Genome BritishColumbia

Genomics positively impacts life, every day.

GENOMICS

More than an emerging technology

ANNUAL REPORT 2021–2022

We acknowledge that Genome BC's office is located on the unceded traditional territories of the Coast Salish peoples, including the territories of the xʷməθkwəy̓əm (Musqueam), Səl̓ílwətaʔ/Selilwitulh (Tsleil-Waututh) and Skwxwú7mesh (Squamish) Nations.
We are honoured to perform the important work of Genome BC on these lands.

Table of Contents

02 Genomics: more than an emerging technology

04 Transforming health care

08 Advancing sustainable agrifood and natural resources

12 One Health – Understanding the interplay between animal and human pathogens and the environment

16 Purposeful innovation

22 Genomics and the data challenge

26 Continuing the conversation

30 Genome BC Project Portfolio

32 Message from the President and CEO

33 Message from the Board Chair

34 Independent Auditors' Report

35 Financial statements and notes

44 Corporate information and acknowledgments

Genomics: more than an emerging technology

We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period.

—**Derek Parfit,** *On What Matters, Volume II (2011)*

"Life sciences is a powerful sector that touches every part of our lives – from health to the environment to food security, natural resources and more. This is what our StrongerBC economic plan is all about – it's about building a strong, sustainable province that works for everyone."

—**The Honourable Ravi Kahlon, M.L.A.**
Minister of Jobs, Economic Recovery and Innovation, Province of British Columbia

Genomics has come a long way since DNA – the building blocks of life – was first discovered by Friedrich Miescher in 1869. Thanks to the hard work of scientists, engineers and clinicians making advancements in technology, great progress has been made since then. Over the past 20 years, we have witnessed a rapid discovery and technological development that, coupled with the plummeting costs of genome sequencing, has truly transformed the utility of genomics – to make a positive difference in our lives, every day.

The unique challenges of our time demand innovative solutions. With continuing existential global threats to human health and increasingly dangerous environmental crises, genomics has emerged as one of science's most relevant technologies.

The contributions of life sciences during the COVID-19 pandemic are an excellent example of the impact of genomics and related disciplines. Genomics allowed us to understand the SARS-CoV-2 virus faster than any other disease-causing organism in history. Data science powered an unprecedented level of information sharing and global collaboration among scientists. Genomic sequencing enabled the surveillance of viral mutations, informed immunologists' understanding of how our immune system builds defences against the virus and was essential for vaccine developers to produce new vaccines at record speed.

In recent years, genomics has proven to be an important tool in the diagnosis and treatment of cancer, rare diseases and the prevention of adverse drug reactions, as well as other health applications. The critical uses of genomics during the pandemic only further underscores the power of the science to rapidly address emerging health crises. However, the utility of genomics can also be measured by its application in areas beyond human health and disease. British Columbia has been ravaged by extreme weather events; from heat domes and severe drought to wildfires followed by torrential rains and flooding to unusually cold winters — well below the seasonal norm for many parts of the province — these events are a visceral reminder of the threat climate change poses to our province. As British Columbia's resource sectors are under increasing pressure to adapt, mitigate and act in the face of climate change, genomics has shown its relevance and value.

Genomics is providing new and transformative ways to address these challenges and alleviate environmental stressors. Genomic technologies determined which plants and trees will be better able to adapt to new environmental conditions, thereby informing reforestation strategies by predicting tree populations at high risk. These technologies are used to identify and manage invasive pests such as the Asian longhorned beetle and Asian gypsy moth, as well as disease causing pathogens that pose threats to forests and many fruit crops. Genomics is also used to monitor and manage at-risk species, including goshawks and grizzly bears. These are just a few of the day-to-day applications that demonstrate the utility of genomics across economically important natural resource and agrifood sectors.

This kind of utility does not happen overnight. It comes from years of building infrastructure and capacity across many disciplines and making the calculated investments necessary to benefit society. This has been Genome BC's pursuit for more than 20 years. Beyond our raison d'être, our passion is to improve people's lives through innovation, credible research, strategic collaborations and technology platforms. Equally important is our proactive leadership on societal impact and the responsible uptake of genomics. We continually aim to convene the brightest minds across the globe to learn and grow and further enhance British Columbia's life sciences ecosystem — catalyzing innovative solutions through 'omics'[1].

