

Nature in Freefall

One million plant and animal species are at risk of extinction. UBC experts are part of the fight to save them.



PLUS:

Rewind: The horrors of in-person course registration

Gourmet grads share their culinary adventures

Raffi has the Last Word

contents

THE CONSERVATION ISSUE

Nature in Freefall

One million plant and animal species are at risk of extinction. Conservationists are calling for bold strategies and urgent action.



Passenger pigeon
Ectopistes migratorius
Cowan Tetrapod Collection No. B002440
Beaty Biodiversity Museum

Photo: Ada Sir

The passenger pigeon once numbered in the low billions, accounting for about a quarter of all birds in North America. Up until the late 1800's, people viewed them as a never-ending resource. They were hunted for food, for feathers used in mattresses, and for agricultural fertilizer. People also hunted them purely for sport, in some cases catching them for live trap shooting. In one hunt in Michigan, 50,000 passenger pigeons were killed each day for five months straight.

Finally, in the 1890's, some people realized that humans might be causing the unthinkable: the elimination of the most abundant bird species in North America. Laws were passed to protect it, but it was too late. Numbers of passenger pigeons continued to decline, due in part to the destruction of their nesting habitat as well as their numbers passing below the needed density for communal breeding.

Long after they were extinct in the wild, the last captive passenger pigeon, a female named Martha, died of old age at 1:00 PM on September 1, 1914, in the Cincinnati Zoo. This moment marked a remarkable milestone for humanity: as an early case in which the exact date of a human-caused extinction is known, it showed our actions can have extreme consequences, forever altering fundamental characteristics of the natural environment.

– **Darren Irwin**, *UBC professor of zoology and former director of the Beaty Biodiversity Museum*

37

A Voice for the Future

Student uses AI to design a voice-activated wheelchair for his brother

43

Rewind

Registration isn't what it used to be. And that's a good thing.

44

Table Talk

Gourmet grads share stories and recipes

60

The Last Word

With Raffi Cavoukian, *DLitt'05*

Q: What's the most important lesson you ever learned?

A: Young children are whole people, worthy of respect.

HIGH ACHIEVERS

32 The 2019 Builder Awards recipients

33 The 2019 *alumni UBC* Achievement Award recipients



PLUS:

- 1 Editor's Note
- 52 Prez Life
- 55 Class Acts
- 57 In Memoriam
- 34 Research Findings
- 49 n=
- 41 Quote, Unquote



This Bird Has Flown

Why is there a picture of a dead pigeon on the cover? Why not a tiger, a gorilla or another charismatic mammal from the endangered list? A corpse is morbid. And this one of a passenger pigeon all the more so, because – as zoologist Darren Irwin describes on the facing page – the Europeans who arrived in North America hunted the exceptionally populous species into extinction a century ago.

But disturbing as the story behind the image is, anthropogenic extinction is not the only thing that this dead bird represents. The shocking loss of the passenger pigeon has been cited as something that propelled the growth of the modern conservation movement, which is characterized by the acknowledgement that human action has a direct impact on the environment, and that we have an obligation to protect and conserve it, guided by science.

There are contemporary accounts from the 1800s that describe skies darkened by massive flocks of passenger pigeons and filled with the thunderous sound of their beating wings. To go from such an awesome spectacle to hardly a sign of one in the wild within one human generation must have been a wake-up call. Earth's last known passenger pigeon, Martha, who was kept in captivity, was a public phenomenon, attracting both curiosity and concern.

About 30 years after Martha dropped off her perch at the Cincinnati Zoo, wildlife ecologist Aldo Leopold wrote in a popular essay: *"Our grandfathers, who saw the glory of the fluttering hosts, were less well-housed, well-fed, well-clothed than we are. The strivings by which they bettered our lot are also those which deprived us of pigeons. Perhaps we now grieve because we are not sure, in our hearts, that we have gained by the exchange."*

Martha was preserved and has been displayed in museums for most of the time ever since – a sad reminder of the consequences of human excess. The rapid demise of her kind led to laws that have enjoyed some success in averting the loss of other species at risk.

But despite the growth of the conservation movement and increasing public awareness, current efforts are not adequate enough to offset our ever-growing consumption of resources, our wastefulness, and our pollution. The landmark IPBES Global Assessment on Biodiversity and Ecosystem Services released this year describes a natural world in freefall, with around one million plant and animal species at risk of extinction. The top five causes all relate to human activity, from how we use our lands and oceans to the introduction of invasive species. "We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide," says Sir Robert Watson, IPBES chair.

As dire as the warning is, it is accompanied by a loud and clear message that it isn't too late to contain the downwards trajectory, but it will take transformative social change. With the stability of Earth's ecosystems at stake, conservationists are calling for bold and urgent action, and the enactment of novel evidence-based strategies to prevent the loss of biodiversity. You can read about some of them in this issue.

As the passenger pigeon slips out of living memory, let's not dwell on what we've lost, but instead focus all of our energy on those species that can still be saved.

Vanessa Clarke
Editor

EDITOR Vanessa Clarke, BA

GRAPHIC DESIGNER Pamela Yan, BDes

EDITORIAL ASSISTANTS

Rachel Glassman, BA'18

Eric Davenport

OFFICERS OF THE BOARD OF DIRECTORS:

CHAIR Ross Langford, BCom'89, LLB'89

VICE-CHAIR Debra Hewson, BA'81

TREASURER Barbara Anderson, BSc'78

PAST CHAIR Randy Findlay, BASc'73

MEMBERS AT LARGE [TERMS ENDING 2020]

Barbara Anderson, BSc'78

Shelina Esmail, BA'93

Ross Langford, BCom'89, LLB'89

MEMBERS AT LARGE [TERMS ENDING 2021]

Amir Adnani, BSc'01

Stephen Brooks, BA'92

Randy Findlay, BASc'73

Debra Hewson, BA'81

Leslie Lee, BCom'84

Rahim Moloo, LLB'05

Shom Sen, BCom'84

MEMBERS AT LARGE [TERMS ENDING 2022]

Aleem Bandali, BA'99

Ian Banks, BA'92

Miranda Huron, BA'02, MEd'16

Patricia Mohr, BA'68, MA'70

Fred Withers, BCom'77

EX-OFFICIO:

UBC PRESIDENT AND VICE-CHANCELLOR

Santa J. Ono

UBC CHANCELLOR

Lindsay Gordon, BA'73, MBA'76

**VICE-PRESIDENT, DEVELOPMENT AND ALUMNI
ENGAGEMENT; PRESIDENT'S DESIGNATE**

Heather McCaw, BCom'86

**INTERIM ASSOCIATE VICE-PRESIDENT,
ALUMNI; EXECUTIVE DIRECTOR, ALUMNI UBC**

Natalie Cook Zywicki

Trek magazine is published two times a year in print by the UBC Alumni Association and distributed free of charge to UBC alumni and friends. Opinions expressed in the magazine do not necessarily reflect the views of the Alumni Association or the university. Address correspondence to:

The Editor, *alumni UBC*
6163 University Boulevard,
Vancouver, BC, Canada V6T 1Z1
email: trek.magazine@ubc.ca

Letters are published at the editor's discretion and may be edited for space.

ADVERTISING

Jenna McCann

jenna.mccann@ubc.ca

604 822 8917

CONTACT NUMBERS AT UBC

Address Changes 604 822 8921

via email alumni.ubc@ubc.ca

alumni UBC / UBC Welcome Centre

604 822 3313

toll free 800 883 3088

Volume 75, Number 2 | Printed in Canada

by Mitchell Press

Canadian Publications

Mail Agreement #40063528

Return undeliverable Canadian addresses to:

Records Department

UBC Development Office

Suite 500 – 5950 University Boulevard

Vancouver, BC V6T 1Z3



Nature in Freefall

One million plant and animal species are at risk of extinction. For the sake of future generations, how can we conserve Earth's biodiversity?



4

"We're Pruning the Tree of Life"

To preserve biodiversity, humans need to live within their means.



8

Legal Rights for Nature

It's happened elsewhere. Why not in Canada?



10

A Last Love Letter to the Serengeti

"All is not lost if we do the right thing."



12

The Iconic Elephant

Can satellite technology save the African elephant?



16

How to Conserve Half the Planet...

... without going hungry

A child looks at a display of preserved birds in the Beaty Biodiversity Museum on UBC's Vancouver campus (beatymuseum.ubc.ca).
Photo: Derek Tan



18

Triage of Life

A tool for prioritizing conservation efforts



20

Fish Banks

An idea for replenishing our oceans



22

The Big Picture

Climate Strike at UBC



24

Curing "Plant Blindness"

It will take more than carrots.



26

The Birds... & the Bees

Looking out for the pollinators



28

Caution: Humans in Area

Sharing the land with other large mammals

Reading the warnings of Dr. Sarah P. Otto, you can't help but envision a world reduced to humans, rats, crows and cockroaches, all squabbling over the last surviving dandelions. In the Anthropocene, it appears that human impact has grown so overwhelming that only a small, hardy and not-always-helpful band of human-tolerant plants and animals may endure with us to the last.


Actually, Otto's academic writings are less apocalyptic, but no less panic inducing. A UBC theoretical biologist and Canada Research Chair in Theoretical and Experimental Evolution, Otto penned an article last year in the *Proceedings of the Royal Society* titled "Adaptation, speciation and extinction in the Anthropocene." It is an understated survey of literature exploring human impacts on the biosphere, and it concludes, in sober but worrying tones, that in everything we do - and in places we don't even go - humans are changing the natural world in a cumulative and potentially disastrous way. It's not just that we are cutting down the forests, dispersing the topsoil, overfishing the oceans and overheating the atmosphere. It's not just the hunting or the pollution. Rather, we have nudged the biological world so hard that even the process of natural selection has changed. As Otto puts it: "Species are not being selected simply for what is 'good' in nature; they are being selected for traits that help them survive human influence."

Despite the dire takeaway, "Sally" Otto (so-called to differentiate from mother Sarah) looks nothing like a modern-day Cassandra, cursed to tell a truth that no one wants to hear. Far from dour, Otto is upbeat - effervescent - with a practical but stylish mop of curls and a beaming smile. She's also frank and entertaining in recounting the indiscretions of a 12-year-old Sally, whom few people likely expected to ever take seriously. Born in New York City in 1967, Otto says that she moved houses 18 times in her first 18 years, changing schools nearly as often. Her father was a salesman whose consummate skill seemed to be finding the next job. So, by seventh grade, Otto was pretty disconnected from school and starting to skip, though still turning up for math class. Indeed, after she completed the advanced curriculum, the teacher let her and the other mathletes play cards. And that, she says, "was probably a great way" to learn math and the laws of probability.

Otto confesses that she's not sure she would have made it through high school, but her mother, Sarah Cutler, could see Sally's spark. Cutler got her daughter an interview for the International Baccalaureate program at the Washington International School, one of the top-rated private schools in Washington, DC. They, too, recognized Otto's potential, granting a full scholarship. Soon enough, the erstwhile slacker found herself sitting before chemistry teacher Ingrid Pritchard. "It was miraculous," Otto says. Mrs. Pritchard began describing a world made of atoms and, for Otto, "it was an instant reveal. For the first time, I could see that there were underlying rules connecting everything around us."

School became a pleasure, and a mission. Otto went from Washington International to Stanford University, where she chose genetic engineering, thinking - wrongly - that it would involve lots of math. (It was mostly chemistry.) So she tweaked her studies to math and biology, earning a BSc and PhD and going on to claim a staggering list of fellowships and prizes, including, in 2011, a "Genius Grant" from the MacArthur Foundation.

In a cable news world in which everyone is entitled to their own opinion, this raises a reasonable question: What's a genius? And why, say, should we listen to Sally Otto, rather than acting on our own entitled intuition? For the MacArthur Foundation, a genius is someone with "extraordinary originality and dedication in their creative pursuits and a marked capacity for self-direction." It's not just brilliance. The MacArthur folks are investing in the combination of talent and rigor,



Sally Otto outside the Beaty Biodiversity Museum on UBC's Vancouver campus, with a Blue Whale skeleton in the background.

“Humans are Pruning *the Tree of Life*”

*In ways intentional and
inadvertent, humans are
remaking the natural world
— and not in a good way.*

By Richard Littlemore



innate intelligence and hard work. The Foundation awarded Otto US\$500,000, no strings attached, as “an investment in [her] originality, insight, and potential.”

Otto spread the money around like Johnny Appleseed sowing fruit for a prosperous future. She split the first \$100k between the Nature Trust of British Columbia and the Nature Conservancy of Canada to protect the Twin Lakes and the Sage and Sparrow Grasslands, both in BC’s Okanagan region. She gave \$100K to a hospital in Borneo, Indonesia, that cares for the families of loggers who agree to become forest guardians; Otto describes it as an investment in the complementary health of the human community and the environment. She set up a MITACS Science Policy Fellowship and a Biodiversity Research Centre internship program. And she still has \$100,000 in the bank for a yet-to-be-identified final investment.

Beyond her diligence and generosity, Otto’s principal genius appears to flow from her enduring adoration for mathematics. As an expert modeller (she is co-author with Queen’s University Professor Troy Day of the book, *A Biologist’s Guide to Mathematical Modelling in Ecology and Evolution*), Otto also loves math for its capacity to break big, complicated issues into manageable, understandable components. She says, “Math is powerful in that way. There aren’t many things that can convince you of how completely wrong you are. It’s so precise. You can be absolutely sure you are right about something, but then you follow it through with a model and find a key piece that you missed.”

Using models that are, in the Einstein tradition, “as simple as possible, but no simpler,” Otto has sought insight or illumination at the micro and macro levels.

At the micro level, she interrogates the budding yeast *Saccharomyces cerevisiae* to help understand species adaptation and mutation. At the macro level, she develops models that have forged new ground and helped explain puzzling patterns in the biological world, such as why so many species reproduce sexually.

Otto’s models also explore evolution’s limits – and it was in recognition of how hard humans are pushing species beyond these limits that led her to write the Royal Society article mentioned above. It’s based on years of reading that she says left her “absolutely panic-stricken.” Otto documented the

degree to which humans overwhelm nature. Most obviously, we chip away at wild populations by hunting and by encroaching on their habitat: since 1970, we have seen populations of wildlife decline by 60 per cent.

But we also damage the gene pool in odd ways. We trim the population of elephants with the longest tusks, mountain sheep with the biggest horns and foxes with the prettiest coats. Our hook-and-line fishing style selects for smaller-mouthed fish, and our gillnets weed out the boldest and most aggressive genotypes among rainbow trout. In a wild world where initiative was once an advantage, humans have created a niche for laziness. “For example,” Otto writes, “the portion of sedentary individuals within the great bustard populations increased from 17 per cent to 45 per cent over a 15-year period, with collisions being the major source of death for migrating individuals.” The big birds are so likely to die flying into glassy condo towers that fortune now favours the laggards.

We break up the landscape, isolating species in a way that favours plants that reseed locally and birds that remain put – reducing the connectedness of the biological world. And we recruit hunting partners that also kill not from need but from habit: US pets perpetrate 2.4 billion “cat predation events” every year. Global extinction rates have risen so dramatically that more than one in five species of vertebrates, invertebrates and plants are now at risk of extinction. And climate

change is making everything worse. As Otto says, “Humans are pruning the tree of life.”

Yet, she writes, the processes remain dangerously out of our control. “As diseases and their vectors become better adapted to life within our cities, pests become better adapted to our crops, and our prey become better adapted to our means of harvesting. As we have witnessed with the evolution of antibiotic resistance, humans may impose selection, but we will often not retain the upper hand.”

So, Otto says, we need to act, quickly and decisively. “If you were a business owner and you knew big changes were coming – like climate change – you would work hard to ensure your business had the capacity to change and was resilient, with a lot of buffers. Same with the natural world. But by reducing their numbers and fragmenting their populations, we’ve hobbled the capacity of many species to adapt, lessening their resilience as we enter a period of dramatic climate change.”

Regrettably, we’re not responding – not globally and not locally. As a former director of UBC’s Biodiversity Research Centre, Otto has fought hard, and so far unsuccessfully, for endangered species protection in BC. She says, “We imagine biodiversity loss as something that is happening off in Brazil. But we look in this province and we don’t have the laws to regulate and prevent habitat destruction and fragmentation for our most endangered species.” The federal Species at Risk Act only covers federal lands – about one per cent of the province. Thus, “99 per cent of land lacks protection for species at risk. And, as a consequence, we’re watching as many species continue to decline, such as the southern mountain caribou, with two more herds going extinct this year.”


The good news, Otto says, is that some solutions are obvious and actionable. “For example, I love the way we’re becoming conscious of having to densify our urban environment. Let’s expand this thinking to all sectors. Every industry should be asking itself how to succeed without further expanding our human footprint; how can we grow the food we need more efficiently without continuing to expand agricultural lands; how can we capture the most solar, geothermal, and wind energy from within our cities and farms rather than going to another pristine area and destroying it?”

The bad news is that Otto’s warning seems to be landing on deaf ears, not just in BC, where you might expect a New Democratic Party/Green Party coalition to be responsive to environmental issues, but everywhere.

“It’s just too easy to keep hurting nature and hoping for a quick and easy technological fix,” Otto says, “but I don’t think there is a technological solution [for biodiversity loss]. We need a cultural solution. We need to reduce our impacts. We need to live within our means.”

It’s an elegantly simple warning that leaves an unanswered question: will we listen? **T**

We have nudged the biological world so hard that even the process of natural selection has changed. As Otto puts it: “Species are not selecting for what is ‘good’ in nature; they are selecting for traits that help them survive human influence.”



The world's 3,500 botanic gardens are home to about one third of known plant species and are a crucial part of the fight to conserve rare and endangered plants. UBC's garden is best known for its extensive collection of maples (including *Acer pentaphyllum*, or five-lobed maple, of which there are fewer than 140 individuals left in the wild). It also conserves magnolias, mountain-ashes, snowbell trees and rhododendrons – all vulnerable in the face of threats like climate change and habitat encroachment. Pictured here is the deciduous tree *Franklinia alatamaha*, from the Carolinian Forest Garden. It is one of two species cultivated at UBC thought to be extinct in the wild. Known only from a small area in the US state of Georgia, along the Altamaha River, *Franklinia alatamaha* was last collected in 1803.

(Photo: Daniel Mosquin, research manager at the UBC Botanical Garden and Centre for Plant Research)

Can you imagine a world without southern resident killer whales, mountain caribou, elephants, giraffes, cheetahs, tigers, leopards, rhinos, gorillas, and orangutans? Or a world where these magnificent animals survive only in zoos and aquariums, as faint, caged shadows of their wild selves?

Most people would be horrified by such nightmarish scenarios. Yet despite decades of dedicated conservation efforts, that is where we are headed. The World Wildlife Fund's Living Planet Index, which monitors over 3,700 vertebrate species, reports an average population decline of roughly 60 per cent since 1970. A 2017 article published in the *Proceedings of the National Academy of Sciences* crunched the data on thousands of populations of mammals and concluded we are in the midst of a "biological annihilation." A 2019 report by hundreds of scientists with the Intergovernmental Policy Platform on Biodiversity and Ecosystem Services (IPBES) warned that a million species are at risk of extinction due to human activities.

In response to the global biodiversity crisis and changes in the way we view other living entities, a radical idea is gaining traction around the world. Laws and cultures are changing to recognize that animals, species, and even nature itself – rivers, coral reefs, mountains, and ecosystems – have rights. Rights have the power to modify our beliefs and behaviour in profound ways, as abolitionists, suffragettes and Indigenous people can attest.

Just a few years ago, suggesting that non-human animals or ecosystems ought to have legal rights might have provoked puzzled looks or even ridicule. The idea is no longer funny or far-fetched. Scientific discoveries sparked by Jane Goodall's work with chimpanzees have obliterated old theories about animals as automatons. Not only our closest relatives, the great apes, are complex, emotional, sentient creatures. Researchers have also discovered amazing capabilities in species from ants to elephants, octopuses to ravens. New discoveries reveal the remarkable communications and networking among trees and other types of plants.

Scientists agree that everything is connected. Humans are related to all other forms of life and are composed of the same elements as mountains and rivers. As British physicist Brian Cox wrote in his book *Forces of Nature*, "there is no fundamental difference between inanimate things, such as planets, and living things such as bacteria and human beings; all objects in the Universe are made of the same ingredients" and shaped by the same laws of nature.

In recent years there have been revolutionary breakthroughs across the world as governments, communities, and courts have recognized the legal rights of non-human animals, endangered species, and ecosystems. Among the beneficiaries so far have been chimpanzees, orangutans, spectacled bears, Asiatic lions, rivers, lakes, forests and, in Bolivia and Ecuador, Mother Nature herself.

One of the first breakthroughs came in 2006, in an unlikely place. Citizens of Tamaqua Borough, a small community in rural Pennsylvania, were deeply concerned about a proposal to spread urban sewage sludge on

farmland. After regular environmental laws failed, they enacted a pioneering municipal bylaw that recognized the rights of nature. Since then, in response to environmental threats such as fracking, more than three dozen American communities – from Santa Monica, California, to Pittsburgh, Pennsylvania – have enacted bylaws elevating nature's rights above corporate rights in an effort to protect both human and ecosystem health.

In 2008, Ecuador passed the first Constitution to include the rights of Pachamama, or Mother Earth. Since then Ecuador has revised more than 70 laws and policies to incorporate nature's rights. Ecuador's courts have begun interpreting these rights, including the first case in the world where a judge ruled that nature's constitutional rights had been violated. The Vilcabamba River had been damaged by highway construction, and a court ordered the government to carry out restoration activities.

In 2010 Bolivia passed a law called Law on the Rights of Mother Earth. Bolivia also sparked a global movement to establish a Universal Declaration for the Rights of Mother Earth.

New Zealand is a world leader in recognizing the rights of nature, sparked by the efforts of the Maori. Like Canada, New Zealand is striving to achieve reconciliation with Indigenous peoples. Te Urewera National Park was created in the 1950s on land that had been illegally taken from the Maori over the course of the previous century. The Maori had consistently pressed for recognition of their relationship to this region, expressed as rangatiratanga [authority], whanaungatanga [kinship], and kaitiakitanga [stewardship].

In 2014, New Zealand passed a revolutionary law that changed the status of Te Urewera National Park to that of a legal person with a variety of rights. Those rights involve maintaining Te Urewera's biodiversity, ecological systems, and cultural heritage in perpetuity. The law empowers a guardian to defend the ecosystem's rights. Most remarkably, title to 200,000 hectares was transferred from the government to the newly created legal person. In other words, the land now owns itself. From a western legal perspective, this is mindboggling. As Dr. Nick Smith, the Minister for Environment, said, "If you'd told me 15 years ago that Parliament would almost unanimously be able to agree to this, I would have said, 'You're dreaming, mate.'"

