsletter to get in on the action.

THIS PAGE, COVERS, LEFT AND MIDDLE: MICHELLE VALBERG; RIGHT: ROBERT POSTMA, OPPOSITE PAGE, LEFT: © PARKS CANADA; RIGHT: MICHELLE NYQUIST.

WHAT'S THIS?

Recognize this mystery object and how it relates to Canadian geography and history?



- Visit cangeo.ca/whatsthis for a hint, to enter your guess and for a chance to win one of three copies of the *Ultimate Canadian Instagram Photos* special issue.* Follow us on [@CanGeo](https://twitter.com/CanGeo) for more hints.
- The deadline is August 5, 2019.
- The correct answer will appear in the September/October 2019 issue.

*Three winners will be randomly selected from all correct responses.

Canadian Geographic and the Canadian Heritage Information Network have partnered to showcase important artifacts from Canadian history and geography. Each object comes from one of the museums in CHIN's national network.



LAST ISSUE'S OBJECT: Ojibway prayer stick

Prayer sticks have long been used by some Indigenous groups in North America during spiritual ceremonies. The one shown here was carved from antler and found near Manitoba's Fork River sometime before 1968. Norm Williamson, a historian from Manitoba, believes that Tenskwatawa, the Shawnee religious leader and younger brother of the renowned chief Tecumseh, gave this stick to his messengers after the War of 1812 to help mobilize First Nations in their fight against the Anglo-American empire that was rapidly taking shape on the continent.

With files from the Fort Dauphin Museum. Learn more about this artifact and others by visiting fortdauphinmuseum.wordpress.com.

Explore more stories from Canada's past through cangeo.ca/whatsthis.

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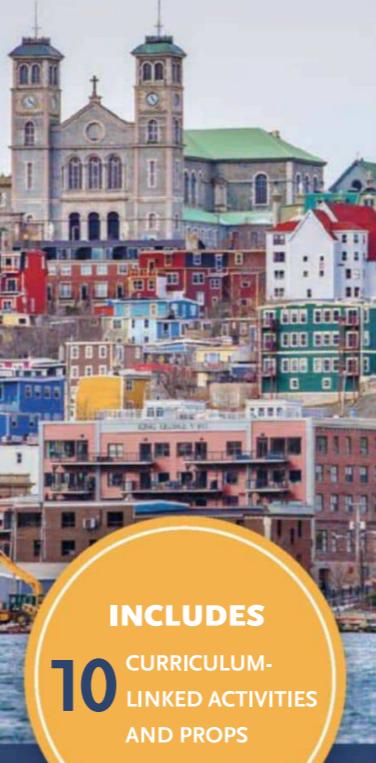
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ROBERTA BONDAR NAMED COMPANION OF THE ORDER OF CANADA

The first Canadian woman to go to space has received Canada's highest civilian honour. Dr. Roberta Bondar, an RCGS Honorary Vice-President, was invested as a Companion of the Order of Canada on May 8, 2019, by Governor General (and fellow astronaut) Julie Payette. Bondar's citation notes her contributions to spaceflight and study of astronauts' neurological state, her acclaimed landscape photography and her ongoing efforts to promote environmental sustainability via the Roberta Bondar Foundation.



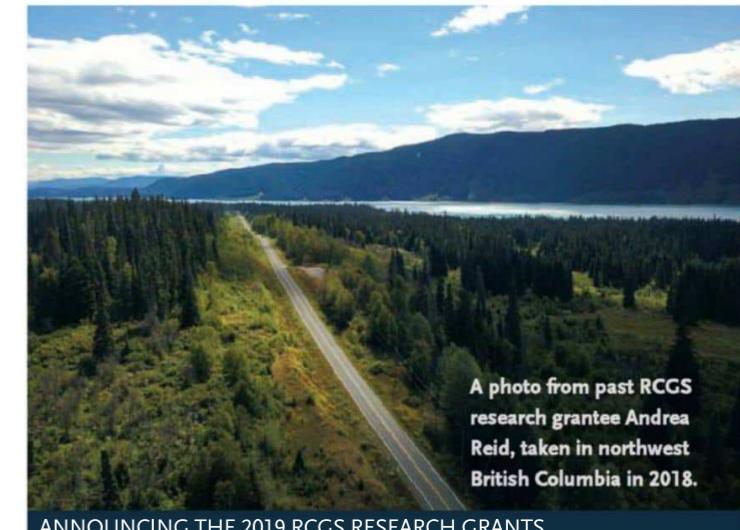
ADRIENNE CLARKSON WINS RCGS GOLD, GEORGE JACOB WINS KAMOOKAK MEDAL

Adrienne Clarkson, the 26th governor general of Canada, an accomplished journalist and the co-founder of the Institute for Canadian Citizenship, was awarded the RCGS's Gold Medal in late March. She was recognized for her decades of work shaping our understanding of Canadian identity.