Genomics has transitioned from an emerging technology to an evolving technology. As with the progression of genomic technologies, our organization continues to evolve. Our aim is always to ensure we are prepared for today's challenges while anticipating and preparing for the future. Over the past year, our team has reworked the way we manage and develop sector initiatives. We added key resources to build capacity in the important areas of data science and innovation.

From discovery to translational and applied projects, Genome BC has worked collaboratively across BC's life sciences ecosystem as a funder and a convener – continually providing flexibility and speed to solve problems in innovative ways. Working with our ecosystem partners and across Canada's genomic enterprise, we believe we can rise to the 21st century's challenges.

Genome Canada shares this vision and has announced a new funding competition that shifts from an applied research approach to one that is challenge-based, aimed at building a portfolio of interdisciplinary projects that generate solutions to significant societal challenges. The inaugural challenge focuses on solutions to ease the pressures climate change is placing on our nation's food systems.

Genome BC embraces this new approach to national funding competitions, seeks to build on our successes and drive even greater impacts through our investment in research and innovation. We are leveraging the utility of genomics to address challenges where we know the science can make a difference and contribute to tangible, equitable impacts for Canadians, such as in health, food security, environment and climate change.

[1] Omics refers to a field of study in biological sciences that ends with 'omics', such as genomics, transcriptomics, proteomics, or metabolomics. The ending -ome is used to address the objects of study of such fields, such as the genome, proteome, transcriptome or metabolome, respectively.

Transforming health care

The power of genomics to deliver better health outcomes for patients is more than a promise for tomorrow — it is a reality today. Genomics is already making an impact in the fields of oncology, pharmacology, rare and undiagnosed diseases and infectious diseases. However, genomic success stories in these fields are mostly found in clinical research settings. There are challenges that must be addressed for genomics to be taken beyond research and applied to the delivery of day-to-day routine clinical health care.

New treatments and procedures must be validated on multiple levels before they can be adopted into clinical practice guidelines. As clinical applications of genomics continue to evolve, ongoing research and dialogue to understand ethical, economic and other concerns within society will help inform policy and ensure that the use of these technologies is responsible, cost effective and will enhance patient care. While this process can sometimes seem arduous, it is necessary.

There are many other challenges that must also be addressed to bridge the gap from research to the clinic. We must make data accessible while ensuring security and privacy for the integration of genomic data into personal health records and data sharing. There is also the need for health professionals to have greater knowledge and understanding of genomic applications in health care. The personalized nature of precision health care will also require patients, including those from underrepresented groups, to be more engaged in decisions related to their personal care. Overcoming these obstacles requires new ways of thinking, but they are not insurmountable.

The pandemic has demonstrated that data sharing can mobilize a global community and accelerate life-saving solutions. Within days of the COVID-19 outbreak in Canada, health providers started using telehealth platforms and public health agencies began using data to make daily decisions about lockdowns, school closures, mask mandates and vaccine rollouts. Notably, this embrace of data sharing occurred without any serious breach of privacy. At Genome BC we believe we must build on the capacity gains and the lessons learned from the pandemic to create a positive data sharing culture across Canada — a shift in thinking that will give our health care researchers new tools to battle other diseases, including a future pandemic. Genome BC is already doing this by funding projects to ethically share and integrate data beyond original research purposes — ensuring that data is used and not just generated.

Genome BC is also committed to catalyzing the development of genomics education for health professionals, addressing a major barrier to clinical implementation of genomics in British Columbia. Phase I of this effort produced an Education Asset Map of clinical genomics education resources available in BC and Canada and identified key gaps to be addressed. Phase II focused on developing a deeper understanding of the BC health care environment and resulted in the creation of an Implementation Framework with recommendations on key principles, tactics and exemplar projects. Our commitment to build and enhance this capacity within our province was further

"BC's life sciences research and companies continue to receive international recognition for playing a key role in the development of new technologies and treatments. By expanding our investments here at home, we are ensuring our public health experts continue to receive world-class research to protect the health and safety of British Columbians while guaranteeing BC remains a global leader in research and innovation."

— **The Honourable Adrian Dix,** *M.L.A.*
Minister of Health, Province of British Columbia

supported by hiring a staff member at Genome BC solely dedicated to working with our partners across the ecosystem to develop and coordinate activities under this initiative.