Negotiations between the Crown and the Maori produced a second ground-breaking law in 2017 recognizing the Whanganui River as a legal person, with a range of rights. The law defines the river in Maori terms as comprising both the physical and metaphysical elements of the watershed, and transferred the Crown's title in the riverbed to the river itself. In 2018, the Maori and the government agreed to designate Mount Taranaki as a legal person, with the same rights and protections as the Whanganui River and Te Urewera.

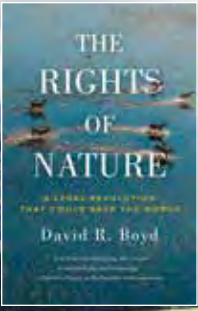
In today's interconnected world, ideas can travel with startling speed. Colombia's Constitutional Court ordered the government to recognize the rights of the Atrato River and create a guardian based on the New Zealand model. Columbia's Supreme Court extended rights to the Amazon rainforest. A court in India ruled that the Ganges and Yamuna Rivers have rights, and later clarified that these rights extend to all natural entities in these watersheds, from glaciers and waterfalls to forests and meadows. A court in Bangladesh made a similar ruling. Laws recognizing the rights of nature have been enacted in Mexico and Uganda.

Many Indigenous people in Canada possess a worldview, concisely summarized in the phrase "all my relations," which goes beyond aunts and cousins to include ravens, killer whales, water, rocks, and more. In his outstanding book *Canada's Indigenous Constitution*, Professor John Borrows indicates that nature's rights are an integral component of many First Nations' legal systems.

Some Canadians, and lawyers in particular, may struggle with the concept of granting rights to an ecosystem or a river. And yet it is far from unusual in our legal system to extend rights to non-human entities. For example, corporations are designated by the law as legal persons and enjoy a wide range of rights.

It is time for Canadians to embrace the rights of nature. This innovative approach would enable all of us to reflect on our relationship with the place we call home. Recognizing that nature has rights could help us transcend the destructive and misconceived perception that humans are separate from our environment and inherently superior to all other creatures. The air, water, soil, plants, wildlife and even the spirit of this incredible country make us who we are, and sustain us physically, mentally, and emotionally. We have to finally understand, as conservationist Aldo Leopold wrote, that nature is not a commodity that we own, but a community to which we belong.

The diversity of life on Earth is one of the most extraordinary wonders in the universe. Facing a global biodiversity emergency of our own making, we must acknowledge the incalculable value of what we are losing, and respond with unprecedented and heroic measures. **T**



David R. Boyd is an associate professor of law, policy and sustainability at UBC's Institute for Resources, Environment and Sustainability, and the author of *The Rights of Nature: A Legal Revolution that Could Save the World* (ECW Press, 2017). He is also currently serving as the United Nations Special Rapporteur on human rights and the environment.

In 2017, the Whanganui River in New Zealand was recognized as a legal person, with a range of rights.

OPINION

THE

Rights OF Nature



David Boyd, PhD'10, says it's time for Canada to embrace the legal rights of non-human animals, endangered species, and ecosystems.

We were standing on a mound in the middle of the vast Serengeti plains – my wife Anne and I holding hands as we gazed to the west into the setting sun. This was to be our farewell to the Serengeti after 50 years of biological research in the most spectacular wildlife area in the world.

We were being filmed by a crew of four capturing the scene from behind us. Suddenly, 50 metres away, up popped the heads of two male lions, staring at us. We stared back until we noticed that there was dead silence behind us. Turning around, we saw the crew now back in their trucks straining their necks like ground squirrels in their holes, wondering what was about to happen. The lions, of course, weren't interested in us. They were using the hillock just as we were – to get a good view. We enticed the ground squirrels back out of their holes to finish filming.

The documentary we were working on is *The Serengeti Rules*, which begins in the 1960s, when a group of young scientists set out to discover how nature works. I was one of those scientists. Five decades later, as I've transitioned from conducting research to helping the next generation of scientists conduct their own research, it's become my job to share what I've learned with the world outside of scientific journals.

What better way to do this than through film? *The Serengeti Rules* tells the story of how researchers elucidated the rules that create ecosystems and keep them together. These are the organizing principles that determine what species can live in an ecosystem without going extinct.

I was born in Africa and was familiar with the countryside and habitats. But when I saw the Serengeti for the first time at the age of 21, I realized it was unique in the number of species it hosts and the spectacular migrations they performed. Why was the Serengeti different from any other place on Earth? What kept it that way? There had to be some higher order rules that allowed the Serengeti to exist – some framework to explain it. And these rules should also explain all other ecosystems in the world.

The Serengeti Rules starts by documenting my long-term study, along with that of four other researchers, showing how mankind has damaged our environment, causing ecosystems to unravel and sometimes collapse completely. It illustrates these changes in the Amazon (environmental scientist John Terborgh), marine systems with killer whales (ecologist Jim Estes), the rocky shores with starfish (ecologist Bob Paine), and river habitats (zoologist Mary Power). In all these cases, the film shows how the rules of ecosystems have been abused by humans.

Then comes the Serengeti. This system had already collapsed by the 19th century due to an introduced disease called rinderpest. It killed off most of the migrating animals – indeed most of the wild animals of Africa. It was a catastrophe. My research recorded how the system was able to repair itself, taking a century to do so. Humans are still damaging our ecosystems, and this damage will disadvantage our grandchildren. But if we protect our ecosystems, use them carefully and even return lost species, we can, as in the Serengeti, repair them and keep them healthy. All is not lost if we do the right thing.

Nicolas Brown, the director of the film, was most interested in how five scientists got started and what drove us to ask our scientific questions at such an early age. To show us in the 1960s, he used actors to represent our early work. In my case, he also had the advantage of existing footage of me in the Serengeti taken by David Attenborough in 1967 and again in 1972, which was spliced into the film. We filmed the modern scenes in 2016, out on the plains and in the woodlands.



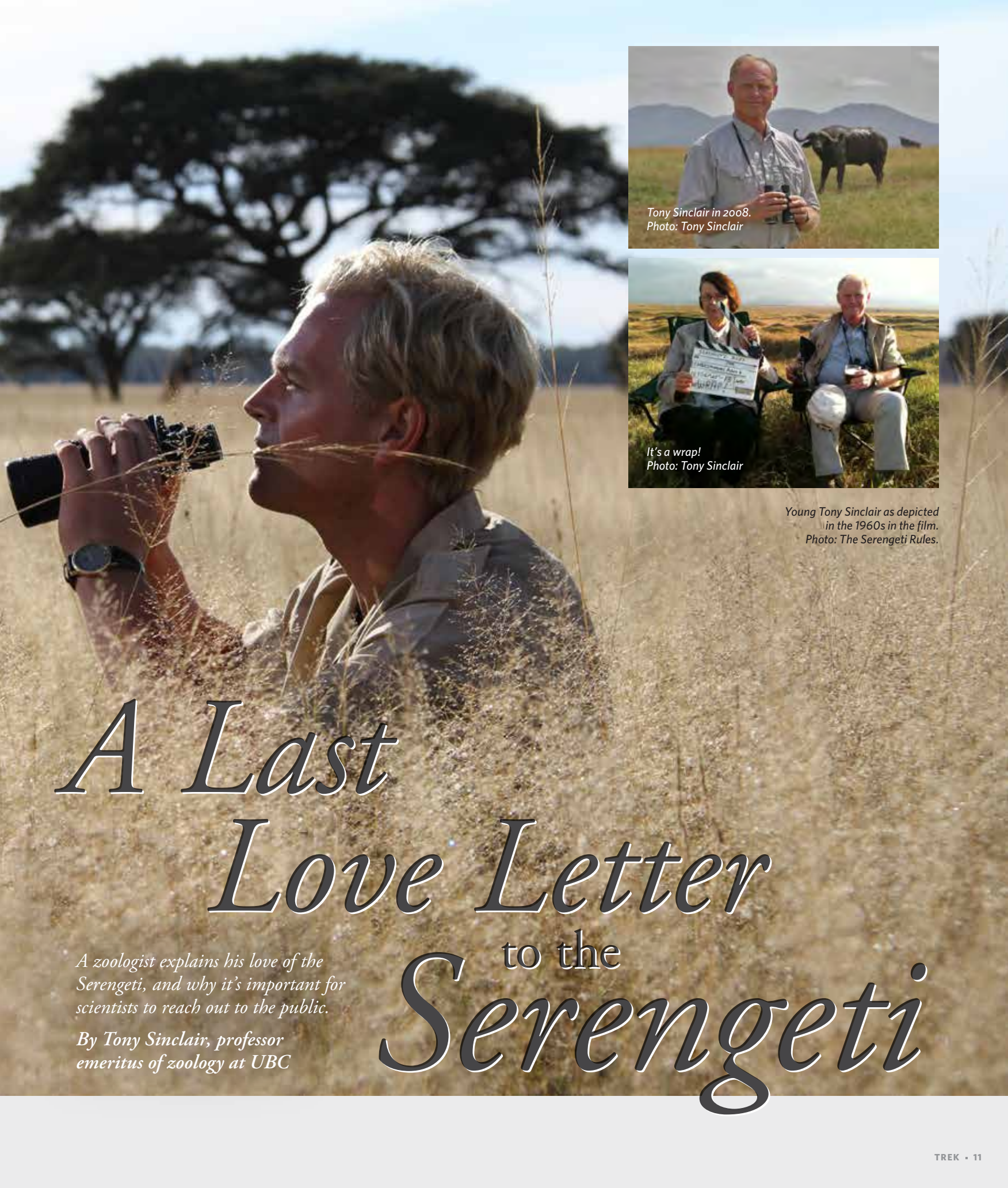
“All is not lost
if we do the
right thing.”

These scenes describe how I elucidated the rules one by one, each taking, by chance, about a decade to finally unveil.

The first and most important rule was that all ecosystems have a self-governing mechanism so that populations can't get out of control – *regulation*. If humans overrule this mechanism, there are consequences such as outbreaks of insects and extinction. There are eight rules in all and it took me 50 years to discover all of them. But the research isn't finished. There is much further to go. I've handed over this work to younger colleagues.

The message that ecosystems can be repaired needs to resonate with the public and we can share this message through documentaries such as *The Serengeti Rules*. The film shows the damage humans can cause but also how the right decisions can lead us to live in balance. Hopefully, it makes others ask themselves questions about stewardship of our environment, just as I did many decades ago. **T**

The Serengeti Rules has been shown around the world at film festivals, earning numerous awards. It will be streaming on Netflix in the near future.



Tony Sinclair in 2008.
Photo: Tony Sinclair



It's a wrap!
Photo: Tony Sinclair

Young Tony Sinclair as depicted
in the 1960s in the film.
Photo: The Serengeti Rules.

A Last Love Letter to the Serengeti

A zoologist explains his love of the Serengeti, and why it's important for scientists to reach out to the public.

By Tony Sinclair, professor emeritus of zoology at UBC



The Iconic

ELEPHANT



Elephants are key to Kenya's ecology, culture and economy, yet conflict with humans is threatening their survival. Can satellite technology provide a lifeline?

By Roberta Staley

Photos: Tallulah Photography

Twigs and other vegetation snap and crackle underfoot as a group of men tread warily through the dense and lush Nyakweri Forest in southern Kenya's Maasai Mara, tracking elephants.

Despite their vast bulk, the pachyderms are difficult to find, their wrinkled grey hides blending chameleon-like into the variegated woodland, soft round feet moving almost soundlessly on the damp forest floor. Such stealth also makes them dangerous, and the group - consisting of conservation rangers, an armed wildlife officer, a veterinarian and UBC alumnus Jake Wall, PhD'15 - are extra cautious, especially since their target is a herd of bull elephants, creatures unafraid of asserting their claim to this verdant jungle.

The group follows elephant spoor - a broken branch here, a footprint there, the occasional pile of fresh dung - and receive advice via walkie talkie from Marc Goss, CEO and helicopter pilot for Kenya's Mara Elephant Project (MEP), who is flying high above the Nyakweri canopy, helping track the herd.

Other than the sporadic radio crackle, there is silence. They must come close enough to the herd to tranquilize one individual and attach a tracking collar. The armed Kenya Wildlife Service

officer stays at the front of the group, in case an elephant charges. The team knows the drill: "get behind the gun; don't run; stand your ground."

Suddenly, the loud cracks of splintering branches - elephants feeding - indicate the herd is close. Veterinarian Campaign Limo, accompanied by Wall, who became director of Research and Conservation for MEP earlier this year, move towards them. It is imperative the animals aren't spooked, so Limo creeps further forward by himself, dart gun at the ready, the syringe barrel full of tranquilizer M99, or etorphine, which will render an elephant paralyzed but still conscious. Limo must get to within 40 to 50 metres of his target animal - about two-thirds the length of a hockey arena - for a precise hit into muscle. If he hits bone or tendon, the M99 will not be absorbed and the team's tracking efforts will have been in vain.

A detonation of startled crashing indicates that Limo has hit his target. Now, the team must find the animal in the thick underbrush, all the while moving as silently as possible to avoid alerting a nearby herd of feeding Cape buffalo - huge, burly, aggressive creatures that attack with the slightest provocation.



Left: A young bull elephant is fitted with a tracking collar.

Right: Jake Wall is director of Research and Conservation for Kenya's Mara Elephant Project.

As many as 10 million elephants roamed the African continent in 1930. Decimated by poaching, habitat loss, sport hunting and conflict with human populations, they now number just 415,000.



The spoor trail is faint, and the ranger team communicates with the helicopter for help. Five minutes later, as copper-tailed monkeys hoot warnings and black and white butterflies dance in frenetic circles about their heads, the team finds the empty syringe, with its bright pink feathered tail piece. M99 takes effect in 10 minutes, so the elephant must be close to collapse. One keen-eyed tracker detects a trail, and 15 minutes later, the team spies a grey-brown mass off in the distance. A young bull elephant is down, but lying on his sternum, limbs splayed out, left leg tucked underneath his body. With his weight bearing down on lungs and heart, the team must work fast to get the tracking collar on and administer the antidote – epinephrine – in order to minimize stress. Kneeling down beside the elephant's huge head, Wall drops his blue bag, which contains tools for cutting the heavy Kevlar band to size and bolts to secure it.

Powered by six D-cell lithium batteries, the high-tech collar contains GPS software, an inexpensive VHF beacon and an expensive Iridium satellite transmitter with data storage capability that transmits data to a software tracking system Wall co-developed called EarthRanger. Linked to the Iridium satellite system, a constellation of 66 active satellites orbiting the planet, EarthRanger gives conservationists 24-hour, real-time access to their collared research subjects, and features an alert system that allows them to intercede in instances of poaching or conflict with villagers trying to protect their crops. It has become a key tool for Protected Area Management initiatives throughout Africa.

Rangers help Wall pull the heavy collar over the elephant's neck and tighten the bolt using a socket wrench. Since the pachyderm is young, about 20 years of age, the collar must be left loose enough to accommodate future growth as well as the breeding period, called musth, when male elephants' neck muscles swell. It is not ideal, as the collar might slip off. Other frustrating fails may include malfunctioning batteries.

But collaring is the elephant's best hope in terms of the survival of his species. According to the Washington office of the World Wildlife Fund, as many as 10 million elephants roamed the African continent in 1930. Decimated by poaching, habitat loss, sport hunting and conflict with human populations, they now number just 415,000. Elephants are deemed "vulnerable" by the International Union for Conservation of Nature, which means they will become endangered unless circumstances threatening their survival improve. Keeping track of their movements not only helps protect them from poachers and human-elephant conflict, but supplies data to determine the size and location of ranges they need to thrive.

While Wall continues the collaring, the vet checks the heart rate and looks for wounds to treat. The elephant's foot and tusks are measured, and a portion of tail hair is taken for carbon

isotope analysis. By determining the C3 and C4 ratios, which are associated with different plants in the diet, scientists can determine where the elephant is feeding and whether it might be raiding farmers' crops – a key factor in human-elephant conflict.

Through all of this the elephant half-sits, fully alert yet incapable of doing anything beyond a slow, meditative flap of his ears, his trunk flaccid in front of him. He manages a deep-chested, drawn-out rumble, suggestive of deep disgruntlement. Despite the surreal experience, most elephants "will get up and start eating" afterwards, Wall remarks when the pachyderm is safely on his feet, blowing a deep, sonorous call to his herd, then vanishing like a shadow back into the forest.

Back at MEP's headquarters, doors and windows are flung open to the breeze to help keep the interior cool. (A male lion has been hanging out in the bush about 50 metres away, deterring casual strolls.) Wall peers up at an enormous, 65" Sony television screen mounted adjacent to his computer. It displays tiny elephant icons against a green and brown background that indicates geographical variance, such as forest and open grassland.

"That's him," Wall says with satisfaction, pointing to one of the icons, which is labelled "Fitz." It's the newly collared young bull, named in honour of the owner of Angama Mara safari camp, which paid the \$26,000 cost of collaring the animal, a fee covering the hardware, helicopter time, drugs, and ongoing digital and field monitoring. Fitz is one of 21 MEP-collared pachyderms that Wall and the ranger team track and

monitor on an annual budget of just \$900,000, made up entirely of donations. "It's a struggle to raise enough money to keep protecting elephants," Wall says.

And yet, as a keystone species, the African elephant is invaluable for myriad reasons, not least of which is the eco-tourism dollars each animal brings into a country, an estimated \$1.6 million over its lifetime – in comparison to \$21,000 for its raw ivory, according to the Sheldrick Wildlife Trust, a 42-year-old Kenya-based organization that operates an orphan elephant rescue and rehabilitation program.

Despite the success of today's collaring, Wall is slightly disappointed. With only metre-long tusks, Fitz isn't a likely target for poachers, and countering poaching is one of the motivations for collaring. From 2010 to 2012 alone, 100,000 elephants in Africa were killed for their ivory. While poaching has declined, thanks to harsher penalties and the vigilance of organizations like MEP – which also runs intelligence operations to disrupt poachers' clandestine killing operations, confiscate their smuggled ivory and arrest them – the slaying of elephants remains a constant threat, due to the high demand for ivory in Asia.

But Fitz's collar will still be useful. The youngster is integrated into a bachelor herd of bulls; following his movements will allow monitoring of his older buddies by proxy, including those whose larger ivories make them attractive to poachers.

The icons on the screen leave digital colour trails, allowing precise monitoring of an elephant's location and direction of travel, as well as its speed. If a digital trail turns into a longer streak, it indicates that a normally placid elephant is running. This is a warning that an elephant may be fleeing for its life, possibly from poachers or armed villagers.

The system also indicates when an elephant breaches a virtual "geo-fence" by moving into farming areas. At this time of year, maize crops are ripening. The sweetcorn is loved by pachyderms for its high caloric content and taste. However, villagers depend on it for food and income and have no qualms about protecting their precious harvest with spears and arrows.

These are emergency situations calling for immediate action – day or night – from MEP's teams of rangers, who are connected to EarthRanger's short message service (SMS) and stationed in temporary camps across the 11,500-square kilometre range MEP monitors.

Each ranger team consists of four to eight men, mostly local Maasai who have undergone rigorous training in weapons handling, conflict resolution, advanced first aid and elephant

wrangling, which is when the animals are driven out of crop fields with chili bombs and firecrackers, among other benign deterrents.

The rangers receive a text message or email informing them of changes in the behaviour of a collared elephant that could indicate crop raiding, poaching, or, if an animal is immobile for a five-hour stretch, severe injury or death. In the case of injury caused by humans, such as snaring, or wounds from arrows, spears or guns, MEP's mandate is to dispatch a helicopter and veterinarian to anaesthetize the animal and treat it. "It's incredible what elephants can heal from," says Wall.

It is largely the result of Wall's inventiveness that MEP has become a leader in Africa for hi-tech wildlife management. He began developing EarthRanger while undertaking his PhD with UBC's geography department, focusing on geospatial studies of elephants. During this time, he worked with Kenya-based Save the Elephants, writing the code and designing the database that the organization used to track 300 pachyderms across the continent. Wall was profoundly influenced by a now-retired zoology professor, Tony Sinclair ("Mr. Serengeti" – see page 10). "He was a true ecologist," says Wall. "He did unbelievable research in the Serengeti on migration and was a legend at UBC."



As they journey across the savannah, elephants transport seeds in their dung, contributing to plant biodiversity and recycling nutrients. By eating bushes, pushing over small trees and digging up soil, they help open up forests for the expansion of grasslands.



Once the elephant is tranquilized, various measurements are taken while the collar is fitted.



The icons on the screen leave digital colour trails, allowing precise monitoring of an elephant's location and direction of travel, as well as its speed. If a digital trail turns into a longer streak, it indicates that a normally placid elephant is running. This is a warning that an elephant may be fleeing for its life, possibly from poachers or armed villagers.

Wall figured out how to upload data in real time onto Google Earth while creating a backend supported by a geographic information system (GIS) provided by California-based Environmental Systems Research Institute. He went on to create a toolkit for movement-ecology analysis, using GPS tracking data and cloud-based computing to calculate elephant range across Africa.

Such data is invaluable for conservation initiatives and the development of public policy at the national level, informing African governments about crucial migration corridors that preserve connectivity between the vast feeding ranges needed by elephants, who travel anywhere from five to 65 kilometres a day in their search for food and water.

As Wall was finishing his PhD, he was approached by Vulcan Inc. in Seattle, the data company started by the late Microsoft co-founder and philanthropist Paul Allen. Vulcan was interested in elephants and the application of technology in conservation. Wall had reached his technological limits and was worried about security and the possibility of poachers hacking into his system. Acting as a consultant for Vulcan, Wall worked with their developers to build EarthRanger, recently achieving the goal of creating interface capabilities that have enabled the integration of data from various feeds: collared elephants, MEP's ranger vehicles and helicopter as well as individual trackers.

The data collected is nuanced, highly detailed and analyzable, providing a rich store of information to facilitate further study by PhD students and post-docs. "We're hoping that that data collection will help inform our conservation practices," says Wall. As an example, he points to the possibility of having farmers switch maize for sunflowers or essential oils like lavender – crops shunned by elephants. However, such agricultural changes must be made in collaboration with local communities, and switching will require more comprehensive study, such as ensuring that there are consistent markets for new crops, Wall says. Conveniently, MEP will soon accommodate additional researchers at its headquarters, thanks to construction of a new research camp with living quarters and a self-serve mess hall.

Wall maintains a level-headed objectivity when it comes to his research. But he is obviously driven not only by his love for elephants, but for Africa itself. Wall's mother worked with the Canadian International Development Agency until 2013; his father was a career diplomat with Global Affairs Canada. As a result, Wall attended high school in Kenya and fondly recalls long hikes through the African bush.