George Jacob, President and CEO of San Francisco's Bay Ecotarium non-profit, was awarded the Louie Kamookak Medal for his leadership on the planned transformation of the Aquarium of the Bay into the Bay Ecotarium — a first-of-its-kind "living museum" with a focus on global warming, plastic pollution, endangered species, habitats and more.



NEWS FROM THE ROYAL CANADIAN GEOGRAPHICAL SOCIETY



ANNOUNCING THE 2019 RCGS RESEARCH GRANTS

The RCGS has confirmed that six researchers will receive support from the Society in 2019:

The James Maxwell Human Geography Scholarship

Miranda Monosky

Monosky will assess the planned closure of the Raglan Mine in Nunavik (northern Quebec) to determine what challenges and opportunities exist for the inclusion of Inuit knowledge, values and priorities in northern mine closures, which routinely result in dramatic ecological change, loss of income, declining populations and reduced services.

with the goal of improving our understanding of how climate change is affecting these patterns as well as our methods for detecting icebergs.

Maeva Gauthier

Gauthier will use live video streaming as a tool to empower youth in Tuktoyaktuk, N.W.T., to share their perceptions of how climate change, plastics and other contaminants are affecting their environment and traditional foods. The project will document community resilience and collect ideas for potential solutions.

Kirsten Reid

Treelines are shifting north and into higher elevations as the climate changes. Reid is analyzing how the presence of a host of non-climatic factors (such as microbes, invertebrates, mammals, vegetation, soil properties, air temperature, light availability and snow depth) are influencing treeline expansion in Canada's northwest Subarctic.

Frances Nicola Shipman

Shipman is exploring how the Northwest Territories' Mackenzie Delta — critical landscape for many migratory bird species — is being transformed by increasingly frequent and intense storms, which flood inland regions with salt water, causing long-term loss of vegetation.

Graduate Research Grants

Abigail Dalton

Dalton is undertaking the first comprehensive survey of iceberg characteristics and drift patterns in Canadian waters,

Follow @RCGS_SGRC for updates on the work of these researchers and other Society programs.

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For over a decade, One Ocean Expeditions has been exploring the most inspiring and remote destinations in the world. Dedicated to providing unique travel experiences with a focus on exceptional guest service (guest to staff ratio 4:1) offering an abundance of activities including wildlife viewing, photography, science and education; guests choose how their adventure unfolds. Our guests broaden their world view and become ambassadors for these unique regions and the communities associated. As the exclusive marine travel partner of **The Royal Canadian Geographical Society**, One Ocean Expeditions is honoured to showcase the RCGS prefix assigned to the newest vessel in our fleet, RCGS *Resolute*. Equipped with incredible indoor and outdoor platforms and a Lloyds 1AS ice class, RCGS *Resolute* offers a first-class experience in a wilderness of raw beauty. **Onboard programming caters to the most avid ornithologist, photographer, historian, or those interested in experiencing all that a region has to offer. A broad range of partnership programming has been expanded to provide an inclusive and equitable exchange of information and ideas - transcending borders.** Youth engagement and leadership is a goal for all communities across Canada. In March 2019, the first live satellite broadcast onboard RCGS *Resolute* through **Connected North** (Tech4Good/CISCO) and **Ocean Wise** brought conversation to new heights, spanning 13,000 km, 15 northern Canadian schools, 300 students and One Ocean Expeditions' marine mammals science team in Antarctica. Onboard summer internship opportunities alongside our long term partners **Ocean Wise**, creators of the Ikaarvik program, continues to build bridges between communities, providing a broader perspective across the Canadian Arctic. Programming built and in place across the Arctic created with and inspired by long standing partner, the **Recreation and Parks Association of Nunavut (RPAN)**, has increased youth engagement by 200%, offering initiatives through summer camp opportunities and leadership conferences.

By creating engaged and informative pathways into and out of remote communities across Canada's North, One Ocean Expeditions and The One Ocean Foundation are proud to build and deliver valued programming alongside our incredible partners, both in northern communities and onboard One Ocean Expeditions' RCGS *Resolute*.