The important perspective of patients and families, including within underrepresented groups is essential to bring genomics into routine clinical care. A greater understanding of the patient's experience is critical to responsible and customized patient care. For example, one of the sensitive issues when discussing patient informed consent and privacy is the potential for patients to receive information about conditions discovered unexpectedly through genomic sequencing — particularly, the impact on families that learn of an inheritable condition and how that knowledge affects their decision making on sharing the information with other members of the family who may also be potentially affected. Whether a patient chooses to opt in or out of receiving incidental findings presents an ethical dilemma — it is a personal choice, yet it can affect an entire family. Other concerns include the risk of personal identification, how data will be used and the purpose of the study. Patients must be directly involved in these discussions and more must be done to advocate for and include their voices in health related research.

One example is a project funded by Genome BC in partnership with Genome Canada and Michael Smith Health Research BC to explore the efficacy and cost-effectiveness of pharmacogenomic testing as a routine component of clinical practice in people living with depression. The project research team includes patient partners living with depression. Working side-by-side with researchers and health professionals, these patient partners will have a voice in the recommendations to implement, not implement, or guide further research to inform the future use of pharmacogenomic testing for depression.

Equitable access to health care for underrepresented groups is also a concern. Genomic tests may not be accurate for Indigenous People because the reference databases used to compare variations are mostly populated with data from individuals of European descent. Reference genomes of Indigenous Peoples are needed to distinguish between a variation linked to a disease and one that might be normally present within Indigenous populations. Genomic innovations can benefit everyone only if the appropriate data is available to classify common variants within any population.

Yet overcoming this inequity presents a significant challenge. Understandably, many Indigenous Peoples hold an inherent distrust of western institutions — the result of a history of systemic racism and exploitation. Unethical and culturally insensitive genetics research in Canada and elsewhere in North America has eroded trust in genetics and genomics for many Indigenous Canadians.[1] Projects such as Silent Genomes, funded through Genome BC and Genome Canada, aim to address this inequity. The goal is to offer the option of bringing life changing genomic diagnoses to children while ensuring Indigenous-led governance over the required patient samples and health data.

Rising to each of these challenges requires time, capacity, dedication and collaboration amongst stakeholders, including medical professionals, health authorities, funders, researchers and patient partners. Genome BC will continue to fill an important role as a funder and a convener, working with our partners across the ecosystem to bridge the gap from research to the clinic to deliver better disease prevention, diagnosis and treatment through genomics. Together, we can contribute to the transformation of health care — improving patient health outcomes and health care system sustainability.

"As patient partners, we have achieved a synergy with the research team to the point of 100% integration into the project. We draw on our lived experience in every meeting and work interaction, building trust and cooperation with the research team and helping nurture a cooperative ethos and co-learning with the team itself. The patient partners are engaged in all aspects of the research project. Our lived experience is the foundation of the work. We feel trusted and secure in discussing our experience within the safe places created by the team as a whole; this trust and co-learning have become the hallmark of our work together within the project."

From left to right: Lisa Ridgway, Ginny Landry, Linda Riches

[1] Morgan, J, Coe, RR, Lesueur, R, et al. Indigenous Peoples and genomics: Starting a conversation. J Genet Couns 2019; 28: 407–418. https://doi.org/10.1002/jgc4.1073

Canadian genomic enterprise rises to the challenge

Initiatives such as **CanCOGeN** and **All for One** are prime demonstrations of the Canadian genomic enterprise collaborating on a national challenge, to identify and develop meaningful solutions for COVID-19 and rare diseases, respectively.

The Canadian COVID-19 Genomics Network **(CanCOGeN)** was launched in April 2020 to establish a coordinated pan-Canadian, cross-agency network for large-scale SARS-CoV-2 and human host sequencing. Viral sequencing enabled tracking of the spread and evolution of SARS-CoV-2 and informed time sensitive, critical decision making for health authorities across Canada during the pandemic. Host sequencing characterized the role of human genetics in COVID-19 disease. The network has contributed significantly to building Canada's capacity to address future outbreaks and pandemics.

The **All for One** initiative is advancing precision health across the country, increasing equitable and timely access to accurate, genomics-enabled clinical diagnoses for Canadians with serious genetic diseases. All for One is improving the health and wellness of Canadians by building regional genomics capacity, promoting the equitable and ethical uptake of precision health tools and addressing barriers to data sharing.