Elephants are valuable not just as a tourist draw but for the crucial role they play as environmental architects and gardeners, says Wall. As they journey across the savannah, elephants transport seeds in their dung, contributing to plant biodiversity and recycling nutrients. By eating bushes, pushing over small trees and digging up soil, they help open up forests for the expansion of grasslands, benefitting a multitude of ungulates such as zebras, wildebeest, gazelles, antelopes and giraffes populating the savannah. But habitat loss has contracted elephant ranges and reduced their sources of food, forcing them closer to human habitation.

Despite the cutting-edge science he is developing and the data he is collecting, Wall is distressed by the feeling that it may not be enough. "I feel a sense of responsibility towards elephants. But it's more than that; it's the environment. These environmental systems are collapsing before our eyes. So it's a sense of panic; sometimes I lie awake at night – stressed about what we're doing to the planet." Despite such a disheartening reality, Wall is unwavering in his work, never taking his eye off his ultimate goal. "We want to move from conflict to co-existence, where wildlife and humans can live sustainably for the long term." **T**



HOW TO CONSERVE HALF THE PLANET WITHOUT GOING HUNGRY

BY ZIA MEHRABI, RESEARCH ASSOCIATE, UBC
NAVIN RAMANKUTTY, PROFESSOR, UBC
ERLE C. ELLIS, PROFESSOR OF GEOGRAPHY AND ENVIRONMENTAL SYSTEMS, UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

Every day there are roughly 386,000 new mouths to feed, and in that same 24 hours, scientists estimate between one and 100 species will go extinct. That's it. Lost forever.

To deal with the biodiversity crisis we need to find a way to give nature more space – habitat loss is a key factor driving these extinctions. But how would this affect our food supplies?

Our research, published in *Nature Sustainability* in 2018, found it could mean we lose a lot of food – but exactly how much really depends on how we choose to give nature that space. Doing it right could mean rethinking how we do agriculture and conservation altogether.

A fair deal

OK, but how much space are we talking about here?

There have been numbers flying around since the early 1990s. Some researchers say a quarter of all the space on Earth, while others say three-quarters of all land and sea. Those in the middle ground, however, seem to suggest one half.

Leading scientists are increasingly endorsing the figure, including natural scientist E.O. Wilson, who wrote a book on it, and the former chief scientist at the World Wildlife Fund, Eric Dinerstein. These individuals are mobilizing funds, researchers, computing power and social capital to see what it takes to achieve this vision – through their organizations, The Half-Earth Project and Nature Needs Half.

The idea might seem crazy, but then again, maybe we need crazy ideas to get us to think about the better world we might be able to create.

And there is something about handing over half of the planet to nature that has an air of fairness to it – well, on the side of nature at least.

The global agricultural footprint

The reality is, most people would likely want to help save other species too (aside maybe from mosquitoes and some other pesky creatures). The upside seems massive and obvious – not in the least that our children will be able to enjoy these beautiful beings for generations to come.

But is it possible to conserve so much land and still feed everyone?

Agriculture and settlements already cover 37 per cent of the Earth's ice-free land, so it's difficult to see how we could set aside half the planet in a way that honours the needs of other species, without losing some of our agricultural lands.

Dinerstein and his colleagues found that some locations, such as the Midwest United States produce so much food that it would be “delusional” to even suggest returning them to nature.

But previous research didn't quantify or map the scale of these trade-offs at a fine enough resolution to identify what's really at stake.

Feeding people and conserving species

Our research did just that.

It found that conserving habitats for other species could cost up to 29 per cent of the calories we currently produce from our food crops. But it also found that these food losses can be minimized to as little as three per cent depending on how that land is allocated to conservation.

If people manage landscapes so they are shared between agriculture and nature conservation – and make agricultural landscapes kinder to other species – it may bring effective results while avoiding large losses in food availability.

The trick here is making our agricultural landscapes less hostile to other life. This is no small ask.

At the country scale, the study identified places where food losses would be large, including India (22 per cent) and China (12 per cent).



These two countries have the greatest number of undernourished people on the planet, 195 million and 134 million respectively. It also identified other areas, such as in Indonesia, that may be less available for conservation than previously thought.

Clearly, conflicts between nature and agriculture need to be navigated carefully. Protecting the world's most vulnerable, malnourished and food insecure populations must remain a priority. And synergies between conservation and poverty reduction need to be the primary focus.

Large potential co-benefits

But it isn't all bad news.

The study also showed that giving half the planet to nature could increase temperate and tropical forest cover by 30 to 40 per cent, which would help tackle climate change and so likely reduce the agricultural losses from extreme weather.

What's more, giving nature space might increase aspects of biodiversity important for crop yields like bees – boosting the amount of food we can produce in a given area – and help to offset some of the losses that might come from conservation.

Paula Ehrlich, the president and CEO of the E.O. Wilson Biodiversity Foundation and head of the Half-Earth Project, shared her thoughts on the scientific study:

“Identifying where conservation areas can protect the most species is key to reversing the species extinction crisis and ensuring a healthy planet for all of life, including people. Once identified, conservation protections must integrate into their planning and management systems the cultures and economies of Indigenous peoples, who are de facto the original conservationists.”

There can be little doubt that the idea of giving half the planet back to nature is visionary and aspirational. We think these new findings have important implications for how humans see their needs against those of other species. [T](#)



Rice terraces, Ubud, Indonesia. Unsplash

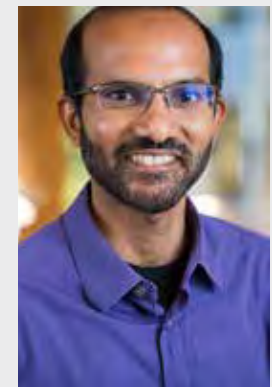
THE CONVERSATION

This article is republished from The Conversation (theconversation.com) under a Creative Commons license.



Mosaic of irrigated crops, Ohrigstad, South Africa. Unsplash

The authors gratefully acknowledge the contributions of Carly Vynne Baker and Eric Dinerstein to the writing of this article, and Paula Ehrlich for her comments.



Along with some of their UBC and international colleagues, Zia Mehrabi (L) and Navin Ramankutty (R) are now involved in a new project, “Whole Earth,” to assess the contribution of working landscapes to nature conservation and human well-being.

English grads might remember the immortal words of Captain Boyle in Seán O’Casey’s masterpiece, *Juno and the Paycock*: “I’m telling you, Joxer, the whole world’s in a terrible state of chassis.” His wife Juno and his daughter have left him, his son’s been murdered and the inheritance he was promised has disappeared. His life lies around him in ruins.

It’s not an inapt observation for our own time. Climate change, unchecked resource extraction, industrial and big city pollution, ocean acidification and a litany of other environmental disasters would indicate that our world, indeed, is in a “terrible state of chassis.”

Captain Boyle had no means – emotional, physical or financial – to get himself out of the impossible situation he’d created for himself. We, on the other hand, can intervene in our own destruction and change conditions for the better.

One such intervention involves a forthright, honest and clear-headed vision about how we should go about saving endangered species. It does, however, come with some obstacles.

“We’re not doing very well saving at-risk species,” says Dr. Tara Martin, a professor in the department of Forest and Conservation Sciences and head of the Martin Conservation Decisions lab. “We often spend the majority of our budget on species with a low likelihood of recovery at a high cost. If our objective is to save as many species as possible, it’s not a good way to spend our conservation money.”

Martin points out that we spend our own money in a much more analytical way: how much does an item cost? Will it solve the need we think we have? Would a different item be a better bet? Am I taking away from other essential resources? “The strange thing is that we haven’t been doing that kind of analysis in conservation. We’ve been shopping without price tags, assuming that we have infinite resources to do everything, everywhere.”

Cost is important, but it’s difficult to know what the price tag would be. “We need more money for species conservation and recovery,” she says, “but how much more? We have no idea what it would cost to save every species at risk in Canada.”

Dr. Martin and her team have developed a process that asks these key questions about at-risk species. The Priority Threat Management tool assesses the likelihood that a particular species can be saved and identifies the management strategies that will recover the most species for the least cost. The process examines a group of at-risk species in a region and determines what conditions are causing the species’ decline. Then, it analyses the interventions that could be done to either eliminate or mitigate those conditions, and estimates the costs of the interventions. Next, the researchers estimate the probability that those interventions, were they to be accomplished, would actually save the species from extinction.

Canada passed the Species at Risk act in 2002, and since then has listed more than 600 plants and animals at risk of extinction. The act requires the federal and provincial governments to do something to protect all these species, but doesn’t spell out how that should be done, nor does it estimate how much it would cost to do so. As a result, different government agencies and non-government organizations try gamely to save some of these species, and while some efforts are successful, others are not. Wildlife Preservation Canada, for one, has been marginally successful with its programs to save the Oregon spotted frog and the western painted turtle. The burrowing owl population in Southwest Saskatchewan, on the other hand, a poster child for soon-to-be-extinct creatures in Canada, continues to decline in spite of ongoing efforts to save it.

And that’s the crux of the problem. The burrowing owl is a spectacular creature, emerging from its ground-level nest to soar to great heights above the prairie in search of prey. But, with fewer than a thousand breeding pairs, it’s in great jeopardy and the likelihood of saving it is in doubt. With widespread loss of habitat, pollution, and the fact that it migrates between here and Mexico, there’s little that can be done unilaterally by Canada that would change the conditions of its existence. Yet, money is still being spent on its survival.

To date, the Priority Threat Management tool has been applied to a third of the Australian continent including the entire state of New South Wales. Case studies are also being undertaken in Southwest Saskatchewan, Saint John River in New Brunswick, the Fraser River Estuary, the Kootenay Bioregion and along the BC Central Coast and its salmon population. (See www.taramartin.org/research/ for details of current projects.)

“If we can increase the probability of recovering species to greater than a coin toss, then it may be possible to save a species,” says Martin. “If there are no management actions that will increase the probability of recovery to more than 50 per cent, it’s unlikely that any effort will save the species, and we’re better off investing in species that have a greater probability of recovery. We might still decide to invest in species that have a low likelihood of recovery because we value that species highly and we’re willing to take the risk of failing. But we need to be explicit about that.”

One of the main criticisms of using Priority Threat Management is that it relies on an economic model to determine which actions will save the most species for the least cost. This criticism holds that the ultimate decision to invest money in a particular species should be social, reflecting the values, cultural traditions and social benefits a species may have. And since we don’t fully understand the relationships particular species have to their environment – how the survival of one species may depend entirely on the survival of another – it’s not reasonable to base those decisions solely on economic criteria.

Another criticism of Priority Threat Management is that it provides incentive to industry to push some species to the point where their protection would be deemed too costly and unlikely to succeed. As well, critics say it gives some support to the idea that the efforts to save some species will have an adverse effect on a given industry, imperilling the economy and destroying jobs.

Martin stresses that some critics are misinterpreting the purpose of the Priority Threat Management analysis. She points out that the tool does take social values into consideration in its computations, as well as environmental and economic ones. The southern resident Orca whales in the Salish Sea are a good example. These creatures have high value to coastal indigenous peoples, and are a valuable tourist resource. But saving the killer whales also involves rescue plans for the salmon they feed on, developing strategies to deal with ocean warming, carbon sequestration and ocean stratification, and ensuring that both the tourism industry and indigenous cultures are part of the mix.

She also notes that the analysis doesn’t suggest giving up on a species because it is too expensive. Rather, if it determines that no amount of management activity or investment will save a species, it makes no sense to continue funding rescue attempts. “This happens when we leave it too late to act,” she says. “For example, it’s been 16 years since the southern mountain caribou was identified as at-risk, but no strategy has been developed to recover the species. During this time critical habitat has continued to be fragmented by industrial logging, recreational activities, oil and gas development and the effects of climate change. These long delays serve

industry rather than species, and allow business-as-usual to continue unabated. By the time an action plan is produced, it may be too late because the population has continued to decline and there may be insufficient habitat left to protect. By contrast, our approach is fast and inexpensive in comparison to action plans produced under the Act.”

Since passage of the Act in 2002, the situation for the vast majority of the 600-plus at-risk species or environments has either stayed the same or become even more dire. In response, the federal government has pledged \$1.3 billion for the cause. But how this money will be used is hard to determine. Two federal entities – Fisheries and Oceans and Environment and Climate Change Canada are responsible for managing the money. Martin is hopeful the Priority Threat Management tool can be applied going forward.

“We’ve spoken to provincial and federal departments and made many presentations and even undertaken a case study together in Southwest Saskatchewan,” says Martin. She reports some resistance to change, and an unwillingness to give up certain approaches. As well, the Priority Threat Management process is very transparent, so there’s some fear of backlash over the unavoidable tradeoffs it would present. Still, she’s seeing some positive response from government.

NGOs, she says, are extremely interested. Projects are underway with The World Wildlife Fund, the Pacific Salmon Foundation, the Lower Fraser Fisheries Alliance (comprising 22 First Nations), the Central Coast Indigenous Resource Alliance (comprising four First Nations), the Raincoast Conservation Foundation and The Nature Conservancy.

In spite of the work being done, is it too late? “It is too late for some species. But it’s not too late for many, many more. There is a better way of doing things, a more timely and effective way of determining how we can be more successful with the resources we have. We have to make decisions now with the data we have at hand.”

It may well be time to cut our losses and invest in the species we have a chance to save. The Priority Threat Management tool is one way of focussing on the at-risk species that have a chance rather than on ones that are lost.

Or as Juno Boyle says in *Juno and the Paycock*, “It’s nearly time we had a little less respect for the dead, and a little more regard for the living.” 📷



Tara Martin with her kids during the climate strike in September.

The Fraser River Estuary

The Fraser River Estuary, with its three million people, industrial centres, agricultural productivity, salmon fishery and historic First Nations culture, is home to more than 100 species considered at risk. Most at-risk species have a reasonable chance of survival, including the southern resident killer whale.

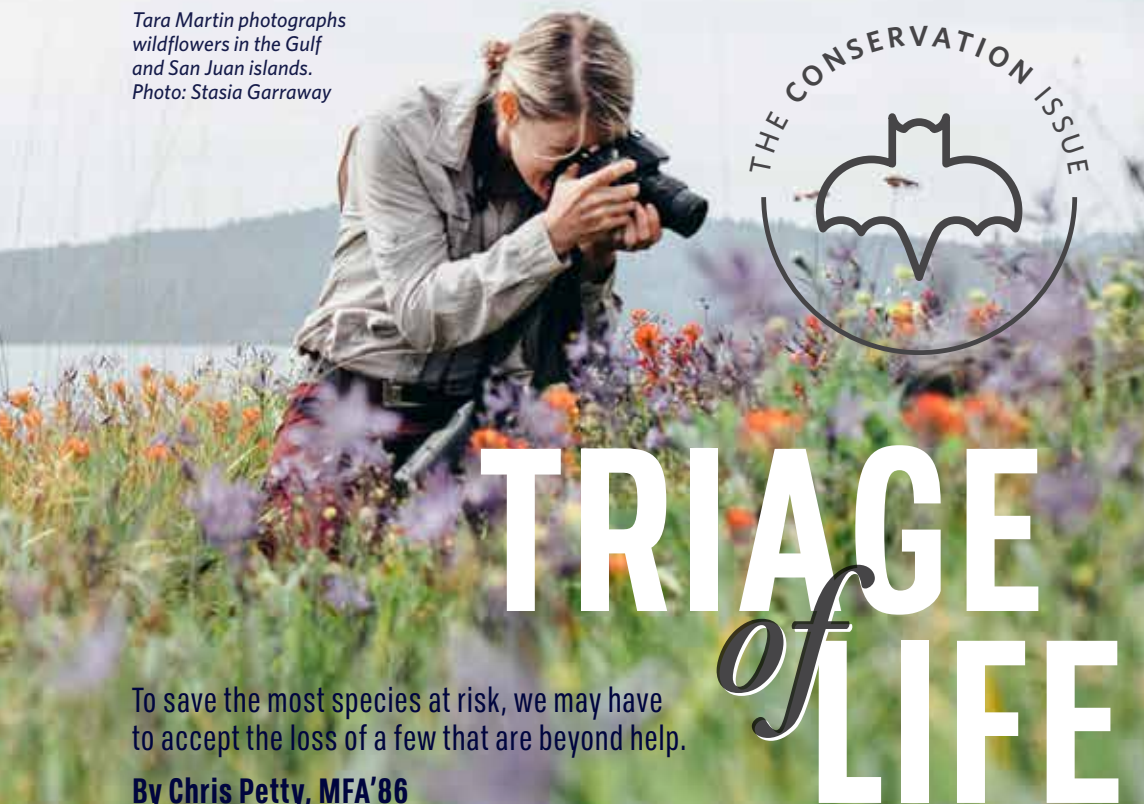
“In the Fraser River Estuary,” says Dr. Tara Martin, “we estimate that an investment of \$350 million over 25 years will be needed to give these species a chance to survive.”

Governments might shudder at such a cost, but, as Martin points out, the economic advantages of a healthy ecosystem and flourishing flora and fauna benefit all aspects of the economy. A healthy killer whale population, for example, attracts millions of dollars for the tourism industry.

At risk species in the Fraser River Estuary include:

- White sturgeon (Lower Fraser Valley)
- All salmon species
- Orca (southern resident population)
- Dungeness crab
- Western bumblebee
- Townsend’s big-eared bat
- Hoary bat
- Barn swallow
- Peregrine falcon
- Barn owl
- Western sandpiper
- Harlequin duck
- Common loon
- Purple martin
- Great blue heron

Tara Martin photographs wildflowers in the Gulf and San Juan islands.
Photo: Stasia Garraway



TRIAGE *of* LIFE

To save the most species at risk, we may have to accept the loss of a few that are beyond help.

By Chris Petty, MFA’86

FISH BANKS

The key to a sustainable world fishery may well lie in our ability to monetize conservation.

By Chris Petty, MFA'86

There's no shortage of dire warnings about the world's fisheries. The collapse of the East Coast cod fishery in 1992 and ongoing problems with the West Coast salmon fishery are just two close-to-home indicators that underline the fragility of ocean resources. Fisheries in the Mediterranean are quickly being depleted, while some fisheries off the coasts of Africa and Asia are already on deathwatch, due to the trifecta of overfishing, climate change and pollution. And while 14 per cent of the Earth's landmass is protected from extractive use, just two per cent of global oceans are in actively managed marine protected areas (MPAs).

With overfishing, the degradation of vital marine habitats, the destruction of "by-catch" species, illegal fishing and a general lack of governmental oversight, there is some doubt that the next generations of humankind will have access to the great bounty of ocean resources that we enjoy today. Worse still, this September the UN's Intergovernmental Panel on Climate Change (IPCC) reported that unchecked pollution and CO₂ production have caused the oceans to become warmer, more acidic, less able to hold oxygen and more permanently stratified. This attack on Earth's oceans is, among other things, creating havoc on already challenged fish populations around the globe.

But hope does exist. Strategies are being developed to mitigate the dwindling supply of fish, and none as interesting and exciting as some of those at UBC. Rashid Sumaila, director of the Fisheries Economics Research Unit and Tier 1 Canada Research Chair in Interdisciplinary Ocean and Fisheries Economics, is part of an international team that is using methods immersed in economic theory to stimulate both awareness of and solutions to this crisis. He and the team are investigating "fish banks" – both on the high seas and within national waters – as a way to maintain vital fisheries and, at the same time, generate economic growth.

Sumaila, whose research centres around bioeconomics, marine ecosystem valuation and the analysis of global marine issues, formulated his interest in oceans and fisheries while pursuing his PhD in Norway. "You can't get away from fish and the ocean in Norway," he says with a laugh. His initial interest was in the economics of oil, but the economics of the world's fisheries as they impact the ocean fascinated him. He tells his students that the ocean is too big, too important to destroy. "I tell them that since it's 70 per cent of the world's surface we can't afford to mess it up. If you mess up 70 per cent of your exam, you're going to fail. It's the same in the ocean."

Tying the economics of the oceans' fisheries to the current situation of that resource was a no-brainer. One of his recent efforts was to examine the state of high seas fisheries. "High seas fishing starts 200 nautical miles from the coast," he says, "and for most of the time there aren't many fish that far out." His research has shown that fishing on the high seas is not economically viable.

In a recent paper in *Science Advances*, "The Economics of Fishing the High Seas," Sumaila and the research team analyzed the relative profitability of high seas fishing in the countries that have the largest fleets (China, Taiwan, Japan, Spain, South Korea and Russia being the top six). The results were surprising. Using data from UN reporting agencies, and ship location data from Global Fishing Watch, which can track vessels in near real-time globally (visit globalfishingwatch.org to view the real-time map), the team learned that most of the high seas fishery is unprofitable.

Governments around the world subsidize their fleets to the tune of \$4.2 billion annually, which is more than double the profits made. The team also found that forced labour and low-wage labour were rampant and, combined with subsidies, the only way to rationalize these fisheries in the first place. While some specific high seas fisheries are profitable before subsidies – Chinese efforts in the northwest Pacific, for instance – on aggregate, current high seas fishing by China, Taiwan and Russia (countries that take 51 per cent of the high seas catch) would not be profitable without government subsidies and low labour costs. Other large high seas fisheries – Japan, South Korea, Spain and the US – showed profits ranging from negligible to around \$250 million after subsidies were applied. These fisheries would prove unprofitable if subsidies were eliminated and fair wages paid.

"The richest part of the ocean is within the 200-mile limit," Sumaila says. As it turns out, research shows that less than one per cent of the fish caught on the high seas spend all their time beyond the 200-mile limit. Most return to off-shore locations to feed, grow and reproduce. Tuna, for instance, is a major high seas catch, but 78 per cent of tuna, according to research,

go in and out of country waters. Why not fish these closer to shore, suggests Sumaila, where profitability is almost assured, without subsidy, and where oversight by national governments is more likely to regulate the catch.

By turning the high seas into a restricted fishing area – a fish bank – fish stocks would flourish, ready to be fished when they return to country waters. Policing such a fish bank would be daunting, Sumaila admits, but with emerging technologies and existing fining protocols through the World Trade Organization, establishment of huge no-take zones would be possible. It's an idea already embraced by the UN. "There is one high seas reserve, established near the end of Obama's term," says Sumaila. "It's in Antarctica. I don't know how they did it. Russia and China blocked it at first but the Americans were able to get it done."