Ikaarvik works with northern Indigenous youth to identify and act on their communities' research priorities. **One Ocean Expeditions'** support of **Ocean Wise** and **Ikaarvik** has been instrumental in creating opportunities for northern Indigenous youth to develop the capacity to help their communities work effectively with researchers, government and industry to meet their own local needs, and to conduct research on behalf of their communities."

- Eric Solomon, Director, Ikaarvik

"**One Ocean Expeditions** invests in RPAN programs, more importantly, they invest in our people and our communities. They provide support for our young leaders to learn and to grow; they provide opportunities for our children to laugh and to play. They recognize the value in investing in the lives of young people today, so that they have the promise of brighter tomorrows. Thank you **One Ocean Expeditions** for being an integral part of the RPAN journey."

- Dawn Currie, President, RPAN

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Canadian Geographic
on breaking new ground



Anne Innis Dagg at a conservation conference in Toronto in 2018 (ABOVE). Archeologist Jenny Cohen screens excavated sediment on Calvert Island, B.C., where ancient human footprints have been discovered (TOP).

As archeologists carefully chipped away layers of black sediment from a sheltered beach on Calvert Island, off British Columbia's central coast, they revealed dozens of footprints sunk into the now fossilized mud approximately 13,000 years ago — the oldest footprints ever found in North America. More artifacts were uncovered there and on nearby Triquet Island, including a preserved wooden atlatl throwing board and obsidian arrowheads mined 200 kilometres away, providing evidence of ancient human settlements that predate anything else ever found in Canada. In the September/October issue, Tom Koppel takes readers back to the end of the last ice age as he joins the team of archeologists unearthing these settlements in the traditional territories of the Wuikinuxv and the Heiltsuk First Nations.

Fast-forward more than 10 millennia to Oct. 17, 2018, when Canada became the second country after Uruguay to legalize the recreational use of cannabis. Since late 2018, Canada's legal cannabis industry has ignited, and online and brick-and-mortar stores across the country now offer all-things cannabis, from dried flower to oil to seeds and plants. Charles Wilkins reflects on the state of Canada as a marijuana nation one year later, exploring who's using it and whether legalization is changing our perception of the plant.

A pioneering woman rounds out the issue. A tribute to leading giraffe expert Anne Innis Dagg, penned by *Canadian Geographic* contributing editor Alanna Mitchell, delves into the work of the biologist who was the first to study the animal's behaviour in the wild in Africa, but whose accomplishments went unrecognized for decades.

Archeological digs, world-leading policies and a revolutionary woman — the September/October issue is all about breaking ground.

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our country

REVEALING CANADA



Dan Aykroyd

The actor and comedian on his classic Canadian hideaway near Kingston, Ont.

My favourite place in Canada is the island that I own. On Canada Day, 1987, I was driving my boat on Loughborough Lake, north of Kingston, when I saw this island for sale. Islands almost never come up for sale, so I spun around, raced into the local real estate office and asked them about it. The agent told me its name was Loon Island. This was the day after the new \$1 coin with the loon on it came out. I took it as a sign and bought the island, and it was the best money I ever spent.

Loon Island is basically a granite hump, about three hectares, right in the middle of Loughborough Lake. I have a very spartan camp there with an Airstream trailer that will never roll again, a cooking tent and a firepit, and I don't think I'm going to improve it much. Over the years people have encouraged me to build a house or cottage, but I like the campground feel of it. It has that classic Group of Seven look with the windswept pines and cedars. The sunrises and sunsets are beautiful. Food always tastes better on the island.

Some friends and I floated the trailer over on a barge. The very first night I spent there, we were inside avoiding the mosquitoes when all of a sudden loons started calling all around the island — first one, then two and three and four, with this welcoming cacophony of their cry. It was as if they were acknowledging me as the new resident of the island.

I like to go there to write; I've written a couple of screenplays there, and other pieces. But mostly I go just to be there. There's nothing like getting up in the morning and going down and slipping into the water for a swim and coming eye to eye with an otter or a fisher. That's how I connect with nature.

—As told to Alexandra Pope

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hashtag #ShareCanGeo.

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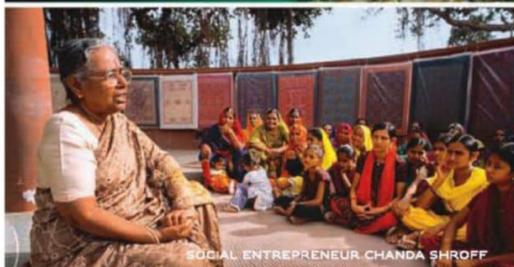
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