CanCOGeN

AllforOne
Canada's Precision Health Partnership

Advancing sustainable agrifood and natural resources

Among many things the COVID-19 pandemic has taught us is that ignoring biological threats can have catastrophic health and economic impacts. Scientists warned us about the risk of a potential deadly zoonotic virus well in advance of SARS-CoV-2. Similarly, scientists have long been raising concerns of other potentially catastrophic biological threats to society. For example, biodiversity loss, as well as invasive pests and pathogens, among other hazards, all pose an increasing threat to the environment — often with irreversible effects that undermine the integrity of whole ecosystems. Climate change is a driver of these threats and is already seriously impacting British Columbia.

The World Economic Forum's 2021 Global Risks Report ranks environmental risks, such as biodiversity loss, natural resource crises and failure to take climate action, among the top threats humanity will face in the next ten years. The consequences of inaction are just as alarming for business and humanity as they are for the environment. The overall health and well being of humankind relies on well functioning, natural ecosystems that provide clean air, fresh water, medicines and food security. The economic health and prosperity of society are also closely tied to these ecosystems.

The industrial revolution gave rise to our current economic system. And while it has succeeded in stimulating economies, creating enormous wealth and improving human welfare, it has failed to preserve nature and create equitable societies. Humanity's footprint on the planet has immensely impacted the natural world. Unsustainable consumption and production patterns have come at the cost of healthy ecosystems, biodiversity and human resilience.[2] The warning signs are visible and, if left unchecked, could lead to a catastrophic collapse.

In contrast, a circular bioeconomy is an economic model that emphasizes the use of renewable natural capital. It is an economy powered by nature that offers the opportunity to transform our land, food, health and industrial systems by focusing on minimizing waste and contributing to managing and rebuilding ecosystems that desperately need it. Land and marine ecosystems, production sectors like agriculture and forestry and the industrial sector work in an intentionally crafted, circular manner, with scientific approaches and technological innovations employed to create more sustainable materials and spur regeneration.[3]

"Leveraging program dollars to create a resource for agriculture and agrifood in BC is a priority for our organization. Working together with Genome BC, IAF will create a lasting impact towards solving climate change."

— **Jack DeWit**, *Chair, IAF Board of Directors*

[2] Inger Andersen, Under-Secretary-General of the United Nations and Director, UN Environment Programme. New Nature Economy Report II: The Future of Nature and Business, World Economic Forum, July 2020

[3] The Circular Bioeconomy: Knowledge Guide, Center for International Forestry Research, January 2021

The circular bioeconomy

A genomics focus on the agrifood and natural resource sectors will help BC transition to a more sustainable low carbon economy, protect natural capital and biodiversity and promote equitable development within social and environmental boundaries.

SOURCE: EFI

Canadian researchers and industry have been integral contributors to genomic solutions for global challenges. From discovery based research to applied and translational research, genomics has proven to be a useful tool on many fronts — driving positive change in health care delivery and outcomes, enabling us to adapt to climate change, increasing our food safety and security and developing cleaner energy.

Genome Canada's recent shift toward a challenge based approach for research funding will take aim at solutions where genomics can make a difference and contribute to tangible, equitable impacts for Canadians, such as in health, food security, environment and climate change.

This is a conscious move toward building a portfolio of projects that bring the right people to the table to generate the impacts that are going to help us solve these big challenges. Collectively, we can leverage collaborations and partnerships to deploy an interdisciplinary, multi-sector approach that will harness cutting edge genomics research and innovation. We can mobilize Canada's genomics data and talent assets to tackle grand challenges in health, climate change and food security – effectively removing silos with a primary focus on the outcome and potential impact of the work.

Genome Canada's inaugural challenge will focus on mitigating and adapting to the impacts of climate change by investing in climate-smart agriculture and food systems. This may include projects involving resilient agriculture and aquaculture, novel and emerging food systems, sustainable food production systems, soil health and carbon capture and enabling the net-zero carbon bioeconomy — while aligning with Canada's public policy, societal and economic priorities.

In further support of climate smart agriculture and food systems, Genome BC has partnered with the Investment Agriculture Foundation of BC (IAF) to co-create and deliver the Genomic Innovation for Regenerative Agriculture, Food and Fisheries Program (GIRAFF). This initiative is investing in projects to provide genomic solutions that enhance the agriculture, food and fisheries sectors, increasing resiliency and sustainability in BC. This program leverages IAF's experience as an industry-led organization and Genome BC's expertise in connecting academic researchers, industry partners and public policy priorities to deliver sustainable benefits for BC.