But the most fascinating idea for fish banks comes from the study of a reserve area off the northeast coast of Spain on the Costa Brava – the Medes Island Marine Reserve. The reserve was established in 1983 by the Catalan government. It provides for a one square kilometre no-take zone in an area with one of the largest biomass of fish in the Mediterranean. The no-take area has become even richer in fish biomass and provides local fishers with large fish spillover outside the zone. But the most impressive result of the reserve is the massive increase in tourism in the Medes Island area. From a small tourism economy before 1983, it now generates more than US\$12 million annually for the local ecotourism economy through diving, snorkelling,

Fish Facts



About 66%

Extent of the marine environment that has been significantly altered by human actions



>55%

Ocean area covered by industrial fishing



33%

Marine fish stocks in 2015 being harvested at unsustainable levels (60% are maximally sustainably fished; 7% are underfished)



Up to 33%

Estimated share in 2011 of world's reported fish catch that is illegal, unreported or unregulated



3-25%

Projected decrease in fish biomass by the end of the century in low and high climate warming scenarios, respectively

Source: IPBES Global Assessment, 2019

Rashid Sumaila is director of the Fisheries Economics Research Unit and Tier 1 Canada Research Chair in Interdisciplinary Ocean and Fisheries Economics.



Initially, local recreational and commercial fishers were dead set against the reserve, thinking it would have a negative impact on their incomes and their community. But within five years both fishery and tourism profits were greater than before the reserve was established. Could this formula work in other locations? Sumaila thinks so.

glass-bottom boats and other ocean activities. "This is a case of the fish being more valuable alive than dead," says Sumaila.

Initially, local recreational and commercial fishers were dead set against the reserve, thinking it would have a negative impact on their incomes and their community. But within five years both fishery and tourism profits were greater than before the reserve was established. Could this formula work in other locations? Sumaila thinks so. He and the team have developed a detailed business plan that plots expenses and incomes from start-up to year eight.

They acknowledge that start-up costs are formidable. Establishing, maintaining and policing the reserve (to eliminate fishers from outside the local area) requires a substantial outlay from local government. Creating tourist infrastructure is also expensive: dive shops must be designed and built, boats and gear purchased, advertising devised and disseminated, and tourist facilities developed. As well, local fishers need to be compensated for the initial loss of fishing income.

But the business model takes all these issues into account. Maintenance of the reserve area would be covered by a portion of access fees paid by divers and snorkellers, while fishers would be compensated by a portion of these fees and through profit-sharing with tourist facilities. Although local governments would be tasked with policing and providing some of the

infrastructure necessary to support the increase in tourist activity, the increase in tax revenue would be a win on all sides.

While it's true that the Medes Island area had rich resources to begin with, there are many areas in the Mediterranean and along the coasts of Africa, South America and Asia that could flourish under a similar plan. And while existing reserves that are poorly managed often don't result in an increase in fish biomass, ecotourism does increase in areas labelled "protected," because of the attraction of exploring a pristine habitat.

Rashid Sumaila continues to make presentations to governments around the world, to the UN, to the High Seas Alliance and at industry conferences. "The creation of fish banks is a logical idea," he says. And with the promise of economic gain attached, it just might become a practical one.

Such solutions may not address the overwhelming environmental threat currently faced by our oceans. But in a world mostly focused on economic growth and development, a business model that can solve potentially devastating problems is a high calling of academic research. 



DEMAND JUSTICE
CLIMATE JUSTICE

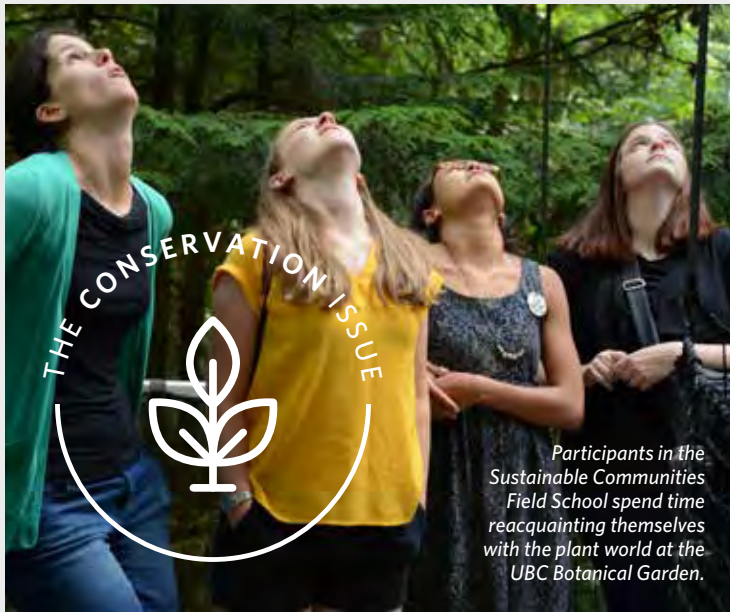
BOX OF
SECURITY
FIELD FOR
FUTURE
LAND
BLIND B&C



THE BIG PICTURE

The scene from the roof of the Robert H. Lee Alumni Centre on September 27, as students, faculty and staff added their voices to those of activists around the world calling for climate justice. The UBC climate strikers gathered outside the alumni centre and the AMS Nest before relocating to City Hall and downtown to join the main throng of Vancouver protesters.

(Photo: Zubair Hirji)



Participants in the Sustainable Communities Field School spend time reacquainting themselves with the plant world at the UBC Botanical Garden.



To Save Biodiversity and Feed the Future, First Cure “Plant Blindness”

Vanishing animals command headlines, but declining plant diversity also imperils humans



From our perches in the urban jungle – or even in the leafier parts of suburbia – we often have a tough time naming the last plant we saw. Even if we just ate part of it. This is a symptom of “plant blindness,” a term coined two decades ago by researchers who showed that modern civilization is perilously disconnected from the plant kingdom. Our blindness has progressed even further since then, to the point where we hardly recognize the plants that feed us every day.

That threat came sharply into view this spring when the United Nations reported that one million plant and animal species are at risk of extinction. Much attention focused on loss of animals – particularly the rhinos and other large charismatic ones. But the decline of plants should be just as unnerving, say researchers in a paper published shortly after in the journal *Plants, People, Planet*.

While all species have an intrinsic value, plants also provide tangible environmental, economic and cultural benefits. Even the wild ones. Plant breeders have used wild tomatoes, for instance, to increase resistance to pests and diseases so that the crop can be grown on a large scale. Other plants remediate polluted soils, or provide people with construction materials and medicines. And all plants clean and regulate the air we breathe.

“Unfortunately, we’re losing species faster than we can study and account for them,” says Tara Moreau, associate director of Sustainability and Community Programs at the UBC Botanical Garden and a co-author of the study. “Plant extinction should not be an option, and public education is key.”

As people worldwide become ever more urban, it is not surprising that plants become less visible in our lives. What is surprising is how far we have departed from knowing even the food plants that we still interact with every day, at every meal.

“It’s amazing how many people don’t even know what a potato plant is,” says Moreau. Despite this disconnect, she and her fellow study authors say that food plants can still offer a bridge to reintroduce people to the world of plants in general, as well as to the vital work of conservationists.

People’s connection (or lack of connection) with the natural world has long been recognized by social scientists as having a significant influence upon their outlook and actions. Moreau also points to recent studies suggesting that nature itself has beneficial effects on cognition and well-being. It’s reasonable to surmise, then, that sustainability education offered in a natural setting could be a powerful way of increasing the public’s appreciation of plants and the urgency of safeguarding biodiversity.

Visited by more than 250 million people every year, the world’s botanical gardens are crucial



Tara Moreau guides a field school group.

allies for addressing plant blindness, and the researchers' paper describes a range of informal education initiatives – including one at UBC – that have already emerged from collaborations between botanical gardens and related organizations, and often with a focus on food and agricultural plants.

“Food literacy – engaging people on understanding where our food comes from – has long been a focus of my work,” says Moreau, who is a former consultant with the UN’s Food and Agriculture Organization. While doing her post-doc at UBC, she started an urban farmer field school that integrated climate change education. It was popular, but Moreau soon realized she was preaching to the choir. “They already got it. They got sustainability, they got the food connection – that’s why they were there. I was interested in reaching the people that don’t get it, that don’t feel connected, that would never look for a workshop like this.”

After taking up her position at the UBC Botanical Garden, Moreau established the Sustainable Communities Field School field in 2015, in collaboration with a local non-profit called SPEC (Society Promoting Environmental Conservation). They purposely targeted local businesses and organizations, offering them

team-building workshops in the context of learning about plants and being in nature.

Much of the field schooling takes place in the food garden, which was established in the 1980s and contains about three-hundred food plants – from furry little kiwifruit to red-stemmed rhubarb to delicately fragranced herbs. It’s an intentionally sensory experience, with participants encouraged to smell, touch, taste, listen and look closely.

By focusing on food plants as an educational tool, Moreau says she is capitalizing on the existing public interest in various food movements, cooking, celebrity chefs and special diets.

“I feel like I’m a dating website, where I’m trying to connect people to plants and finding the right match. Some people connect to plants through food, some people connect to plants as medicine, other people just love forests.”

The team-building exercises are based on communication and problem-solving around four main topics: sustainable food choices, biodiversity conservation, waste reduction, and water conservation. If a team expresses

interest, Moreau is happy to tackle more complex topics such as global food systems or food poverty.


The intention is that participants become more conscious of their habits and the consequences of their choices. “The goal is critical food literacy,” says Moreau, “so that people are equipped with questions that they can ask and answer when they’re out in their day-to-day life: ‘How would I bring in a plant-based diet into this catering event that I’m organizing?’ or ‘how do we better support this in our workplace?’”

Moreau was inspired by field schools run by the UN in the 1980s for farmers in Asia and Africa, aimed at mobilizing community knowledge to reduce the use of pesticides. Rather than relying on outside experts coming in and calling the shots, the schools tapped into local knowledge around these practices – opening a dialogue, empowering the farmers, and getting buy-in.

Because the UBC field school’s ultimate aim is behaviour change, psychology is employed in its design. “We use behavioural science to inform how we communicate,” says Moreau. This is the domain of research faculty partner Jiaying Zhao, whose work focuses on how cognitive science can contribute to sustainability. Based on an examination of the cognitive, motivational, and sociocultural factors that shape perceptions of climate change, she looks for optimal ways to engage the public on biodiversity conservation.

As a result, the program is less prescriptive than it has been in the past. The tour guides celebrate what people are already doing and encourage them to think and do more, rather than chastising them for not doing enough. There is more emphasis on exchange and discussion, and less on expert decree. “Should” and “ought” have never been the greatest motivators.

In 2017 Moreau, Zhao and their research colleagues at UBC tested their educational model by surveying field school participants, as well as general visitors to the garden. They found the field school participants to be more knowledgeable about environmental issues after completing the program. They were also more connected to nature, and more willing to engage in pro-environmental behaviours compared with other garden visitors.

Encouraged by the findings, Moreau established and chairs a group to support food literacy programming in other public gardens around North America, freely sharing the curricula her team has developed. “As an educator, ultimately I want people to feel connected to nature,” she says. “If people aren’t connected to the natural landscape, they’re not going to be allies in helping to protect it.” 

Find out more and book a green team-building experience for your organization at botanicalgarden.ubc.ca/team-building

“I feel like I’m a dating website, where I’m trying to connect people to plants and finding the right match. Some people connect to plants through food, some people connect to plants as medicine, other people just love forests.”



Detail from a winning window decal design by PhD student Lora Zosia Moon

THE BIRDS...

A *thump*, a small stunned body, perhaps a grisly smear on the window-pane: most of us have seen or heard a bird crashing into glass, but it's hardly an everyday experience, and we might be forgiven for assuming that such avian accidents are isolated cases of bad luck.

Bird collisions, however, are much more common than most of us realize. In fact, buildings are glassy death traps, knocking out birds in droves. UBC student researchers who undertook the macabre task of counting telltale bodies, feathers, and smears found that as many as 10,000 birds a year die from colliding with buildings on the Point Grey campus alone.

The campus shares skies and trees with a particularly robust population of birds. This is due to its location near the Fraser River Estuary, where birds from three continents cross paths as they make their way along the Pacific Flyway, a vast migratory route from Alaska to Patagonia that's travelled by at least a billion birds.

That we need these creatures may be obvious: pollinating plants and transporting seeds, birds are essential to ecosystems – and, besides, they are lovely. What would poetry be without birds? No “thing with

UBC students, staff, and faculty from SEEDS (Social Ecological Economic Development Studies) Sustainability program have collaborated on an innovative answer. They've used campus as a living lab to create official design guidelines, part of UBC's Green Building Action Plan, to make our buildings less of a bird-bashing menace.

The Bird Friendly Building Design Guidelines draw on what scientists know about birds' visual perception. Birds see glass as thin air, or they mistake reflections for real, inviting landscapes. This means that windows in bird-friendly designs should be screened, glazed, or patterned to make the glass perceptible (window markings must have spaces no larger than two inches by four inches, otherwise birds will think they can squeeze “through” the gaps). The guidelines also recommend strategies such as installing motion-sensitive light fixtures, or simply drawing shades, to minimize the light pollution that disorients migrating birds at night.

These details might seem burdensome at first glance, but the array of bird-friendly solutions in various UBC buildings attests that designing with biodiversity in mind also encourages a diversity of creative problem-solving. For instance, the Bookstore's designers created visual markers for birds by asking the UBC community to submit their favourite literary quotes, and then etching those words in small white text across the windows. At the Beaty Biodiversity Research Centre, some windows are tucked behind exterior mesh screens, which let in plenty of light but appear solid to birds. On other panes, volunteers have doodled cheerful patterns with oil-based markers.

The Centre for Interactive Research on Sustainability (CIRS) tucks windows behind a “living wall” of vine-covered mesh. The plants lose their leaves in winter, letting in more light during rainy months and providing more shade during summer. In 2017, SEEDS hosted a campus-wide contest to design bird-friendly decals for other CIRS windows. The winning creation, by PhD student Lora Zosia Moon, featured intricately-patterned depictions of campus flora and fauna, protecting birds while educating the public about wildlife at UBC.

All these design innovations are not costly, nor are their benefits just for the birds: window screens naturally regulate buildings' temperatures, and window art gives spaces a quirky and personal touch. With this in mind, all new buildings at UBC will comply with the bird-friendly guidelines by 2020, part of the university's goal for campus buildings to make net-positive contributions to biodiversity by 2035. That's a lofty hope, perhaps, but one that's both possible and necessary.

Surely, the poets would agree. “Thou wast not born for death, immortal Bird!” cries Keats in “Ode to a Nightingale.” Granted, there might not be any nightingales at UBC – but thanks to some creative design, their comrades will warble on, “sing[ing] of summer in full-throated ease.”



Window art is both attractive and bird-friendly.

feathers,” (Emily Dickinson), no whistling blackbird's inflection and innuendo (Wallace Stevens), no darkling thrush “to fling his soul / Upon the growing gloom” (Thomas Hardy). Less obvious may be how, exactly, we can stop the thing with feathers, the blackbird, and the thrush from smacking into our windows.

WILD BEES

Rhona McAdam

We, we multitude
sun-blossomed on leaves or
dark-spotting petal
pistil stamen. Knowing each
flower's golden mean.
Sweet comfort there
for our young.
Priming our baskets
with pollen.
A day's work
and a day's work and a day and a day
more. All this purpose
purpose purpose.
The weeds the woods
the garden.
Those single single
destinations, never mix this
with that:
one source in its
many places.
We fly, we crawl, we gather.
And again.
Our futures waiting to be larded.
So many homes
we have, our
dark places, combed and tunnelled,
crumbed with our
comings and goings.
The neatness of our labours:
eggs entombed
with food
for an afterlife
we will not witness.
Our one season this
duty, duty.

*(One of ten winning entries
for a poetry competition run by
Border Free Bees and co-judged by
UBC Okanagan's Nancy Holmes)*

How many species of bees can you name? Honeybees, bumblebees... That's about as far as most of us get - but honeybees, though much discussed these days, are far from the only pollinators we rely on, nor are they native to Canada. In fact, there are more than 800 bee species in Canada, and about 20,000 in the world.

Dr. Nancy Holmes, a poet and creative writing professor at UBC Okanagan, wants us to look more closely at the pollinators buzzing around us. She began learning about bee diversity four years ago, and was astonished by the many species in her own garden: a rainbow of bees - iridescent blue, green, purple, jet-black - ranging in size from several inches to as minuscule as a grain of rice. "Suddenly I see things I've been blind to all my life," she says. "It's been a beautiful revelation in my own backyard."

Holmes' revelation was threefold: First, wild bees are seriously cute. Second, they're essential to ecosystems - one mason bee, for instance, pollinates 400 times more efficiently than a honeybee. Third, wild pollinators are in grave danger, threatened by a trifecta of disease, exposure to pesticides, and loss of habitat.

Part of the problem, according to Holmes, is that most of us aren't even aware that wild bees exist. Without a place in our imaginations, we "erase them from our possible caring and stewardship."


To change that, Holmes teamed up with Dr. Cameron Cartiere, an artist and professor at Emily Carr. If it strikes you as odd that a poet and an artist are insect advocates, consider: who better than two creative communicators to bedazzle dusty research into compelling community action? The duo founded Border Free Bees, a public art initiative that partners with scientists to raise awareness about wild pollinators, and empowers "citizen-scientists" to create bee habitats.

Since the monotony of lawns and shrubs in urban areas has starved pollinators of the diverse plants they need, Border

Free Bees transforms underused city land, such as BC Hydro rights-of-way, into vibrant meadows. In 2015, they created their first "pollinator pasture" at the Bridgeport Industrial Park, inviting 600 elementary-school students to cultivate and plant sunflowers on the plot; other children harvested mustard seeds from the meadow, and volunteers crafted "insect hotels" to encourage native bees to take up residence there. The following year, to encourage conversations about the plight of pollinators, the group planted flowers in the shape of huge bumblebee wings, visible from the airport flight path overhead.

While the Richmond pasture is carefully cultivated, the initiative also "re-wilds" other plots of underutilized land, rescuing hearty weeds from development sites and transplanting them onto their pollinator havens. (The weeds might not look like much, Holmes says, but they suit the bees just fine.)

Whether partnering with developers-turned-weed-donors or with sunflower-planting schoolchildren, community involvement is central to the initiative's ethos. Perhaps no project better exemplifies this than the Kelowna Nectar Trail, for which 101 families, businesses, churches, and schools each committed to planting and caring for a small garden. The community created more than seven kilometres of "flowery stepping stones" for pollinators to travel safely through the city.

Inevitably, Holmes has become known as the local "Bee Lady." Strangers phone the poet asking how to manage swarms and hives. "I don't know what to do about that!" she laughs. "I'm not a beekeeper!" Maybe not, but Border Free Bees is irrefutable proof that poets, scientists, and schoolchildren all have a role to play in conservation. With many stewards, the trail of flowers grows, and the bees buzz on. 

Volunteers for Border Free Bees crafted "insect hotels" to encourage native bees to take up residence.

... and THE BEES

BY RACHEL GLASSMAN, BA'18



CAUTION HUMANS IN AREA

Human-modified landscapes present challenges for the other large mammals with whom we share them. A UBC Okanagan lab is looking for the best solutions.

By Chris Cannon

In the wild hinterland of the south Okanagan, among several thousand square kilometers of semi-arid brushland and cliffs formed by long-forgotten glaciers, a graduate student from UBC's Wildlife Restoration Ecology (WiRE) Lab investigates how human-made changes in the landscape are affecting mule deer populations in British Columbia.

Nearby, between Penticton and the US border, another student maps the vulnerability and physical connectivity of California bighorn sheep.

Somewhere in the middle, a third student fits cougars with tracking collars to study the predator's relationship with the large prey in the valley – specifically, the deer and the sheep.

"So we're going to see how one student's data is eating another student's data," laughs Adam Ford, founder of the WiRE Lab at UBC's Okanagan campus in Kelowna. With the WiRE Lab's focus on

the interaction between mammals co-existing in the same ecosystem, it should come as no surprise that one student's subject might occasionally serve as another subject's snack.

Established in 2016, the WiRE Lab launched with only two students – one studying human-bear conflict in the Bow Valley of Alberta, the other looking for new ways to count wolves with a combination of camera traps and sound recordings of their howls.

It's since grown into a bustling research center for studying the relationship between humans and large animals, and the impact of human activity on the interactions between predators, prey, and plants in human-modified landscapes. Newer student projects range from moose-harvesting practices among Indigenous communities to the movements of mountain goats in Cathedral Park to the study of wolf-human contact along the rugged west coast of Vancouver Island.



Left: A wolverine overpass in Banff, Alberta

Below: Data is collected to determine how mule deer are affected by human-made changes to the landscape. Photo: Chloe Wright



Activities such as road-building can disrupt migration routes and separate predator and prey, creating large-scale conflict between humans and wildlife.

Through field experiments, GPS tracking, computer models, and satellite imagery, Ford and his students study how individuals and communities affect nature through forest management practices and urban growth, as well as how activities such as road-building can disrupt migration routes and separate predator and prey, creating large-scale conflict between humans and wildlife. This is especially true for large terrestrial mammals, which lie at the heart of the lab's research.

"Big animals have a special role to play for people," says Ford, who is also assistant professor in the Department of Biology and the Canada Research Chair in Wildlife Restoration Ecology. "These animals are also an important part of food security and cultural practices, and they are often elevated in conservation. So when people talk about conserving Yellowstone to Yukon, or the indicators of successful management in a protected area, they're often thinking about things like grizzly bears and caribou."

Ford himself was thinking of these things long before he could turn it into a profession. An avid fly-fisherman while he was still in high school, and later working as a fishing guide in the Northwest Territories during breaks from college, he'd stand in Alberta's Bow River or at the spot where the Mackenzie River drains out of Great Slave Lake and think about why fish congregate where they do.

"Fish are in predictable spots called lies," he recalls. "And I got really curious about that. I'd look up from the river and across the land, and I thought that must be the same for deer and moose and the other animals."

Measuring animal congregation has since become his academic obsession. Where do these animals want to be? Why do they want to be there? What impacts do those choices have on other animals and their own population? By the time Ford earned his PhD from UBC's Department of Zoology in 2014, he had studied a range of mammals, from chipmunks on Vancouver Island to leopards, wild dogs, and antelope in Kenya.

By using conservation study to inform conservation practice, the WiRE Lab injects science into the decision-making process, whether through direct advice to policymakers or through influencing public perception of the critical issues we face.



Above: A tagged mule deer.
Photo: TJ Gooliaff, MSc'18



Below: A tagged bear encounters human equipment.

But despite his expertise, he doesn't lead his lab students in the field, preferring instead to work as an assistant – carrying supplies and taking directions – to give them a leadership role in their projects.

"They are there to cut their teeth on those experiences on their own," he says. "And as long as they're doing it safely and have the resources to pull that off, I'm really happy for them to experience the world as they need to without me getting in the way."

In the face of massive anthropogenic impacts on that world, in which a large proportion of the Earth's animals and plants face potential extinction, the work can take a personal toll, and the responsibility can be daunting. There is always bad news for nature in the headlines – another upward tick in ocean temperature, another last-of-its-kind forest or reef, another cornerstone species winking out of existence.

But the work continues.

"The goal is not to get caught up in the negativity of it," says Ford, "to look for the victories."

These victories are often of the political stripe. Restoration ecology comes down to pushing policy change as much as studying conservation, trying to build partnerships with people, governments, and the private sector, and trying to help them build partnerships with each other.

By using conservation study to inform conservation practice, the WiRE Lab injects science into the decision-making process, whether through direct advice to policymakers or through influencing public perception of the critical issues we face.

"It's not just conservation," says Ford. "I want each student to place their work in the context of what ecological theory they are advancing. *How are you trying to save the world?* What motivates me is not how do I prepare my kids for this changing world, but how do I prepare the world for these kids?"

The centrality of policy is key to the WiRE Lab's work. Rather than just picking questions out of thin air and saying *let's see if we can translate this science into something that would change policy*, they target questions – identifying the problem first, and then designing experiments to figure out how to solve it. ("Choose any of our projects and I can tell you the

policy relevant to it," says Ford.) They then translate these solutions to fill the knowledge gap for the public and policymakers and generate real-world changes in human behaviour.

Although the WiRE Lab has only been around for three years, restoration ecology has been tackling these sorts of problems for decades. For large animals, the prevalence of human-created barriers – such as roads, pipelines, and high-tension power lines – has had a detrimental effect on their populations. Isolating animals from their food sources, mates, or protective environments can have a dramatic cumulative impact on the species.

While it is not realistic to remove these obstacles entirely, experiments have shown that these negative effects can be mitigated through projects such as bridges and tunnels – and even a "salmon cannon" that launches fish over dams – that allow animals to bypass barriers and enjoy greater freedom of movement. By conducting experiments like these and translating the results into real-world solutions for policymakers, restoration ecologists have made significant strides towards reducing the impact of human infrastructure on the natural world.

But the rest of us are part of the equation too. Politicians have more contact with constituents than with scientists, and those voters are the people they listen to. Ford would like to see more individuals voicing their environmental concerns face-to-face with politicians, telling them that glyphosate spraying in the forest is no longer acceptable, that we need to find better policy on letting fire return to the landscape, that we need better road-mitigation strategies to make them more permeable for wildlife and safer for people.

These aren't just federal and provincial issues, either. The discoveries and insights that come out of the WiRE Lab also find their way to local governments that are keen to act on environmental issues directly affecting the local community.

Ford emphasizes that these local changes can have large repercussions. By supporting biodiversity and conservation efforts on a small scale, communities can help bring about pilot programs that, if successful, can provide crucial data and blueprints for larger changes that affect the province, or even the planet.

"I feel like the biggest conservation solutions are actually about people rather than what we can learn from nature," Ford says. "I'm not a social scientist, but I do try in my work to see science as a way of resolving problems. So if I can put something on the table that everybody can agree on, then perhaps they can come together more closely to take action collectively, to make the change that they want to see in the world." ■



THE UNIVERSITY OF BRITISH COLUMBIA

\$100 million and counting

Thanks to the generosity of almost 16,000 donors, UBC's Blue & Gold Campaign for Students has already exceeded its original target of \$100 million.

Your commitment to our students is inspiring—we want to keep the momentum going and help even more students. That is why we are doubling the target to \$200 million by 2022!

We are counting on alumni like you to transform the lives of our students for generations to come.

Please donate today at
support.ubc.ca/change-their-world



Change their world so they can change ours



ALUMNI
BUILDER
AWARDS

Congratulations to our Alumni Builders

Created in 2017 as a part of *alumni UBC's* 100th anniversary, the Alumni Builder Awards recognize a cross section of alumni from all faculties who have contributed to the university and enriched the lives of others. In doing so, they have supported *alumni UBC's* vision of a global community with shared ambition for a better world and exceptional UBC. We are proud to honour the 2019-20 Alumni Builder Award recipients whose generous contributions have been recognized by their UBC faculty.

Mary Ainslie
QC, LLB'91

For her pivotal role in the competitive mooting program at the Allard School of Law and her tireless dedication to mentoring law students.

Sidney Chiu
BA'02

For his distinguished leadership and advocacy in support of the Film Production Program and for his invaluable contributions to the UBC community in the Toronto region.

Thelma Sharp Cook
BEd (Sec)'58

For her contributions to the Faculty of Education and her persistent efforts to make studying at UBC more accessible to Indigenous students.

Shelagh Davies
MSc'75

For her outstanding contributions to the field of speech language pathology education and research and to the School of Audiology and Speech Science within the UBC Faculty of Medicine.

Linda Hensman
BSc (Pharm)'74

For her national leadership in pharmacy, philanthropy, and commitment to volunteering for UBC.

Alan Hutton
BAsc'64

For his long and distinguished record of leadership, volunteerism and support for the UBC Faculty of Applied Science.

Nilufar Islam
MAsc'11, PhD'15

For her leadership in water research, and her ongoing advocacy for the School of Engineering.

aj Jaeger
BFA'13

For her advocacy of the local arts community and valued work as a community connector.

Eunice Li-Chan
BSc (Agr)'75, PhD'81

For her dedication to education and commitment to excellence in agricultural sciences and food chemistry in the Faculty of Land and Food Systems.

Tracey McVicar
BCom'90

For her long record of support, dedication and distinguished leadership in support of transformational experiences for UBC Sauder School of Business students.

Peter Smith
PhD'98

For his long record of volunteerism with the Department of Computer Science and for his continuous advocacy and support of fostering connections and opportunities for intellectual growth within the CS alumni community.

Matt Wealick
BSF'01

For his distinguished and long record of service within the Faculty of Forestry.

Richard Wilczek
DMD'81

For his loyalty and engagement as an alumnus, his long-time leadership in the profession, and his selfless dedication to the underserved.

Read more about the recipients at alumni.ubc.ca/builder

alumni UBC

alumni UBC 2019 *Achievement Awards*

PRESENTED BY **boyden**

alumni UBC is committed to an exceptional UBC and a better world. This November at the *alumni UBC* Achievement Awards, we honoured seven inspiring members of the UBC community who, through their extraordinary endeavours, have demonstrated this vision.

Congratulations to this year's recipients



YOUNG ALUMNI AWARD

Tara Cookson
BA'09

Dr. Cookson is a distinguished scholar of gender equity and social policy. Her research has contributed greatly to policy debates by revealing that aid programs intended to alleviate poverty can actually place oppressive burdens on vulnerable mothers. She is the co-founder of Ladysmith, a feminist consultancy that rigorously collects and analyzes gender equity data for international development and humanitarian organizations.



FACULTY COMMUNITY SERVICE AWARD

Douglas Clement
C.M., MD'59

Dr. Clement is a pioneer in the field of sports medicine who co-founded Canada's first sports medicine clinic. He taught sport medicine at UBC for more than 20 years and was an early advocate for exercise as a key to preventing heart disease. A former Olympic athlete, Dr. Clement inspires community spirit through sport.



VOLUNTEER LEADERSHIP AWARD

Gwendolyn Point
BEd'87

Dr. Point of the Sts'ailes First Nation is an educator, scholar, healer, knowledge keeper, cultural advisor, and leader. Her commitment to revitalizing and sharing Stó:lō language, knowledge and practices has had transformative impacts on her communities. She is known as a "bridge builder" across Indigenous and settler communities - one whose eloquence, personal strength, passion for education, and spiritual leadership inspires healing.



HONORARY ALUMNI AWARD

Deborah Buszard

Professor Buszard is a visionary champion for UBC Okanagan with a talent for forging productive community partnerships, notably with the City of Kelowna and the Okanagan Nation Alliance. As deputy vice-chancellor and principal, she has led efforts to double research funding, increased access to education for Aboriginal students, and promoted a healthy environment in which to work and learn.



GLOBAL CITIZENSHIP AWARD

David Morley
C.M., MEd'08

Mr. Morley is the president and CEO of UNICEF Canada. He brings to this role more than 40 years of experience in human rights and community development, including his leadership of organizations such as Doctors without Borders Canada and Save the Children Canada. He is known for his exceptional leadership and his commitment to addressing humanitarian issues.



RESEARCH AND INNOVATION AWARD

John MacDonald
O.C., BAsC'59, DSc'89

Dr. MacDonald is a pioneer of Canada's high-tech industry. His novel use of satellites to produce high-resolution images of Earth is what made ubiquitous technology like Google Maps possible.

Dr. MacDonald's company was also involved in developing NASA's Canadarm, an iconic remote-controlled robotic arm deployed on the Space Shuttle system. In 2001 he co-founded the successful solar energy company Day4 Energy Inc.



ALUMNI AWARD OF DISTINCTION

Dominic Barton
BA'84, LLD'12

Dr. Barton is global managing partner emeritus, McKinsey & Company, and has helped organizations from all sectors to set direction and drive change. He is also a prolific writer, who emphasizes the role business leaders can play in positive social outcomes. He chairs the Canadian Minister of Finance's Advisory Council on Economic Growth, and in September 2019 was appointed Canada's ambassador to China.


Find out more at alumni.ubc.ca/awards

alumni UBC 2020
Achievement Awards
CALL FOR NOMINATIONS

THE NEXT AWARD RECIPIENTS WON'T RAISE THEIR OWN HANDS.
THAT'S WHY WE NEED YOU!

Do you know a graduate, student, faculty or friend of UBC who deserves to be recognized as a leader, advocate, artist or visionary? This is your chance to bring them into the limelight.

To nominate online, visit alumni.ubc.ca/nominate | NOMINATION DEADLINE: **Friday, January 31, 2020**



Testing at the field research station

research FINDINGS

EFFECTIVE MONITORING FOR LEAKY OIL AND GAS WELLS

Fluctuations in atmospheric pressure can heavily influence how much natural gas leaks from wells below the ground surface at oil and gas sites, according to UBC research. However, current monitoring strategies do not take this phenomenon into account, and therefore may be under- or over-estimating the true magnitude of gas emissions.

The unintentional leakage of natural gas from oil and gas wells into the surrounding subsurface – known as fugitive gas migration – is a major environmental concern that can lead to groundwater contamination and the emission of greenhouse gases into the atmosphere.

“Currently, subsurface gas migration is monitored using infrequent or short-term location-restrictive measurements,” says Olenka Forde, a geological sciences PhD student and lead author of the study. “Our study shows that the magnitude of gas emissions to the atmosphere can depend on atmospheric pressure before and during the time of monitoring, so short-term, one-time measurements may not be representative of average emissions.”

Variations in atmospheric pressure tend to compress or expand soil gas, with the most significant impact at sites with deep water tables, explains Forde. During a high-pressure system, soil gas is compressed and pushes leaked natural gas deeper underground, where it will likely not be detected at the surface. When atmospheric pressure declines, natural gas trapped below the surface during the previous high-pressure conditions can escape to the atmosphere, contributing to greenhouse gas emissions.

To evaluate this effect, the team ran a field experiment in an area of significant historic and ongoing oil and gas development near Hudson’s Hope, in northern BC. Over a period of five days, 30 cubic metres of natural gas (98.3 per cent methane) was continuously injected 12 metres below the ground surface. Atmospheric pressure and methane emissions were then continuously measured for 24 days during and after gas injection. The researchers controlled for depth and rate of well leakage, which are key factors that influence fugitive gas migration.

“We found that the magnitude and duration of atmospheric pressure changes directly influenced the amount of natural gas coming out the ground and being emitted into the atmosphere,” says Forde. “Under high pressure conditions, methane emissions decreased, sometimes even below the detection limit. But when atmospheric pressure decreased, methane emissions increased rapidly – at times more than 20-fold in less than 24 hours.”

As a result, continuous monitoring over a longer period of time is key. “This will help to more accurately detect and evaluate gas migrations and emissions and thus, the risks posed by leaking oil and gas wells,” says Forde.

There are over four million onshore hydrocarbon wells around the world, a portion of which are known to suffer loss of structural integrity, which can lead to this type of subsurface leakage and resulting greenhouse gas emissions.

“The results of our study allow us to move towards refining and improving regulations and monitoring methods,” says co-author Aaron Cahill, co-director of the Energy and Environment Research Initiative at UBC. “This will help determine which leaky wells should be prioritized for remedial action to limit the most substantial greenhouse gas emissions.”

ROADMAP FOR BC HYDROGEN SUPPLY NETWORK

Transportation is the largest source of greenhouse gas emissions in BC. Researchers at UBC have developed a hydrogen supply chain model that can enable the adoption of zero-emission, hydrogen-powered cars – transforming them from a novelty into everyday transportation in just 30 years.

The researchers have provided an analysis of the infrastructure needed to support hydrogen cars, SUVs and mini vans in BC. They recommend a refuelling infrastructure extending from Prince George in the north to Kamloops and Vancouver in the south and Victoria in the west. Production plants would capture by-product hydrogen from chemical plants or produce it from water electrolysis and steam methane reforming. A network of refuelling stations would be established to serve consumers in major urban centres.

“Hydrogen-powered vehicles are a strong alternative to battery electric vehicles, which don’t always comply with fast-refuelling, long-distance travel or cold weather requirements,” says lead author Hoda Talebian, a PhD candidate in the Department of Mechanical Engineering at UBC. “We believe we have created the most comprehensive model for hydrogen adoption in a region like BC, where demand is still low for these types of vehicles.”

The researchers, all affiliated with UBC’s Clean Energy Research Centre (CERC), analyzed future demand for light-duty hydrogen vehicles and included the potential effects of policy tools like BC’s carbon tax and the low carbon fuel standard.

“Provided BC maintains those policies, and assuming enough hydrogen vehicles are available, our model sees hydrogen demand growing significantly every year,” says co-author and CERC program manager Omar Herrera.

The researchers note that hydrogen cars like the Toyota Mirai and Hyundai’s Nexo are already available in BC, and a public retail hydrogen station opened in Vancouver last year – Canada’s first. By 2020, Greater Vancouver and Victoria are projected to have a network of six stations.

“The momentum for hydrogen vehicles is growing, and BC is leading developments in Canada by providing supports like car sales rebates and incentives for building fuelling stations,” says engineering professor and senior study author Walter Mérida.

“However, we need a solid refuelling network to truly promote mass adoption. We hope that our framework contributes to its development and to the CleanBC plan, which includes a zero-emission vehicle mandate by 2040.”





IS THERE A GENETIC COMPONENT TO PROBLEM GAMBLING?

Biological siblings of people with gambling disorder also display markers of increased impulsivity and risk-taking, according to a UBC psychology study. The findings suggest people with gambling disorder – a psychiatric term for

serious gambling problems – may have pre-existing genetic vulnerabilities to the illness.

This study is the first to investigate vulnerabilities to gambling disorder by looking at siblings. The disorder, which is associated with severe negative consequences including depression, bankruptcy and family breakup, affects up to three per cent of the Canadian population.

“Impulsivity, risky decision-making and altered brain reward processing are observed in people with gambling disorder,” says lead author Eve Limbrick-Oldfield, a postdoctoral research fellow. “We wanted to find out whether these markers represent pre-existing vulnerabilities or are a consequence of how gambling changes the brain. To test this, we studied gamblers’ siblings since they share similar genetic material and environment.”

The researchers worked with 20 people with gambling disorder, 16 siblings and a control group of healthy volunteers. The participants were asked to complete questionnaires and cognitive computer tests that measured their impulsivity and risk-taking behaviour. They also underwent brain scanning in an MRI while playing a slot machine task, to measure brain responses to rewards and wins.

The researchers found that both the problem gamblers and the siblings reported increased risk-taking and impulsivity compared to the control group. For example, problem gamblers and their siblings were more likely to act impulsively when experiencing negative emotions, and placed larger bets when making a risky choice.

Interestingly, the siblings showed no alterations in the brain response to rewards compared to the control group, leaving the possibility that the brain activity found in problem gamblers may have developed as a result of gambling experience.

The researchers note that siblings of problem gamblers were particularly difficult to recruit for the study because family relationships are often strained as a consequence of gambling problems.

“Since our study had a relatively small sample size, we hope it will encourage other researchers to replicate it so we could learn more about how genetics play a role in the gambling disorder,” says study co-author Dr. Henrietta Bowden-Jones, director of the United Kingdom’s National Problem Gambling Clinic, from where the group with gambling disorder were recruited.

Bowden-Jones said the findings also highlight the potential for public awareness and gambling prevention.

NEXT-GENERATION BATTERY

Researchers at UBC Okanagan are collaborating with Fenix Advanced Materials of Trail, BC, to design and develop a battery that is smaller and more powerful than what’s currently available.

Using raw materials from BC-based companies, the goal is to create a tellurium-based cathode – a tiny device that will be used to make all-solid-state, lithium-tellurium batteries. Tellurium – a rare metal byproduct of copper and lead-zinc smelting – has characteristics that will enable miniature, all-solid-state lithium-tellurium battery devices with both high energy density and a high safety rating.

Rapidly expanding use of portable electronics and the evolution of electric vehicles is driving global demand for smaller but more powerful battery technology, explains Jian Liu, an assistant professor in the School of Engineering at UBC Okanagan.

“Improvements are necessary thanks to many other emerging devices such as medical implants, wireless sensors and radio-frequency identification,” says Liu. “Due to the limited space and high-reliability requirements in these new devices, researchers are exploring technologies that possess high-energy density and more stable configurations.”

One tellurium atom can store two lithium ions and two electrons – making it a potent material for storing and releasing electricity.

“Due to its high density, tellurium provides a much higher volumetric capacity than other cathode materials, such as sulfur and selenium,” explains Liu. “With the advantages of high volumetric energy density and excellent safety, all-solid-state lithium-tellurium batteries have the potential to power high-end electronic applications where a smaller size, but higher energy output is required.”

Strategic partners of this new research collaboration are all members of Metal Tech Alley – a consortium of sustainable companies that encourage and support economic development in Southern BC.

Don Freschi, CEO of Fenix Advanced Materials, says the collaboration with UBCO will result in next-generation batteries that will have an added economic benefit.

“We want to utilize and add value to the raw materials readily available in our region especially from Fenix, Teck, Retriev, Eagle Graphite and Deer Horn,” says Freschi. “This can stimulate our rural economy and advance our technological capability through circular economy.”



UBCO engineering students Peter Zhao (left) and Huibing He examine the component of a tiny lithium-tellurium battery along with assistant professor Jian Liu (right).



AMATEUR INVESTORS BETTER OFF CHOOSING STOCKS AT RANDOM

Whether they're aiming to avoid high financial management fees, control their own investments, or enjoy the thrill of playing the market, more consumers are opening investment accounts and making their own stock picks.

But a new study from the UBC Sauder School of Business has found that less experienced investors are failing to diversify – and could be putting themselves at serious financial risk. The effect is so pronounced that many amateur investors would be better off choosing stocks at complete random.

For the study, researchers first asked participants to create portfolios of financial assets using tables of previous returns, and then assessed the participants' level of financial literacy. The researchers found the investors with poor financial literacy tended to choose positively correlated assets – for example, stocks in oil companies and forestry – which tend to fluctuate in value together.

"An amateur investor might buy stocks in lumber, mining, oil and banks, and believe they are diversifying because they're investing in different companies and sectors," says David Hardisty, study co-author and assistant professor at UBC Sauder. "But because all of those equities tend to move in unison, it can be quite risky, because all the assets can potentially plunge at the same time."

More experienced investors know to hedge their bets by including negatively correlated assets, which are likely to move down when others go up – or uncorrelated assets (ones that move up and down independently of the others) in order to mitigate losses.

The researchers also found that the amateur investors were actively preferring correlated assets because they seemed less complicated and more predictable.

"If it seems predictable, it seems safer and easier to track," explains Hardisty. "Whereas if you have a combination of assets that all go in different directions, it seems chaotic, unpredictable and riskier."

Ironically, when the study participants were encouraged to take more risk when creating a portfolio, the amateur investors ended up making safer, more diversified selections, compared to when they were encouraged to avoid risk.

"This shows that amateur investors rely on a definition of risk that greatly differs from the objective definition of portfolio risk," says assistant professor and study co-author Yann Cornil.

The researchers found that when amateur investors are shown the aggregate returns of portfolios (and not merely the returns of each asset composing the portfolio), they can see that having negatively correlated or uncorrelated assets is the winning investment strategy – even if it might seem counterintuitive to play both sides.

Hardisty hopes the research will encourage investors to educate themselves on investment strategies, and use the diversification tools that online investment services provide to properly balance their portfolios.

"In the best-case scenario you could make lots of money and have an extra vacation or buy a car or something like that," he explains of the positively correlated accounts. "But if your whole portfolio crashes you could risk losing your life savings. So, the best-case scenario isn't that much better, but the worst-case scenario is a whole lot worse."

HIRING COMMITTEES AND GENDER BIAS

Is gender bias in hiring really a thing?

Opinions vary, but a study by a UBC psychologist and researchers in France reveals that hiring committees who denied it's a problem were less likely to promote women.

"Our evidence suggests that when people recognize women might face barriers, they are more able to put aside their own biases," says Toni Schmader, a UBC psychology professor and Canada Research Chair in social psychology. "We don't see any favourability for or against male or female candidates among those committees who believe they need to be vigilant to the possibility that biases could be creeping in to their decision-making."

The study was unique in that findings were based on actual decisions made by 40 hiring committees in France, charged with filling elite research positions with the National Committee for Scientific Research (CNRS) for two consecutive years. Past research in this area has relied mostly on hypothetical scenarios, such as presenting a large sample of participants with identical resumés bearing either male or female names and asking who they would hire. By contrast, the decisions made during this study had real impact on scientists' careers.

With cooperation from the CNRS, the researchers were able to first measure how strongly hiring committee members associated men with science. They did this using an "implicit association test" that flashes words on a computer screen and measures how quickly participants are able to assign those words to a particular category. People who make a strong association between men and science have to think a bit longer, and react more slowly, when challenged to pair female-related words with science concepts.

Both men and women on the hiring committees tended to show the science = male association, which is difficult to hide in such a test.

"There's research suggesting that you can document a 'think science, think male' implicit association showing up with kids as early as elementary school," Schmader says. "We learn associations from what we see in our environment. If we don't see a lot of women who are role models in science, then we learn to associate science more with men than women."

These implicit associations are distinct from people's explicit beliefs about women in science. In a separate survey that asked panellists directly whether women in science careers are impacted by such things as discrimination and family constraints, some hiring committees minimized those issues. Others acknowledged them.

When the researchers compared these implicit and explicit beliefs with the actual hiring outcomes, they learned that committees attuned to the barriers women face were more likely to overcome their implicit science/male associations when selecting candidates for the job. Among committees that believed "science isn't sexist," those which implicitly associated science more with men promoted fewer women. The difference was especially pronounced in year two of the study, when committee members would have been less conscious of the fact that their selections were being studied.