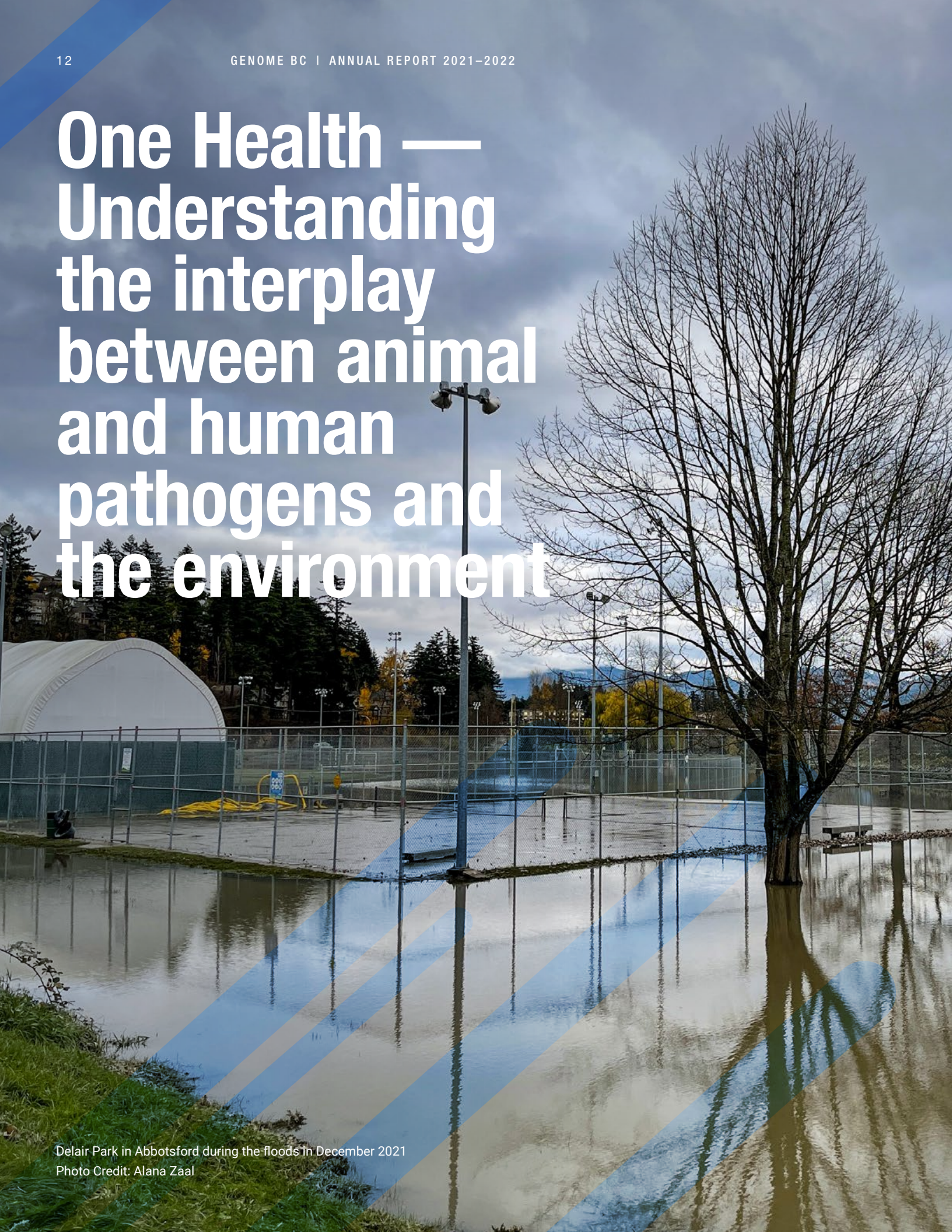
Projects funded through this program will inform and address some of the challenges raised by the Regenerative Agriculture and Agritech Network, launched in July 2021 by the BC Government. This is a strategic four-year plan combining agritech – which includes the development and application of technology and innovations that will help the farm, food and fish sectors improve production, profitability and sustainability – and regenerative agriculture to benefit farmers and build food system resiliency. The overall goal is to have net positive environmental and social impacts from our food production systems. The Network will facilitate partnerships between government, industry, academia and the private sector to address major challenges such as the increased cost of resources for food production, labour shortages and the impacts of climate change.

Moving forward, Genome BC will continue to look for new and existing opportunities to integrate and leverage biodiversity genomics to further demonstrate economic impacts and inform policy and regulatory development. By focusing on food security, renewable resources and resilient ecosystems, we will promote economic growth and productivity while prioritizing ecosystem health and yielding creative solutions for an equitable, greener and more competitive resource-based economy in BC.

"Adopting agritech and regenerative farming practices will be key to increasing food security for future generations. In addition to increasing production, these practices will increase environmental sustainability, mitigate the effects of climate change and increase profitability and market opportunities for BC farmers."

— **The Honourable Lana Popham, M.L.A.**
Minister of Agriculture, Province of British Columbia

One Health — Understanding the interplay between animal and human pathogens and the environment



Delair Park in Abbotsford during the floods in December 2021
Photo Credit: Alana Zaal

When we consider the intersection of human health and the environment, the COVID-19 pandemic – stemming from a pathogen transmitted from an animal to a human – is still top of mind for the past year. During that same time, however, British Columbia has seen a convergence of environmental disasters that have had notable impacts on the health of both humans and animals.

For example, following the December 2021 floods in southern British Columbia, over 640,000 animals died, an estimated 4,000 tonnes of unharvested vegetables were lost and three land-based fish farms in the Fraser Valley were severely damaged. This flooding event also demonstrated how interconnected crises can be as it led to the displacement of nearly 15,000 people amidst an increase in COVID-19 prevalence due to the Omicron variant.

Now, in early 2022, authorities are monitoring the spread of Avian Influenza H5N1; so far, an estimated 1.7 million birds have been euthanized or killed by the virus in Canada with a significant effect not just on animal health but on human food supply. This outbreak has now reached BC where poultry farmers are implementing quarantine measures to protect their livestock from the highly infectious virus and looking to scientific solutions to assess and preserve animal health.

Climate change is shifting the range of organisms we encounter and contributes to the emergence of diseases in places we may not have previously anticipated. The ways in which we are experiencing climate change has made it even more apparent that there are shared health impacts between humans, animals and our ecosystems and that it is overdue that we consider these areas collectively.

This growing awareness is driving conversations around the need for a holistic "One Health" approach in British Columbia. One Health places an emphasis on the interdependencies between human, animal and environmental health. Recognizing that a single sector or siloed approach cannot solve complex and multifaceted issues, One Health is collaborative in nature and requires interdisciplinary inputs to detect, prepare, prevent and respond to these challenges. Policies designed in alignment with the principles of the One Health concept have the potential to strengthen identification, monitoring and prevention of health risks among animals, humans and environments.

One Health efforts are already being championed in British Columbia. Genome BC is working closely with key government ministries and leaders in clinical genomics research to explore the benefits of One Health frameworks to advance the province's genomics capacity in this area through cross-sectoral collaboration.

Genomic technology and services are particularly impactful for surveillance. For example, Genome BC has funded several projects which have provided powerful cross-disciplinary surveillance tools to help identify and mitigate risks to human health and agriculture. As early as 2015, Genome BC funded a project in partnership with Genome Canada that led to the development of the world's first early warning system for Avian Influenza based on genomics analysis of wetland sediment. The novel methodology was validated in field studies over two years by demonstrating that the level of detection of Avian Influenza sequences in sediment samples was 37 times more effective for detection compared to previous surveillance programs which used difficult to obtain samples from live and hunter-killed birds that could not provide population level information.

"The relationship between people and nature must be one of interdependence, otherwise we risk something that Indigenous Peoples have known all along: that we are nature and nature is us and failing to see this simple truth is what has gotten us into this mess in the first place."

— **Dr. Tonio Sadik**, *Sr. Director of Environment, Lands and Water, Assembly of First Nations (Canada) at the Global Landscape Forum Biodiversity Digital Conference 2020*

At the outset of the pandemic, Genome BC funded an initiative by British Columbia's Centre for Disease Control Public Health Laboratory (BCCDC), to incorporate genomic analysis into tracking the SARS-CoV-2 virus, adding a critical new dimension to its outbreak response capabilities. As well, Genome BC initiated a pilot project that provided surveillance of COVID-19 in farmed mink to understand how the virus was impacting mink farms, monitor potential spill-over into nearby wild animals and help build capacity for future pathogen tracking. Following the recommendations of public health officials and infectious disease experts who were managing the threat of the virus to farm workers and the public, the province initiated a process to phase out BC's mink farming industry due to ongoing public health risks associated with COVID-19.