The findings show that awareness and acknowledgement of the barriers women face might be key to making sure implicit biases don't affect hiring decisions. They also point to the importance of educating hiring committees about gender bias and how to guard against it, Schmader says.





Michael Ko with his invention

Voice-Operated Wheelchair Brings Independence

A UBC STUDENT BECOMES AN INVENTOR TO HELP BROTHER WITH MUSCULAR DYSTROPHY

By Lou Corpuz-Bosshart



The family calls the setup Eva, after a character in one of the brothers' favourite films, *Wall-E*.



Watching his older brother Daniel struggle with Duchenne muscular dystrophy – a disease that progressively weakens the muscles and eventually leaves the individual unable to walk – is one of the hardest things UBC student Michael Ko has ever had to do in his life.

In response, Michael, currently in his fourth year in UBC's engineering physics program, turned to technology and his knack for invention to help his brother do simple tasks and find a measure of enjoyment in life.

Daniel, now 28, was diagnosed with the condition as a child and needed a wheelchair by age eight. Two years ago, he started having difficulties speaking following an operation that involved his vocal chords. This meant that Google Assistant, which he relied on to manipulate his environment, could no longer recognize his commands.

"Due to Daniel's physical challenges, being able to use Google Assistant to play music and do other things is very important," says Michael. "I realized that with a voice-assistive device he could continue using Google Assistant and keep some of his independence."

Fired up with the idea, Michael taught himself basic programming and electrical engineering throughout the summer of 2018, relying mainly on YouTube videos and trial and error to build a controller that responds to Daniel's voice. As a result, Daniel was able to access Google Assistant by saying an easy keyword, instead of having to enunciate "Hello Google" or "Okay Google."

A year later, a new challenge came along when Daniel's arms got weaker and he found it increasingly difficult to operate his wheelchair.


"This chair is important to our family and we've made many good memories with it," says Michael. In the past, while using the electric wheelchair, his brother could join family dinners, go out to meet friends or enjoy a visit to the mall.

Once again, Michael set to work, diving deep into voice recognition programming to build a voice-activated micro-controller that operates Daniel's wheelchair when given simplified vocal commands.

Along with programming the software, Michael designed the joystick controller and mount, figuring out how to manipulate the wheelchair's joystick using mechanical motions and making all the electrical connections work.

The family now calls the setup Eva, after a character in one of the brothers' favourite films, *Wall-E*. Eva is built to recognize simple commands, turning left when Daniel calls out "Eva, L" or going right when he says "Eva, R."

Eva may well be the first personalized voice-operated wheelchair, but Michael is less concerned about accolades and more intent on helping people like his brother, who face incredibly difficult situations in their day-to-day lives. With two years left in his program at UBC's faculty of applied science, he's looking forward to learning as much as he can about engineering and computer science in order to develop more assistive devices in the future.

"Sometimes the challenges we face can seem overwhelming," says Michael, "but at the same time I think it's important to remember that we can always try our best to overcome them and that eventually, we will." 



WILLS & TRUSTS

RRSPS, RRIFS & TFSAS



**PERSONAL PROPERTY
& REAL ESTATE**



**GENEROUS GIFTS
COME IN EVERY
SHAPE AND SIZE**



INTERNATIONAL GIFTS



SECURITIES

**EVERY DONOR IS UNIQUE.
EVERY GIFT MAKES A DIFFERENCE.**

Explore your giving options with our professional gift planning team.

www.giftandestateplanning.ubc.ca or 604.822.5373

support UBC



HOW NATURE RESHAPES WINGS

Birds come in an astounding array of shapes and colours. But it's their physical prowess – like a bald eagle's incredible ability to soar – that captivates human imagination.

An enduring mystery is why bird species with similar flight styles or body sizes don't have consistent wing shapes. All hummingbirds, and some species of falcons, hawks, kingfishers and passerines can hover, but the birds have strikingly different morphologies and are only distantly related. Ravens soar like eagles while their look-alike cousins, crows, stick more closely to the ground.

UBC research helps explain why. Bird species tend to reshape the range of motion of their wings – rather than wing shape or size itself – as they evolve new ways of flying.

"Birds essentially swim through the air. They flex, extend and bend their wings in flight," explains lead author Vikram Baliga. "As a bird specializes in a flight style, nature doesn't appear to reshape the size or shape of the wing as much as it remodels the wing's range of motion. Much like a swimmer adjusting their stroke."

Hovering birds, according to the research, are relatively restricted in their ability to extend their elbows, but have a generous capability to move their wrist.


"Hummingbirds basically tuck their elbows in and predominately rely on rapidly swinging their wings at the wrist joint," says Baliga. "For birds that glide, it's more about maintaining the position of the limbs to keep steady sail. The most restricted species in our study are the bald eagle (*Haliaeetus leucocephalus*) and the sooty shearwater (*Ardenna grisea*), both of which frequently soar and glide."



Baliga and UBC zoologists Douglas Altshuler and Ildiko Szabo categorized 61 species of birds by flight style – from hovering to gliding to soaring. Using samples collected by the UBC Beaty Biodiversity Museum, the researchers manually measured the shape, flexibility and extendibility of each species' wing. They also built an evolutionary family tree of the birds to then determine how range of motion evolved in the wrists and elbows of birds' wings.

This work provides insights for drone and aircraft design. Engineers are looking to nature, using bioinspiration to improve flying performance.

"By looking across avian flight diversity, our research has determined one component of how birds use their wings," says Baliga. "We're working towards understanding how wings in nature morph during flight so that the knowledge can be applied to unmanned aerial vehicles – particularly in turbulence, wind gusts, or when attacked by aerial predators.

"Evolution has tested a range of wing designs and motions for specific circumstances. Looking at the restrictions that nature places on birds of different sizes and flight styles can help us understand what does and does not work when designing new technology." 

Wings from several birds. Specimens from UBC's Beaty Biodiversity Museum. Photo: Vikram Baliga.



This fall my 18-year-old daughter enrolled in my alma mater. Where did the time go?

If a new season of life has you thinking about buying or selling a home, let's talk. We can grab coffee and reminisce about the days when UBC was mostly parking lots.

Give me a call or text 604-329-3288

**I'm a UBC grad.
Now I'm a UBC dad.**



homesbydavidyoung.com

young@dexterrealty.com

2019-20 ALUMNI UBC BOARD OF DIRECTORS

Officers of the Board of Directors:



CHAIR
Ross Langford,
BCom'89, LLB'89



VICE-CHAIR
Debra Hewson,
BA'81



TREASURER
Barbara Anderson,
BSc'78



PAST CHAIR
Randy Findlay,
BAsC'73

Members at Large:

TERMS ENDING 2020

Barbara Anderson, BSc'78
Shelina Esmail, BA'93
Ross Langford, BCom'89, LLB'89



Barbara Anderson



Shelina Esmail



Ross Langford

TERMS ENDING 2021

Amir Adnani, BSc'01
Stephen Brooks, BA'92
Randy Findlay, BAsC'73
Debra Hewson, BA'81
Leslie Lee, BCom'84
Rahim Moloo, LLB'05
Shom Sen, BCom'84



Amir Adnani



Stephen Brooks



Randy Findlay



Debra Hewson



Leslie Lee



Rahim Moloo

TERMS ENDING 2022

Aleem Bandali, BA'99
Ian Banks, BA'92
Miranda Huron, BA'92, MEd'16
Patricia Mohr, BA'68, MA'70
Fred Withers, BCom'77



Shom Sen



Aleem Bandali



Ian Banks



Miranda Huron



Patricia Mohr



Fred Withers

Ex-Officio:



UBC PRESIDENT AND VICE-CHANCELLOR
Santa J. Ono



UBC CHANCELLOR
Lindsay Gordon,
BA'73, MBA'76



VICE-PRESIDENT, DEVELOPMENT AND ALUMNI ENGAGEMENT; PRESIDENT'S DESIGNATE
Heather McCaw,
BCom'86



INTERIM ASSOCIATE VICE-PRESIDENT, ALUMNI; EXECUTIVE DIRECTOR, ALUMNI UBC
Natalie
Cook Zywicki



TIME TO ESCAPE.

Save **up to 25% off** base rates when you visit avis.com/ubcalumni and use Avis Worldwide Discount number (AWD) # **C403200**.

In addition, Aeroplan® Members can earn Aeroplan Miles at participating Avis locations, worldwide.

AVIS®

For full terms and conditions visit avis.com/ubcalumni
©2018 Aviscar, Inc. All Rights Reserved. @Avis is a registered trademark licensed to Aviscar Inc., for use in Canada. @Aeroplan is a registered trademark of Aeroplan Canada Inc.

HELLO, SAVINGS.

Get great rates with Budget.

Our name says it all, save **up to 25% off** base rates when you visit budget.com/ubcalumni and use Budget Customer Discount number (BCD) # **A050800**.

If you are an Aeroplan® Member you can also earn Aeroplan Miles at participating Budget locations, worldwide.



Budget®

For full terms and conditions visit budget.com/ubcalumni.
©2018 Budgetcar, Inc. All Rights Reserved. @Budget is a registered trademark licensed to Budgetcar Inc., for use in Canada. @Aeroplan is a registered trademark of Aeroplan Canada Inc.



PETS + US®

ACCIDENTS HAPPEN. PETS GET SICK.

You can't predict if and when your pet will need to go to the veterinarian, but you can be ready!

With any Accident or Accident & Illness pet insurance policy provided by our partner Pets Plus Us, you can save up to 90% on veterinary bills* - **AND University of British Columbia Alumni and staff receive a 5% DISCOUNT on the monthly premium!**



CALL US TO ENROLL YOUR DOG OR CAT IN PET INSURANCE TODAY!

1-800-364-8422 | USE OFFER CODE "UBC19"



OR GO ONLINE AT www.petsplusus.com/partner/ubc19

*The information herein is summarized. All pet insurance plans have limitations and exclusions. Specific products, features, rates, and discounts may vary by province/territory, eligibility, and are subject to change.

©2019 PTZ Insurance Services Ltd. All rights reserved. Pets Plus Us is a division of PTZ Insurance Services Ltd. and its products are underwritten by Northbridge General Insurance Corporation and are distributed by PTZ Insurance Services Ltd. & Sodaco Juridique Inc. in Quebec, and are available in all provinces and territories. Pets Plus Us, Pets Plus Us & Design and related words and logos are trademarks and the property of PTZ Insurance Services Ltd.



quote

UNQUOTE

“Our planet is the only one with badgers and dragonflies – and chocolate! It’s worth fighting for.”

David Suzuki on the biodiversity and climate crises. (Georgia Straight, September 10)

“Although she doesn’t speak in a powerfully rhetorical way – the kind of thing that we expect to hear from politicians or celebrities – she’s a lot like the kid in the Hans Christian Andersen story who points out that the emperor has no clothes. She’s just so blunt and direct and uncompromising and that’s just extremely powerful.”

UBC Okanagan professor of environmental humanities **Greg Garrard**, on the attention Greta Thunberg is drawing to climate change. (CBC News, October 26)

“I want to be clear, UBC does not endorse the views of controversial speakers or the organizations that book them or any other speakers who are invited to its campuses. The fundamental issue here is what the university stands for. I believe, and the Vancouver Senate statement on Academic Freedom clearly articulates, that UBC must be an open and inclusive forum, where members of the University have the freedom ‘to engage in full and unrestricted consideration of any opinion’. Selectively shutting down conversations on complex and challenging topics undermines that crucial foundation that enables challenge of the status quo. Ultimately, silenced opinions are not subject to ‘full and unrestricted consideration.’”

Provost **Andrew Szeri** commenting on free speech and speakers who rent UBC venues whose views are considered by some to be inflammatory or offensive. (UBC News, June 9)

“We need a fundamentally new energy technology that can be scaled within the span of a human lifetime. Achieving this goal requires scientists to be afforded the opportunity to do daring work. This program provided us with a safe environment to take the long shot – given the profound impact this could have on society, we should remain open to it even if there is an unknown probability of success.”

Professor of chemistry and chemical and biological engineering **Curtis Berlinguette** commenting on a group of scientists’ partnership with Google to investigate cold fusion, a type of benign nuclear reaction hypothesized to occur at room temperature. (UBC News, May 27)

“We all have that resiliency within us – especially if you come from a place where you’ve had to learn to survive... By any number of statistics, I shouldn’t be where I am... I’ve fallen and got back up, survived violence, worked two or three jobs to make ends meet as a single mom. In my journey, I keep getting better and healthier.”

Alumna **Dawn Johnson** on graduating from UBC’s Allard School of Law. She was a child in the foster system, lived on the streets, survived abuse, became a teen mom, and dropped out of school in Grade 7. (Globe & Mail, May 21)

“We’re grateful to UBC for providing space and a great room that works for prayer... I like to imagine prayer as my refuge from the world. When I put my forehead down, it’s like speaking to a friend and letting the burdens in my life go. It’s a time to reconnect with yourself and feel grounded again.”

Tuqa Al-Shakarchi, a second-year dental hygiene student and president of the AMS Thaqalayn Muslim Association, commenting on UBC opening an additional temporary prayer room for Muslim students during exam time. (UBC News, April 17)

“Diversity is essential in all facets of our society, and certainly so in engineering... For example, a man who doesn’t have the lived experience of using an intrauterine device (IUD) should not be the lead designer on this type of product.”

UBC alumna **Annalies Tjebbes**, who graduated through the biomedical option in UBC’s electrical engineering program. (UBC News, May 14)

“You can’t blueberry your way out of a depression! Nor will a detox enema help. An anti-inflammatory diet may help to prevent those illnesses associated with inflammation, including depression, but it isn’t a form of treatment.”

Clinical assistant prof **Diane McIntosh**, who is a leading proponent in Canada of the emerging theory that depression is a disease caused by the body’s immune system. (Globe & Mail, October 20)

“... the era of writing letters and asking nicely [is over]... We are demanding action, and we are willing to cause disruption and make certain sacrifices in order

to do that because we realize that all the conventional methods of campaigning and trying to communicate have failed.”

PhD student **Maayan Kreitzman**, who is a volunteer with Extinction Rebellion Vancouver. (Vancouver Sun, October 25)

“Often, resources for music education... are cut or not available in elementary and secondary schools so that they could focus on math, science and English. The irony is that music education... can be the very thing that improves all-around academic achievement and an ideal way to have students learn more holistically in schools.”

~ Professor of education **Peter Gouzouasis** discussing a study he led that found high school students who take music courses score significantly better on math, science and English exams than their non-musical peers. (UBC News, June 14)





Need help with information management at your organization?

UBC iSchool students are available to help you collect, organize, preserve, digitize and make information available!

Employer options

Paid work opportunities

Students are available year-round for 4 or 8 month co-op work terms beginning in January, May and September.

Professional experiences

Hands-on work, project based or independent work (120 hours), and job shadow experiences.

Types of work for students

- Archives & Records Management
- Preservation & Digitization of Information
- UX & Information Design
- Information & Data Analysis
- Library & Information Services
- Information Systems
- Qualitative & Quantitative Research
- Information Policy

Hire a UBC iSchool graduate student for all your information needs.



THE UNIVERSITY OF BRITISH COLUMBIA

iSchool

Faculty of Arts

Contact Kevin Day, UBC iSchool Educational Services Coordinator
ischool.edsc@ubc.ca | 604-822-2461 | slais.ubc.ca/hire

rewind

Crisp fall days, freshly sharpened pencils, and... waiting in line? For those at UBC before the mid-80s, the words “back to school” likely conjure memories of in-person course registration. Various descriptions include “a horror,” “nightmarish,” and “a test of endurance,” the process involving rushing around campus and standing in a series of lines in order to gain entry to one’s desired courses.

“At UBC, as in the army, it’s ‘Hurry up and wait,’” complained the *Ubyyssey* in 1959. “The system brings ulcers.”

Ever resourceful, students schemed to beat the queues. Some planned with military precision their route to collect the punched cards signifying entrance to each course, strategically weighing the distance between registration locations against the popularity of each desired class, then running from building to building in a cloud of anxiety.



REGISTRATION WOES

To claim prime spots in line, others simply showed up at 6:00 AM. A student could also licitly skip the lines, according to the *Ubyyssey* in 1963, if she were pregnant or a “girl who faints in lineups.”

Was every so-called girlish swoon 100 per cent authentic? It’s doubtful: a little creativity was useful for victory at the registration desks. Allegedly, one student donned overalls and pretended to be a maintenance worker; another told guards he was a professor manning the desk; a third flashed a printed press badge and claimed to be a reporter. Another student, hobbling pitifully on crutches to the front of a line, made a miraculous recovery the moment he’d completed his paperwork, striding away sans crutches.

Registration even inspired tortured poetry: “My feet ache / o god, how they ache . . . I hate having to number myself like an / i.b.m. machine / it’s inhuman . . . now look here professors, why do you have / to go on lunch just when I get to the front of the line?”

The moans, ulcers, and aching feet eventually joined the annals of history. By 1987, students could register by telephone, and, by 2001, online. Today’s students still rush to nab coveted spots in courses, but they do so with one click – at home, in pyjamas, tea in hand, no fainting required. **T**

Registration line, September 30, 1951.
Photo courtesy UBC Archives
(UBC 1.1/6629)

GOURMET GRADS SHARE STORIES AND RECIPES

TABLE TALK

BY RACHEL GLASSMAN, BA'18

Evan Elman, like Odysseus, is a man of twists and turns – someone in possession of intense focus and discipline, with an impressive ability to steer himself into seemingly-endless calamities. (He'll cheerfully say things like, "So after almost dying in Antarctica, I swallowed paint thinner by accident.") Somehow, he's still here to tell the tale. After working as a line cook throughout his time at UBC, Elman entered Vancouver's high-end dining scene at places like the Flying Pig, Hawksworth, and Relais & Chateaux's Wedgewood Hotel. Along the way, he had a few adventures.

There was his stint in Antarctica as sous-chef on a Russian research-vessel-turned-cruise-ship, where he spent his rare breaks getting up close and personal with 600 penguins ("some pecked at me"), and the rest of his time cooking for 120 passengers. The cooking and dining conditions were far from ideal. During one storm in the Drake Passage, some of the roughest seas in the world, "We got hit with a rogue wave that knocked everybody's plates off their tables at dinner," Elman recalls. In the kitchen, pots of boiling water and hot oil flew off the stove, and outside it was so cold that seawater froze onto the boat, slowly dragging it sideways and requiring crew members to pound its side with sledge hammers throughout the night. Elman says he feared for his life. "I was thinking, *This ship's for sure gonna capsiz*." Regardless, he made dinner.

The Antarctic storms actually weren't so bad, Elman reflects, compared to the month he spent cooking on a fishing boat: "That was bad, because those guys were a bunch of sociopathic fishermen from Courtenay." A drunken fisherman cornered Elman in the walk-in fridge, threw boxes of food out the window, and hit him in the face with a metal bar. "It was aluminum, so it wasn't devastating," Elman says. "But my nose was bleeding everywhere. I got \$5000 for the month – not worth getting beat up in a cooler."

Aside from the hazards of catastrophic storms, aluminum bars to the face, and drinking paint thinner in Tierra del Fuego (someone had stored it



Evan Elman, BA'14

in a water bottle; Elman was fine, although he did have to endure "a Russian doctor screaming" as he threw up over the toilet, "getting fed charcoal by some Californian doctor," and "burping up paint thinner for the next two weeks"), the chef values his time working in extreme conditions. On the ships, he says, "I had nowhere to run. I had no vices. I had no contact with the outside world. I had no one to give me a hug and tell me things would be okay." The result, though emotionally trying, was a creative immersion: "If you lock yourself in a room for 50 days, you're going to make something incredible, and you're going to train yourself to become more diligent and more patient."

Diligence is certainly a quality Elman possesses; he's no stranger to 80 consecutive work days and 15-hour shifts. Eventually, though, the fascination with all-encompassing work and far-flung adventure began to wane. When Elman met his now-fiancée, with whom he has a baby girl, for the first time he wanted to slow down and stay close to home. "I have so much more to lose at this point," he says.

His definition of slowing down, of course, is not entirely sedate. Elman became executive chef at

Dinner in the Sky, where staff and guests float in harnesses, strapped to an outdoor table, 100 feet off the ground. Most recently, Elman started Verde Experiences, offering private fine-dining and catering meals infused with cannabis. The company creates gourmet food, he says, with the option to dose precise amounts of cannabis – a classy upgrade, his website says, on the days of "getting far too stoned and waking up the next morning covered in Cheeto dust, realizing I'd binge-watched all three 'Robo-Cops.'"

In the absence of adrenaline-pumping conditions, what keeps Elman excited in the kitchen? His diners taking their first bites. "It's just this moment – a 10-second window – where all you hear is quiet, cutlery clinking on the plates, and then, *Oh my God, this is sooo good*. Being able to change people's experience for that brief moment is so gratifying." Quiet, when you're doing what you love, is as thrilling as 10-metre waves in the Drake Passage.



Photo by Erin Brooke Burns, Avenue magazine.

Gwendolyn Richards, MJ'13

When Gwendolyn Richards was a crime reporter at the *Calgary Herald*, she'd show up at crime scenes in red, patent, peep-toe high heels. She spent her work days listening to a police scanner, then rushing to the scenes of accidents or interviewing people who had lost loved ones in shootings. At the end of those devastating days, Richards would seek refuge in her kitchen, where the "bright, hot, sour flavours" she brewed up, like her red shoes, created a bit of stubborn happiness.

The comfort that cooking evoked was especially welcome for Richards in April 2008, when she was reporting on a gang war gripping Calgary with near-record numbers of homicides. Desperate to immerse herself in something that wasn't unrelentingly sad, she started a food blog, *Patent and the Pantry*.

Ever since, she's been sharing with readers her cooking successes and struggles (scones were nearly her Waterloo), focusing on enjoyment rather than feats of culinary perfection. "Cooking doesn't have to be a contact sport," she says – It's just meant to make you happy.

Following that brightness, Richards left crime scenes behind to become a food journalist and eventually published a cookbook. She knew what her book's theme would be when an editor at the *Herald* banned her, a self-declared citrus fanatic, from pitching any more lemon recipes. In a characteristically bold move, instead of reining in her obsession, Richards made it the star of the show and created *Pucker: A Cookbook for Citrus Lovers*.

Richards wrote, food-styled, and photographed the recipes for *Pucker* while working full-time at the newspaper – recipe-testing until 3:00 am, then whizzing back to the office by 7:00. The worst part was not the exhaustion, she says, but the piles of dirty dishes: "Nobody tells you about that part! If you're a famous chef you have minions to do that, but not so much when you're just doing it at home."

The sleepless, minion-less grind was worth it, Richards says, when she heard from people who loved the results. She delights in knowing she's created dishes that strangers crave and share around their dinner tables.