Further expanding the province's capabilities for outbreak response, a funding partnership between Genome BC and BC's Ministry of Agriculture and Food led to three interdisciplinary teams from BCCDC, UBC and the Canadian Food Inspection Agency (CFIA) developing and evaluating One Health sequencing tools to identify strains of norovirus and *Vibrio parahaemolyticus*, a pathogenic bacterium present in marine and coastal environments. Both pathogens can cause acute gastroenteritis in people who eat raw, undercooked, or mishandled marine products. These tools positively change how shellfish-related illness outbreaks and food safety investigations are handled.

Scientists estimate that more than six out of every 10 known infectious diseases in people are zoonotic (can be spread from animals), and three out of every four new or emerging infectious diseases in people come from animals.[4] Zoonotic diseases like COVID-19 and influenza, as well as infection from Salmonella bacterium and norovirus, are examples of how human health can be impacted by animal encounters – and the likelihood of these encounters is impacted when nature is pushed to its limits. The impact to ecosystems through resource extraction, agricultural conversion and urbanization contribute to habitat fragmentation — the largest factor contributing to the loss of biodiversity. This ultimately removes natural buffers, expanding the interface between wildlife and people where pandemics emerge.

This threat extends far beyond the risk of disease transmission. The World Economic Forum's New Nature Economy Report series, Nature Risk Rising, highlighted that $44 trillion of economic value generation — over half the world's total GDP — is potentially at risk because of the dependence of business on nature and its services.

Adopting a One Health approach is an important step as it highlights the links between biodiversity, which signals a healthy ecosystem and human and animal health. The decline of biodiversity is reducing the ability of ecosystems to provide essential life sustaining services — agricultural productivity, food security, medicines and disease prevention — and in many cases, leads to negative outcomes for health and well-being. Opportunities to expand and accelerate the implementation of One Health through provincial policy are essential to provide social, environmental and economic benefits to all people in British Columbia.

"Sequencing the genomes of Canada's plants and animals is a massive proposition that requires significant scientific collaboration — one with enormous benefits not only for better understanding the evolution of life itself but, in uncovering fundamental principles of health and disease, for individuals and populations."

— **Dr. Steven Jones**, *Project Lead, Canada BioGenome, Co-Director and Head of Bioinformatics for Canada's Michael Smith Genome Sciences Centre*

[4] https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html

Canada's contribution to the global effort to map the genomes of complex life on Earth

Canada possesses significant biodiversity, having approximately 80,000 plant and animal species in environments ranging from desert to the arctic. British Columbia is home to thousands of species and ecosystems and some of these are at risk of disappearing from our province due to rapid changes in climate and other human-led impacts on our environment.

The Canadian BioGenome Project, funded in partnership between Genome Canada and Genome BC, is one of Canada's contributions to the Earth BioGenome Project — a global effort to map the genomes of all plants, animals, fungi and other microbial life on Earth. The Canadian initiative will sequence 400 species where a genome will aid in their conservation and increase our understanding of their underlying biology and populations. Through the study of these genomes, scientists can explore the diversity of life, how species interact, and how they create ecosystems.

Photo Credit: Eric Sambol

Purposeful innovation

The rapid progression of genomic technologies has made them accessible for an increasing number of day-to-day applications. Scientific research, basic and applied, continuously generates new discoveries, rapidly expanding the breadth and depth of scientific knowledge. The challenge is in ensuring the practical translation of ideas and research outcomes into new or improved products, services, processes, systems or social interactions that benefit society. This is an important measure for innovation.

By funding applied and translational research, Genome BC has been supporting innovation implicitly for many years, particularly by investing in end-user-driven research. However, funding and program criteria have traditionally been focused on generating research outcomes, rather than deliberate innovation outcomes specifically. Recognizing the need for active and focused programs to support innovation, Genome BC is now developing programs in three key areas: innovation specific funding programs, outcome specific projects and capacity building.

Launched in 2021, the $1.5M Pilot Innovation Fund (PIF) was purposefully designed to align with the landscape of programs offered by government(s) and other funders while matching the needs of the omics ecosystem we support. Six diverse projects with a credible probability of success were selected for funding and launched in early 2022. This pilot program, with year-long projects, was also designed to experiment and learn in order to inform the specifics of an enduring Innovation Funding Program which will be launched in 2023. One of the most unique components of the PIF is that each project team was assigned a mentor with expertise in entrepreneurship and commercialization to support them through obstacles encountered on their path to commercialization. These individuals bring experience and passion to their role and add significant value to the project teams.