Does Richards cook in red heels, too? "No high heels in the kitchen!" she says. "That's not safe." For cooking, she prefers pyjamas.



Photo: Eric Wolfinger

Naz Deravian, BFA'94

Naz Deravian is fascinated by memory. It's at the centre of her award-winning blog and cookbook, both called *Bottom of the Pot*, in which she weaves together recipes and reminiscences about her family's life in the wake of the Iranian Revolution. Charting their journey from Tehran to Rome to Vancouver to Los Angeles, Deravian's writing is laden with wistfulness for her lost childhood home and bright with a sensual attention to the present.

The results are mouthwatering. Saffron-scented rice with a crust crispy from the bottom of the pot, sour cherry and feta crostini, fava beans with mint and pistachio sauce, and "flowers and nightingales ice cream" are a few of the delights in *Bottom of the Pot*, which makes Persian home-cooking accessible – and enticing – to the uninitiated.

As passionate as Deravian is about cooking, she's quick to say that she's not a chef but a storyteller. Having graduated with a BFA in theatre, she worked in film and television in LA until her eldest daughter was born, when the demands of being a new mom made her eager for a way to be creative on her own terms. Cooking had always been a respite – "I call my cutting board my yoga mat" – so she began a food blog, and then transformed the collection of vignettes and recipes into a book through a gruelling writing process she likens to childbirth.

If *Bottom of the Pot* is Deravian's baby, it is also a tribute to her mother. Renowned in Iran as a professor, poet, and Iran's first female lyricist, Deravian's mother had to improvise a way to support the family when they immigrated to Canada. On a whim, she offered to supply a Vancouver deli with homemade Persian bread – not mentioning to the deli owner, of course, that she had never baked bread in her life. Somehow, she got the contract, necessitating a frantic long-distance phone call to a favourite bakery in Iran to ask how, exactly, a person makes bread. Across the chaos of "the dialing of rotary phones, a lot of crackling on the line, and plenty of yelling 'allo, allo' over and over again," Deravian's mother scribbled down the method yelled back to her. The poet turned out to have a knack for baking. Her bread business succeeded wildly, and the family's livelihood in Canada was secured.

For Deravian, part of the magic of food is that the tastes of home are transmittable across phone lines and portable across continents. Cooking offers her a path back to the people and places she left behind as a child, evoking memories with every whiff: "A bottle of rose water, the bitter tang of a dried lime. Sometimes that's all it takes."

Sage and Sausage Palmiers

Evan Elman

Yield: 15 servings

Prep time: 30 min

Total time: 1.5 hrs

Extra Virgin Olive Oil (EVOO) | 1 T

Shallots | x2 Finely chopped

Free-range Sausage meat | 150g

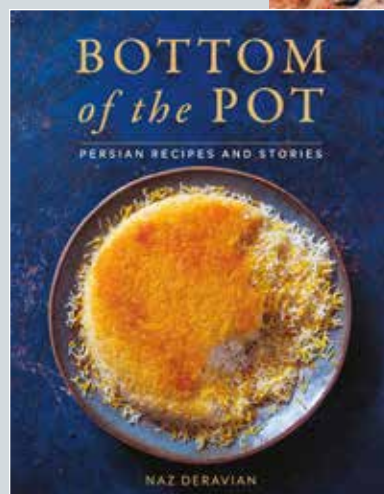
Ground Pork | 150g

Sage | 10 Leaves, finely sliced

Puff Pastry | 375g Rolled Out

S+P | To Taste

1. Heat the oil in a small frying pan, then gently fry the shallots for 10 minutes until soft. Transfer to a mixing bowl to cool. Add the sausage meat, pork mince and sliced sage to the bowl, season and mix well. To test if the seasoning is right, fry a little of the mixture in a pan until cooked, then season to taste.
2. Unroll the pastry sheet and spread evenly with the pork mixture, leaving a 1cm border around each edge. Roll up each long side to halfway so they meet in the middle. Chill in the fridge for at least 1 hour (or wrap well in cling film and freeze until ready to cook).
3. Preheat the oven to 400°F. Cut the chilled roll into slices about 7mm thick, then arrange over 2 baking sheets, leaving a 5cm gap between each slice as they'll spread a little as they cook. Bake for 20-25 minutes until golden and puffed. Serve warm.



Borani-yeh Laboo | Yogurt Beet Dip

Naz Deravian

Nothing brightens up a meal and everyone's moods more than a bowl of this fuchsia Borani-yeh Laboo. The tang from the vinegar and yogurt balances and cuts through the earthy sweetness of the beets, and the tarragon adds a fresh bite. You can cook the beets by steaming them on the stovetop or in the oven. Or you can simply use store-bought cooked beets. Scoop up with warm lavash bread, or spread on crisp endive leaves for a striking mazel.

Serves 6

1 medium beet, cooked and peeled
1 cup Greek yogurt
3 tablespoons red wine vinegar
¼ teaspoon kosher salt
1 teaspoon dried mint
1 teaspoon finely chopped fresh tarragon (optional)
Olive oil for drizzling

Into a medium bowl, grate the beet on the large holes of a box grater. Add the rest of the ingredients, except the olive oil, and mix to completely combine. Taste to make it delicious, keeping in mind that the flavors will develop and deepen as the dip rests. Cover and place in the fridge for at least 1 hour for the flavors to develop before serving. Stir, drizzle with olive oil if you like, and serve.

MAKE AHEAD: Prepare up to 3 days in advance and store in the fridge in an airtight container. If the yogurt weeps, simply stir to incorporate again. Drizzle with olive oil before serving.

Excerpted BOTTOM OF THE POT: Persian Recipes and Stories by Naz Deravian. Copyright © 2018 by Naz Deravian. Reprinted with permission from Flatiron Books. All rights reserved. Photography by Eric Wolfinger.



Chewy Lemon Cookies

Gwendolyn Richards

Makes about 30 cookies

2 3/4 cups (685 mL) flour
1 teaspoon (5 mL) baking soda
1/2 teaspoon (2 mL) baking powder
1/2 teaspoon (2 mL) salt
1 cup (250 mL) butter, softened
1 1/2 cups (375 mL) sugar, divided
Zest of 1 lemon
1 egg
1/4 cup (60 mL) lemon juice

Preheat the oven to 350°F (180°C) and prepare a cookie sheet by lining it with parchment paper.

In a medium bowl, mix together the flour, baking soda, baking powder and salt.

In the bowl of a stand mixer fitted with the paddle attachment, beat together the butter and 1 1/4 cups (310 mL) sugar until pale and fluffy, scraping down the side as necessary. Beat in the zest until well combined.

With the mixer on medium speed, add the egg, then the lemon juice, beating until incorporated. Add the flour mixture and mix on low speed until just combined.

Using a spoon, scoop out 1-inch (2.5 cm) balls of dough and roll them between your hands to form spheres. Drop into a small bowl of the remaining 1/4 cup (60 mL) of sugar and roll gently with your fingertips to coat the dough on all sides.

Space the dough balls about 2 inches (5 cm) apart on the cookie sheet and bake until the edges are cooked but the tops are still puffy, about 8 to 10 minutes. The cookies will be barely golden at the edges and still look ever so slightly uncooked on top. Cool on the cookie sheet for a few minutes, until the tops have fallen and crinkled. Remove to a cooling rack.

OWN YOUR FUTURE

UBC Diploma in Accounting Program



“The decision to pursue an accounting career through UBC DAP was an easy one. Not only does the program offer students flexibility by providing evening classes, DAP’s strong value in diversity and strengthening communities align with my own values as well.”

Tina Ma

BSc (SFU), UBC DAP Student

Find out how to put your career aspirations into action at sauder.ubc.ca/dap



Support UBC with time and knowledge: Apply to become a Convocation Member of Senate

Under the University Act, academic governance of The University of British Columbia is vested in two Senates, comprised of faculty, staff, alumni and student representatives that meet monthly throughout the academic year.

As a Convocation Member of Senate, you can have a real and lasting impact on the operations and future direction of The University of British Columbia. **All members of the convocation are eligible, except for current faculty members. The three year term begins September 1st, 2020.**

During your three-year term, you may help to:

- Set academic policies
- Review and revise admission standards
- Establish new departments and schools
- And much more! Visit <http://senate.ubc.ca> for more.

Twelve positions on the Vancouver Senate and two positions on the Okanagan Senate are waiting.

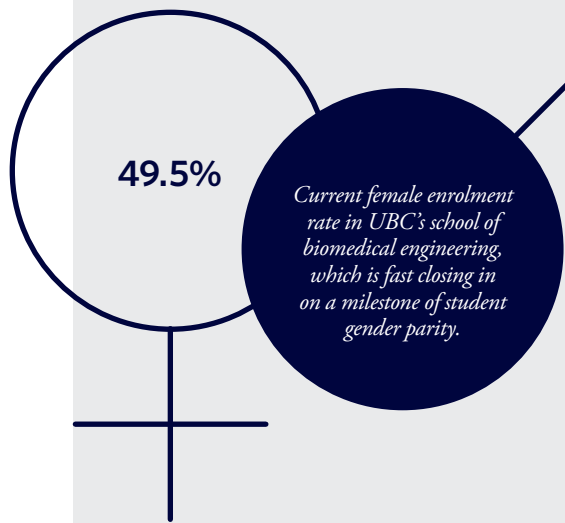
**Don't wait – nominations are due
January 31st 2020.**



THE UNIVERSITY OF BRITISH COLUMBIA

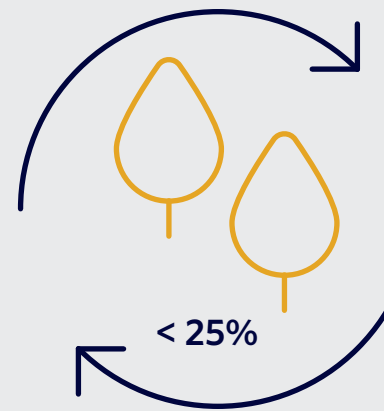
Visit facultystaff.students.ubc.ca/2019-2020-triennial-elections for more about the nomination process, or connect for more information through elections.information@ubc.ca / 604-827-0003

n=



-65min +40min
WOMEN MEN

Research led by UBC sociology professor Neil Guppy, based on a study of over 5,000 heterosexual couples between 1986 and 2015, found that the number of daily minutes spent by women on housework dropped by 65 minutes over the 30-year study period, while it rose by 40 minutes for men.



Percentage of nations that are close to reaching international sustainability goals, according to the Green Growth Index, to which UBC business professor Jose Pineda was a contributor.

Number of therapy dogs who visited UBC campus weekly during exams to provide a little canine therapy for anxious students. Survey research led by Professor John-Tyler Binfet, the director of UBC Okanagan's Building Academic Retention through K9's (B.A.R.K.) program, showed that students who interacted with the therapy dogs experienced a significant reduction in stress.



15 to 17



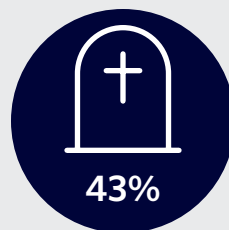
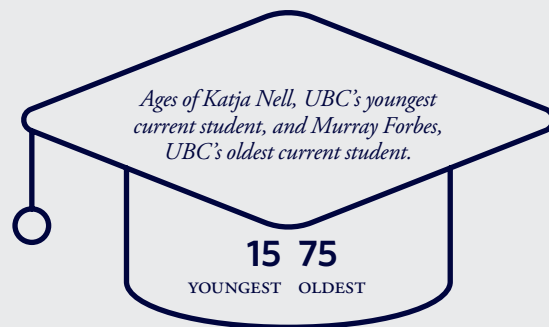
Amount by which UBC has reduced its annual water consumption over the last 20 years, even as enrolment has increased by 24,000 students.



Age of the oldest tree in Vancouver (a red cedar in Stanley Park), according to Ira Sutherland, a PhD student in UBC's Faculty of Forestry.



Number of cake slices served in one week of UBC graduations this May on the Vancouver campus.

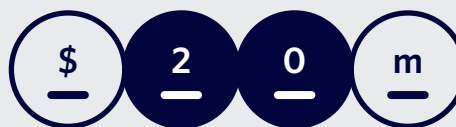


The extent to which Halloween is more deadly for pedestrians than average autumn nights, according to a UBC study,



125,000

Number of books that have been banned or censored somewhere in the world but are now on a searchable online database co-created by UBC's Florian Gassner, a senior instructor in UBC's department of Central, Eastern, and Northern European studies. (kasselerliste.com/the-list/)



The amount of money over the last 10 years left unclaimed by BC winners of the lottery, according to a study from UBC psychology prof Peter Graf.

ALUMNI BENEFITS THAT ARE A CUT ABOVE

Whether you're a sports fan, love to travel, enjoy live theatre, need a car, or simply enjoy getting a great deal, you're sure to find an offer you love on our list of exclusive *alumni UBC* partners.

Visit alumni.ubc.ca/savings

CURRENT PARTNERS

adidas Canada	L'Oreal Canada
Avis Budget Group	Modo
Broadway Across Canada	PC Express
Choice Hotels	Pets Plus Us
Contiki Holidays	Sparkling Hill Resort
Evo	Trip Merchant
Filld	Unhaggle
Fresh Prep	Vancouver Canucks
HearingLife Advantage	Vancouver Whitecaps



Alumni across Canada are eligible to enjoy a perk from PC Express.

*Try PC Express online grocery pickup or delivery and get \$10 off your first three orders with promo code **UBCGROCERY10X3**.*

Shop your favourite grocery stores like the Real Canadian Superstore and No Frills now to take advantage of the exclusive offer!

alumni.ubc.ca/pc-express

Get
\$10 OFF
your first three orders of \$30 or more.

express × **REAL CANADIAN SUPERSTORE**

Interested in becoming an *alumni UBC* corporate partner?
Contact jenna.mccann@ubc.ca

CONTEST!

In September 2019 we launched a monthly contest series open to all UBC alumni. One lucky winner was selected to receive a nostalgic treat: a one-year supply of UBC cinnamon buns!

Visit alumni.ubc.ca/contests to enter

Over the next year we will be giving away prizes every month, courtesy of our many Alumni Savings and Benefits partners. Be sure to check back regularly for updates and new giveaways, and while you're on our site, take a look at the many perks and discounts available to you as a UBC graduate.

NOVEMBER freshprep

DECEMBER

avis budget group

JANUARY coming soon

FEBRUARY coming soon

MARCH coming soon

Enter the December contest for a chance to win a two-night stay at the Swarovski crystal-infused Sparkling Hill Resort in Vernon, BC, with a vehicle rental to transport you and a guest, courtesy of Sparkling Hill Resort and Avis Budget Group.



alumni **UBC**

prez LIFE

Highlights from the busy schedule of UBC president Santa J. Ono. Follow him on Facebook, Instagram, YouTube and Twitter @UBCprez



Shared this photo of his family on campus in 1961. His father, Takashi Ono, was a math prof at UBC.



Dined with French president Emmanuel Macron at his official residence, the Elysée Palace in Paris.



Played ball with Kaye Kaminishi, the last living member of Vancouver's legendary Asahi baseball team.



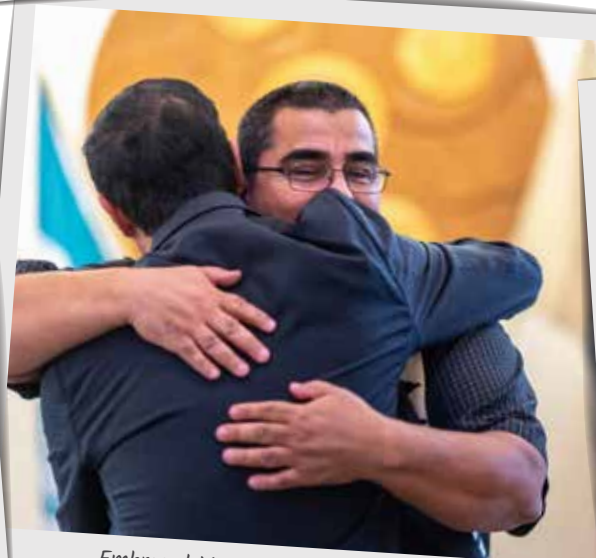
With McGill principal and vice-chancellor Suzanne Fortier, launched a new scholars exchange program.



Met Judith Fraser, a former cellist in the VSO and the CBC Radio Orchestra.



Took part in Vancouver's Indian Summer Festival. UBC was one of the major sponsors.



Embraced Musqueam Chief Wayne Sparrow after presenting a plaque commemorating the Statement of Apology made on behalf of UBC to residential school survivors last April.



Welcomed Margaret Trudeau to UBC for #ChangingMyMind, an event hosted by the UBC Faculty of Education.



Thanked staff at the Chan Centre for "their tremendous work supporting the UBC graduation ceremonies."



Caught up with alumni Fred Withers and Peter Jackson and thanked them for their continued support of UBC.



Delivered the 2019 Carr Distinguished Lecture at St. Mark's College: "Liberal Arts in the 21st Century: More Important Than Ever."



Signed the charter Dimensions: Equity and Inclusion alongside federal science and sport minister Kirsty Duncan.



Ran into some UBC students in Paris.



Congratulated Afton Cayford of the Mathematics Department on his 60th year as a professor at UBC.



Played a role in the ballet Giselle, which he called "a highlight of my life."



Helped some new students on move-in day.

NATURE & WILDLIFE



SILVER & GOLD: A YUKON ADVENTURE

JUNE 16 - 23, 2020

with UBC professor and geologist Lee Groat

ACTIVE & WELLNESS



CLIMBING KILIMANJARO

NOV. 4 - 13, 2020

with UBC coach and Olympic Medalist Lynn Kanuka

Journey Across the Mystical Caucasus

TOUR SPOTLIGHT:

Georgia

SEPT. 25 - OCT. 5, 2020

WITH UBC EMERITUS PROFESSOR ANN GORSUCH



TSMINDA SAMEBA, GEORGIA

Travel arrangements by:



Please contact Worldwide Quest for all bookings and to view detailed itineraries.

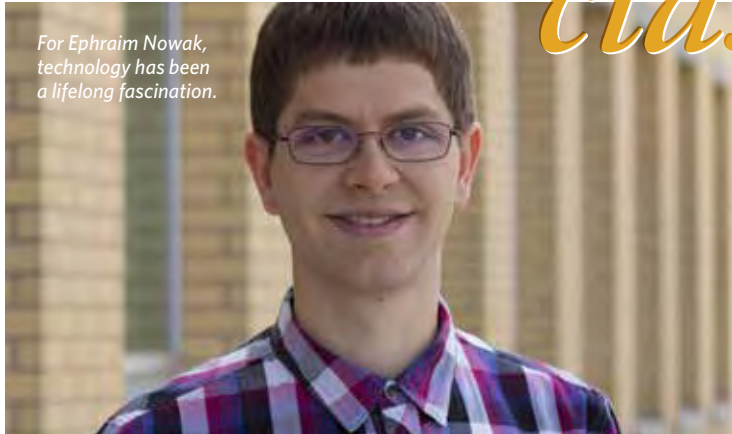
1 800 387 1483 | travel@worldwidequest.com

The complete *alumni UBC* calendar is available online at: alumni.ubc.ca/travel Don't miss out! Sign-up for our Travel Club e-newsletter.

alumni UBC

Travel Club

class ACTS



For Ephraim Nowak, technology has been a lifelong fascination.



Tanya Boteju (centre) at her book launch.

Ingenuity that Saves Lives

Ephraim Nowak, BSc'15, MAsc'18, had recently become manager at Central Okanagan Search and Rescue when he answered a “one of a kind call.” A small plane had disappeared from radar. It was carrying former Alberta premier Jim Prentice, Jim Kruk, Ken Gellatly, and Sheldon Reid. Nowak’s team raced to find the site of the crash, only to make the devastating discovery that there were no survivors.

The accident had a lasting impact on Nowak and his fellow volunteers. In the aftermath, they waited anxiously for the transportation safety board report, hoping for some closure through an understanding as to why the crash happened. But their questions would remain unanswered. “The report ended up coming back inconclusive,” says Nowak, “because there was no form of voice or data recorder on board that aircraft.”

In the void of information around the tragedy, Nowak saw a chance to make a difference by putting his technical savvy to work. He founded a company, Percept Systems, to create a cockpit video and data recorder lightweight enough for small aircrafts. Called SkyVU, the recorder will provide insights as to why small plane crashes happen and ultimately help to prevent them. Two SkyVU prototypes were deployed in wildfire helicopters this summer, and Nowak has been flooded with interest from around the world in the award-winning design.

For Nowak, technology has been a lifelong fascination and a family affair. He and his brother, Raphael, with whom he works closely on SkyVU, were the sort of children who were taking apart radios at age three and building remotely operated underwater vehicles to explore Okanagan Lake at age ten. By middle school, Nowak was running lighting and sound for a media production company. Studying computer science and electrical engineering at UBC was a natural extension of his voracious drive to learn.

Nowak sees creative problem-solving as inherently fun, whether the challenge is as serious as improving aviation safety – or as whimsical as building a bridge out of nothing but pasta. (Among his other accomplishments, Nowak is champion of the 33rd annual Okanagan College Spaghetti Bridge Building Heavyweight Competition; his pasta masterpiece held 184.3 kilograms of load before shattering.) For him, the pull lies in the spontaneity and excitement of a new problem that needs a solution. “I enjoy learning,” he says. “When I wake up in the morning, it doesn’t feel like I’m going to work.”

Rainbow Representation

You know you’ve found **Tanya Boteju’s** classroom when you spot the timeline of feminism on the walls and the big box of rainbow tutus, leg warmers, and wigs under her desk. Boteju, a high school English teacher for 17 years, is known equally for her colourful commitment to feminism and pride, and her signature loud cackle – the sort of gleeful, head-thrown-back laugh that puts people at ease and cuts through teenage moroseness like a splash of water in the face.

But Boteju (BA’00, BEd’01) hasn’t always been the sort of woman with a confident laugh and a rainbow tutu at the ready. As a queer teenager in the early 90s, she says she was “a hot mess.” While she cultivated the persona of an outgoing and model student, she felt like an oddball outsider. “I was really insecure, really out of touch with myself, really hard on myself underneath the shiny layer,” she says. At the time, Boteju didn’t know anyone who was out. Her teachers never mentioned that LGBTQ+ people existed. She didn’t encounter queer characters in books or on TV, nor any characters who even looked like her. She kept who she was a secret for a long time, even from herself.

Now, Boteju gives her students what she wishes she’d had in high school. When she takes classes on field trips to see slam poetry, or when she attends school plays, her wife often accompanies her. “I make it a point to be really out and open for students, so they can see there are people in the school who are queer.” Boteju started and sponsors the school’s Gay-Straight Alliance and runs workshops on “intentional acknowledgement” of race, gender, and sexuality. Unwilling to assign her students only books by “old, white, dead men,” she makes a concerted effort to “bring in as much diversity as possible to the texts we use.”

And she has published a young-adult novel of her own, *Kings, Queens, and In-Betweens*, enticingly described as “Judy Blume meets *Ru Paul’s Drag Race*” (Simon & Schuster 2019). For Boteju, the book is “a love letter” to the drag community she discovered as a UBC student in her twenties, and a story intended for queer kids of colour who need to see themselves represented in literature. She wrote the book to give today’s teens what she once craved – a story that “tells you that you are okay, that there are other people like you – an acknowledgement that people live those lives.” **■**

More Class Acts will be available to read online in the New Year.

THE
Classic



**CECIL GREEN
PARK HOUSE**

604 822 6289
info@cecilgreenpark.ubc.ca
cecilgreenpark.ubc.ca

OR THE
Modern
CLASSIC



2019 Winner
Best Wedding
Reception Venue



**Robert H. Lee
Alumni Centre**

604 822 1922
venue.manager@ubc.ca
alumnicentre.ubc.ca

PRIVATE, ROMANTIC, STYLISH

Unforgettable venues - for intimate gatherings or grand celebrations.

IN *memoriam*



Alexander Wilbert Skene, BAsC'46

December 6, 1921 (Calgary, Alberta) – February 14, 2019 (Calgary, Alberta)

Alex Skene of Calgary passed away on Thursday, February 14, 2019, at the age of 97. Alex was born in Calgary to Ina Fern (Myers) and George Wilbert Skene. He graduated UBC with a mechanical engineering degree. His long

career with Imperial Oil led him to many different locales over the course of 25 years, including Sarnia, before his return to Calgary, where he retired. Alex loved the mountains, swimming, and dessert. Most of all, he loved his family. Alex was a devoted husband to Patty and an exceptional parent, grandfather, and great-grandfather. He was incredibly supportive and kind, with a wonderful sense of humour. Alex is survived by his daughter Susan (Rick), son George (Stephanie), daughter Catherine (Neil), and daughter Diane (Stu); four grandchildren – Alexander (Laura), Elaine, Rachael, and Julianne; and three great-grandchildren – Alexis, Logan, and Leah. He is also survived by his brother, John, of Kelowna.



Beatrice Delane, BA'50

Bea Delane (née Louie) passed away peacefully in Vancouver, BC, on June 21, 2019. Bea received her BA in psychology and thereafter continued to work in the family business, the H.Y. Louie Company Limited. Bea married Gerald Delane (a UBC Engineering graduate) in 1963 at Chown Memorial Church in Vancouver. After raising

daughters Jill and Heather, she returned to the workforce, taking positions at the City of Vancouver and later on with the BC Lottery Corporation. She was predeceased by her parents, Hok Yat and Young Shee Louie, and by brothers Tim, Tong, William, Ernest, Quan, John, Edward, Willis, and Kenny. Bea was a family-oriented and caring person and will be fondly remembered as a loving mother, aunt, sister, grandmother, and loyal friend.



Stephen F. Kun, BSF'55, MF'58

March 15, 1931 – February 27, 2019

Steve is remembered as an active, energetic man who got things done. His satisfaction came from planning, working on, and completing his tasks. His accomplishments were immense. Steve was born in Drumheller, Alberta, and attended school there. He enrolled in the

Faculty of Forestry at UBC in 1950, graduating with a master's degree in 1958. He began his 30-year career with Parks Canada as an assistant warden in Banff National Park in the summer of 1951. With time taken for education, he moved through the ranks, serving as Western regional forester in Jasper, assistant to the Western regional director in Calgary and Banff, superintendent of Prince Albert National Park, chief of national parks in Ottawa for policy and planning, and superintendent of Banff National Park. He moved back to Ottawa to work on developing new

national parks, and finally to Calgary as director general of the Western region. During his career, he visited every national park and historic site in Canada and travelled internationally, representing Canada in conservation work. He loved travelling by horseback through the Rocky Mountains, and came to know well the backcountry and the wardens who worked there.

After his retirement in 1988, Steve embarked on a new career ranching in the foothills of Alberta and raising pedigreed Canadian pinto horses. He and his wife Gail built a beautiful place that was enjoyed by his family and friends for 30 years. In 2017, Steve and Gail moved to Cochrane to live in a retirement community. There, they made many new friends. In 2019, they moved to Wakefield, Quebec, to be closer to their family and to live in the province they had so much enjoyed exploring by canoe and on skis. Steve is survived by his wife of 62 years, Gail (née Jeffery), his son Randall (Jerene Sutherland), daughter Jennifer (John Robson), two granddaughters, two great-grandchildren, and his sister, Irene Forgo of Drumheller, Alberta. At Steve's request, there will not be a funeral. His immediate family held a private memorial. Many thanks to the doctors and staff of the Wakefield Hospital. Gail's contact address is: 2-106, Chemin des Collines, Wakefield QC, JoX 3Go.



John Maynard, BCom'57

John Maynard passed away on February 20, 2019, at Cambridge Ontario Memorial Hospital. He is survived by his wife of 61 years, Marion, three children, nine grandchildren, and one great-granddaughter. John was born in North Battleford, SK. He received a Bachelor of Commerce degree and a diploma in hospital

administration from UBC, and a diploma in health systems management from Harvard University. John served as director of provincial psychiatric services and as executive director of the institutional division for the Ontario Ministry of Health. He was executive director of the Ontario Nursing Home Association, establishing nursing home accreditation for the Province of Ontario. As a consultant with Diversicare he performed operational reviews of large hospitals across Canada and was responsible for the establishment of the Ontario Veterinary College Hospital in Guelph, Ontario. After leaving Diversicare, he established John K. Maynard and Associates with his wife, Marion, to do consulting in the field of housing and healthcare for seniors.



Dr. Crawford S. (Buzz) Holling, PhD'57

Calling him a "wonderful person, inspiring scientific leader, and incomparable mentor for many young scientists," Carl Walters, professor emeritus in the Institute for the Oceans and Fisheries, mourned the passing of C.S. "Buzz" Holling on August 16, 2019. Recognized as one of the world's leading ecologists, having made

major contributions to the theory of predation, the concept of ecological resilience, the concept of panarchy, and adaptive management, he received numerous awards, including the Mercer and Eminent Ecologist awards

from the Ecological Society of America, the Volvo Environment Prize, and honorary doctorates from Guelph, Simon Fraser, and UBC. He was a Fellow of the Royal Society of Canada and had received the Order of Canada. Holling was born in 1930 and obtained his PhD from UBC.

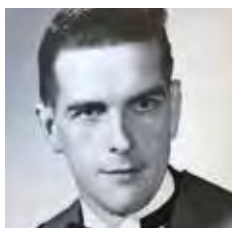
He worked as a research scientist in the Canadian Forest Service before returning to UBC, this time as a professor. He was the first director of the Institute of Animal Resource Ecology (now Institute for the Oceans and Fisheries), which is where, as a junior faculty member, Dr. Walters was his colleague. Eric Charnov, Distinguished Professor of Ecology & Evolutionary Biology at the University of Utah, was one of Holling's postdoctoral fellows, and concurs with Walters' assessment. "He was wonderfully supportive and fun to talk with, particularly when we disagreed, which was often," said Dr. Charnov. "Buzz trained many distinguished scholars, which reflects very much on his mentorship, as noted by Carl. I am proud to have been among them." Holling left UBC in the late 1970s to direct the International Institute for Applied Systems Analysis (Vienna, Austria), returned briefly in the early 1980s, before moving to the University of Florida. After retirement he lived for several years in Cedar Key, Florida, then returned to Nanaimo, BC, for the last years of his life.



Joanna M. Hay, BSc'58

It is with sadness that we announce the passing of Joanna Hay (née Farmer) on 6 May 2019 at the age of 84. Born in Moose Jaw, SK, Joanna grew up in Caulfield. She attended UBC from 1954 to 1958, where she spent many happy hours in the cattle barns and science labs. She excelled on the grass hockey field, playing right half and

being awarded the Big Block Athletic award two years running. She enjoyed the team reunions and coached school hockey teams. She enjoyed attending the PNE and the IPE in Armstrong, leading the Lumby 4H Beef club for many years. Animals were her lifelong passion, as well as the study of science. She taught biology, chemistry, and math in Lumby, BC, for over 30 years and especially enjoyed taking students on trips to the coast at Bamfield. She is predeceased by her mother (Violet) and father (Philip), and survived by son Nairn (Paula) and daughter Sarah (Simon), and by brother Geoff (Mabel), and sister Wendy (Lorne). Never without dogs and horses, she threw them some hay before leaving her home of 50 years for the last time.



Dr. M. Leslie Hassan, BSc'58, MD'63

Les passed away peacefully on November 24, 2018, at the age of 84. He is survived by his wife, Sylvia, his sons, Doug (Mary-Louise) and Tom (Genevieve), and six grandsons. With a modest upbringing in East Vancouver, Les was the first in his family to attend university. He graduated from UBC medicine in 1963. After a medical

residency in San Diego, he returned to North Vancouver to start a family practice, which he maintained for 30 years. For his medical care and advice, he was adored by hundreds of friends and patients. This included many from the Squamish Nation, who, upon his retirement, honoured him with a potlatch-style celebration and gave him an ancestral name: "The Healer." Les' greatest joy was his friends and family. He was a man of many talents.

He enjoyed carpentry, home construction, plumbing, and electrical projects. He had a lifelong passion for the outdoors and enjoyed many trips to fish the rivers of Haida Gwaii with friends and his sons. He admired the Haida people and their way of life. Along with going on fishing adventures, he travelled the world with his Sylvia. Les will be sadly missed.



Lorne James Reid, BAsC'58

Lorne passed away peacefully on April 5, 2019, in Kelowna, BC, in his 86th year. He was born an only child in Trail, BC, on July 31, 1933. He is predeceased by his parents, Elsie and Jimmy Reid. He is remembered and dearly missed by his loving wife of 62 years, Joan (née Everard), also from Trail, as well as his four children

(Sherry, Wendy, Scott, and Jim), and seven grandchildren (Sara, Emily, Iain, Lauren, Eric, Danielle, and Manuel). Lorne graduated from UBC in 1958 with a degree in chemical engineering and spent his entire career working for DuPont of Canada in Kingston, Ajax, Burlington, North Bay, Montreal, and Wilmington, Delaware. Lorne retired at 57 years of age and built a home on Lake Ontario, in Picton. Lorne and Joan became homesick for BC, and settled in Gallagher's Canyon, Kelowna, and then in Salmon Arm, and finally Mission Villas, Kelowna.



Theodore J. Cyr, BSc'63, MSc'66, PhD'68

Theodore James Raymond Cyr, of Abbotsford, BC, passed away on August 17, 2019, at the age of 78 years, from prostate cancer. He was born in Prince Rupert, BC, on June 15, 1941, to the late Joseph Phillip Raymond Regis ("Raymond") Cyr of Mission, BC, and the late Josephine Alemede Mildred Edith ("Mildred") Cyr (née

Stokes) of Goodwater, SK. Dr. Cyr attended UBC for his BSc, MSc, and PhD in chemistry. He completed post-doctoral fellowships in Kyoto, Japan, and Nottingham, UK, and taught physical chemistry at the University of Montreal. He worked for CANMET and Imperial Oil. In 1978 he joined AOSTRA (Alberta Oil Sands Technology and Research Authority) as research manager in the grants program, co-inventing numerous patents related to oil extraction and recovery. He obtained a PEng from the University of Alberta in 1988. In 2000 he moved to the Alberta Department of Energy until his retirement in 2013. He is survived by his brother, Dr. Wayne Cyr of Abbotsford, children Reiko and Gregory, and his former wife, Dr. Natsuko Cyr.

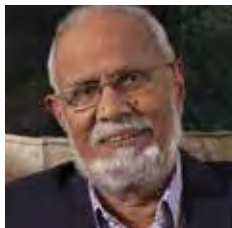


Stephen Salter, BAsC'64

Stephen Salter, the only son of Kate and Steve Salter, was born in Prince Rupert in 1941. Shortly thereafter, his family settled in West Vancouver. He excelled academically and attended UBC, where he received his degree in electrical engineering. After graduating, he worked for BC Hydro designing power lines for the Peace

River project and went on to work in the computer management division of General Electric. Several years later, he worked as a lead computer programmer for Datawest before starting his own company, Fimetrics,

creating computer software for financial planners. He had a loyal following and developed trusting relationships with his clients. For Steve, living a full life meant taking care of his family and enjoying simple things like dark chocolate, and coffee with lots of sugar. He was happiest reading, spending time with his granddaughter, and being near the ocean watching the eagles, sea lions, deer, and Hornby Island sunsets. Steve will be remembered best for his offbeat sense of humour, goofy one-liners, and kindness. He was a loving dad and grandpa, and we miss him.



Dr. Bikkar Singh Lalli, BA(Hons)'49 & MA'51 (Punjab University), PhD'66 (UBC)

Dr. Bikkar Singh Lalli (June 5, 1928, to Feb 13, 2019) was born in Kotli, in Punjab. He was the first in his family to do post-secondary education, and received scholarships throughout his studies. During his 42-year career, he taught at Punjab University, UBC, and the

University of Saskatchewan. He received grants from NRC and NSERC to do research in mathematics, and he supervised seven PhD candidates and one MA candidate. A distinguished scholar, Dr. Lalli published over 150 journal articles in national and international journals, and he was an invited speaker at about 40 universities and research institutes worldwide. He was a visiting scholar in four countries. After retirement, Dr. Lalli moved back to British Columbia. He devoted his retirement years to championing education. Dr. Lalli was elected to the UBC Senate in 1999, where he served as a convocation senator for 18 years. He loved attending convocation and congratulating new graduates. In addition, he served on other boards and committees, including the Coalition to Eliminate Abuse of Seniors, City of Surrey Seniors Advisory and Accessibility Committee, Kwantlen Polytechnic University's Foundation Board, and Simon Fraser University's Komagata Maru Advisory Board. Dr. Lalli was a regular contributor to community newspapers, and often spoke on television and radio. Parents and grandparents approached him to seek advice about their children and grandchildren. A humble and soft-spoken man, Dr. Lalli always took the time to meet them and provide thoughtful guidance and encouragement. Dr. Lalli also cared deeply about causes related to seniors. He wrote many successful grant applications for seniors' societies. These resulted in a computer lab for seniors, wellness workshops and trips, as well as a health research study entitled "Wellness model for Indo-Canadian seniors: a research report" (2000). He was recognized by several seniors' societies for his contributions. In 2011, Dr. Lalli was awarded Doctor of Laws (Honoris Causa) by Kwantlen Polytechnic University for his community service. His beloved presence will be missed by family, friends, and all those who knew him. A celebration of life and Bhog (prayers) were held on Friday, March 8, 2019, at Gurudwara Shahib York Centre in Surrey.



Daniel Brian Cumming, BSc(Agr)'67, PhD'73

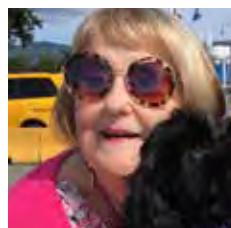
Daniel Brian Cumming died suddenly on November 30, 2018, in Negril, Jamaica, of a heart attack as he was preparing to run the 10k race of the Reggae Marathon. He was born on January 6, 1945, in Vancouver to Jack and Lil Cumming and attended King Edward

and Eric Hamber high schools. He graduated from UBC (BSc(Agr), PhD) and the University of Guelph (MSc). After 20 years as a food scientist and administrator with Agriculture Canada Research Branch in places such as Kentville, NS, Summerland, BC, Brussels, Belgium, and Morden, MB, he spent 10 years in the private sector, helping to develop an innovative bio waste conversion system. After retiring to South Surrey, he was keen to devote more time to his family, volunteering, writing, cooking, genealogy, and his passion, running. He once described the joy of running this way: "It is getting to a free state of mind where you can let your inner self take over." He is survived by his wife of 50 years, Judi; his daughters, Danielle (Greg) and Janna (Jason); his son, Cam; and grandsons Charlie and Jonah.



Dominic Venditti, MEng'67

Dominic passed away at home of a massive heart attack. He leaves his wife of 43 years, three married children, and six grandchildren.



Andrea Gayle Allingham, BA'83

Born in Vancouver, Andrea spent her childhood on Stewart Island, before completing elementary school in Burnaby. After graduating from Burnaby South in 1967, she attended UBC, and eventually obtained a bachelor's degree in linguistics. After working for the Canadian Correctional Service in adult basic education, she taught

English for eight years at Golden Secondary before joining her husband Philip, BA(Hon)'64, PhD'88, on the faculty of Lakehead University in Thunder Bay, Ontario. They retired from the Faculty of Education in June 2015 and returned to Victoria, where two of their four children (Dana and Devon) and two of their grandchildren (Juno and Jaxon) live. She passed away suddenly from a heart attack on July 11 at Victoria General Hospital. At her bedside were her brothers, Mark and Dave Evans, as well as her husband and three daughters (Gwen, Steph, and Dana). We all regret that she did not live to see the publication of her first novel, *A Wensbury House Mystery: Mine for the Taking*, on July 15 by Apple iBooks. A memorial service took place in August.

Obituaries are included in our biannual print issues, usually published in May and November, and should be 1100 characters (about 300 words) or less. Please send original photos by post or attach high resolution images to your online submission. Tributes may be edited for length and clarity where necessary. Note that print issues of the magazine are also published online.

There is no fee for submission.

Due to the high number of submissions, we are unable to guarantee publication in the next print issue. If you would prefer your submission be included in the next applicable online issue in lieu of print, please select that option on the form.

trekmagazine.alumni.ubc.ca/memorial 

THE LAST WORD WITH

Raffi Cavoukian DLitt'05

Raffi Cavoukian, beloved by generations of children who have grown up listening to his songs, says he was inspired from a young age by folk singers like Pete Seeger and Joni Mitchell. But it was his own song – the iconic hit “Baby Beluga,” released in 1980 – that inspired his passion for ecology. Eight years after it was released, he sat in on a presentation about belugas at the Ontario Science Centre and was “stunned” by what he heard about massive declines in the beluga population.

Raffi’s music began to focus on his concern for the natural world. He released *Evergreen Everblue* in 1990. He sang songs about moral issues that mattered deeply to him, just as his folk heroes had done years before.

His latest song is called “Young People Marching.” It’s written for Greta Thunberg, the sixteen-year-old activist from Sweden who is calling on young people to demand climate action from their governments. And it’s no surprise that Raffi is inspired by her.

As a part of his ecological activism, Raffi is an advocate for children and young people. When he received an honorary degree from UBC in 2005, he sang “Turn This World Around [for the children]” to the congregation. In 1996, he came up with a name for his life’s philosophy – “Child Honouring” – and published a book about it a year later. But child honouring and activism on behalf of the Earth aren’t two separate things, says Raffi. He writes in his book “that all children are created whole, endowed with innate intelligence, with dignity and wonder, worthy of respect” and that respect for the world that nurtures children is part of that same philosophy. He argues for “detoxifying the environments that make up the ecology of the child.”

In a September interview with Slate, Raffi said his new song “was written for climate strikes... every movement has had music.” Pete Seeger would be proud. **T**

Who was your childhood hero? | Hank Aaron, home run champion.

Describe the place you most like to spend time. | Home on Salt Spring Island, with my dog.

What was the last thing you read? | *Falter*, by Bill McKibben

What or who makes you laugh out loud? | My dog Luna.

What’s the most important lesson you ever learned? | Young children are whole people, worthy of respect.

What’s your idea of the perfect day? | A mix of solitude and a friend’s company.

What is your most prized possession? | My concert guitar, a Takamine cut-away.

What would be the title of your biography? | *Bananaphone Banter*

If a genie granted you one wish, what would it be? | Global climate stabilization, transformed economy.

What item have you owned for the longest time? | Joni Mitchell album.

Whom do you most admire (living or dead) and why? | Greta Thunberg, moral voice of our time. Why? Conscience, courage.

What would you like your epitaph to say? | Life – took his breath away.

If you could invent something, what would it be? | Rainfall percussive energy capture to increase efficiency of solar panels.

In which era would you most like to have lived, and why? | Now... dental work is quite painless.

What are you afraid of? | Our global climate emergency.

What is your latest purchase? | A book.

Name the skill or talent you would most like to have. | Excellent swimmer.

Which three pieces of music would you take to that desert island? | Dunno. Not much good without a power charger, right?

What is your pet peeve? | Exxon knew about global warming; lied, deceived, obstructed.

What is the secret to a good life? | Curiosity and lifelong learning.

Do you have a personal motto? | Easy once you know how.



Not all surprises are good ones.

Especially the ones that could cost you hundreds or even thousands of dollars – like a sprained knee, a medical emergency abroad or even a broken tooth. That's why there's **Alumni Health & Dental Insurance**.

It can help protect you against the cost of routine and unexpected medical expenses not covered by your government plan*. Coverage options include dental care, prescription drugs, massage therapy, travel emergency medical and more. The icing on the cake is that it helps you keep more money in your pocket. And who doesn't want that?



Get a quote today. 1-866-842-5757
or **Manulife.com/ubc**

Underwritten by **The Manufacturers Life Insurance Company.**

Manulife and the Block Design are trademarks of The Manufacturers Life Insurance Company and are used by it, and by its affiliates under licence. ©2019 The Manufacturers Life Insurance Company. All rights reserved. Manulife, PO Box 670, Stn Waterloo, Waterloo, ON N2J 4B8.

*Conditions, Limitations, Exclusions may apply. See policy for full details.

Accessible formats and communication supports are available upon request. Visit Manulife.com/accessibility for more information.

DISCIPLINED ADVICE. GUIDED BY VALUES.



For over 96 years, Odlum Brown Limited has been one of BC's most respected investment firms, thanks to the vision of our founders, the passion and dedication of our employees and the trust and loyalty of our valued clients.

Odlum Brown is a full-service investment firm providing disciplined investment advice and objective value-based research with a singular focus on clients. For all your investment needs including financial, retirement and estate planning,* call **604-669-1600**, toll free at **1-888-886-3586** or visit **odlumbrown.com** for more information.



ODLUM BROWN
Investing for Generations®

Waterstone
CANADA'S
MOST
ADMIRED
CORPORATE
CULTURES

CANADA
**BEST
MANAGED
COMPANIES**
Platinum member

 Odlum Brown Limited

 @Odlum_Brown

 Odlum Brown Community

 OdlumBrown

Member-Canadian Investor Protection Fund

*Odlum Brown Financial Services Limited is a wholly owned subsidiary of Odlum Brown Limited offering life insurance products, retirement, estate and financial planning exclusively to Odlum Brown clients.