In addition to Genome BC's own program investments such as the PIF, Genome BC's partnership with the IAF to deliver the GIRAFF program, mentioned earlier in this report, is an example of our support for outcome specific projects. While the GIRAFF program aims to support sustainable food systems, we are also engaged with the Bioproduct Institute (BPI) at UBC to support the development of sustainable bioproducts and building biomanufacturing capacity in our province. Working with BPI, alongside stakeholders from industry and government, we identified key opportunities for development of compostable bioplastics and upgradation of industrial and agrifood waste streams.

Genomic tools, especially biological engineering approaches, have a significant role in the development of bioproducts. To realize this potential, Genome BC has committed to support initiatives, such as application for Canada First Research Excellence Fund, led by the BPI.

Capacity building is essential for the responsible uptake of genomics and can be a barrier to the implementation of genomic technologies. Experts not only need to be aware of the tools available and have clear access to them, but they must also understand the utility. Genome BC's Genomic Education for Health Professionals (GEHP) program is our first initiative focused on capacity building within the health care system. Recognizing a lack of dedicated resources to educate health professionals as one of the major barriers to

"Knowing what it takes to get a new business off the ground or bring new and innovative products to market can be a real hurdle to success. Programs like the Pilot Innovation Fund are a great example of the kind of supportive partnerships Genome BC has provided to strengthen entrepreneurship and commercialization in British Columbia."

— **Nancy Harrison,** *Venture Partner, Amplitude Ventures*

Supporting purposeful innovation

The following are the inaugural projects supported through Genome BC's Pilot Innovation Fund.

Isolatrix: An innovative method for single cell isolation using inkjet printing led by Karen Cheung (UBC), Adi Steif (UBC) and Marco Marra (BC Cancer). New methods for profiling the genetic diversity of individual cells are transforming our understanding of diseases like cancer. Current single cell genomics platforms present deficiencies in throughput, accuracy and customizability that will be addressed in this project. The development and validation of key features of this technology will progress it towards commercialization.

A DNA-based global positioning system led by Nozomu Yachie (UBC) and Geoffrey Schiebinger, (UBC). This project will develop a scalable spatial gene expression technology, called GPS-seq. GPS-seq will have impacts in broad fields of research in the life sciences and will change the way we understand tissues. It will allow the development of numerous therapies and drugs and will trigger a shift in biology, similar to high-throughput deep sequencing and single-cell genomics technologies in the last decades.

Fibre based approach to scalable single-protein analysis led by Reuven Gordon (University of Victoria). The objective of this project is to innovate an optical fiber-based approach to laser tweezers that can hold a single protein. This provides the ability to track single proteins in real time without labels and deliver insights into protein structure, function and single molecule interactions.

Tope-seq: A high-throughput platform to discover and characterize T-cell receptor reactivity for advancing safe and effective immunotherapies led by Govinda Sharma, James Round and Rob Holt (BC Cancer). This project will demonstrate the commercial potential of Tope-seq, a high-throughput platform that allows therapeutic T-cell receptor development to be faster, safer and more effective.

Breaking the blood group barrier for kidney transplantations led by Peter Rahfeld (ABOzymes), Caigan Du, Christopher Nguan, Jayachandran Kizhakkedathu and Stephen Withers (all with UBC). This project's goal is the further development of a process to convert blood group type-A kidney donor organs to universal blood group type-O, in a preclinical transplant model with the ultimate objective of meeting the global demand for kidney transplantation.

Identification of the target sites of a new acaricide against the honey bee parasite, Varroa destructor led by Erika Plettner (SFU) and Leonard Foster (UBC). Using proteomic tools, this project aims to discover the mode of actions of a new compound against Varroa that does not visibly harm the bees and has no adverse effects in vertebrates, which is key to gaining approval with health authorities. The advancement of this new pesticide will be a gamechanger for the beekeeping industry in the fight against Varroamite infestations.

clinical implementation of genomics, Genome BC is working collaboratively with key stakeholders to share genomic educational resources and develop new tools to support BC Health Professionals to integrate genomics into clinical practice. Experiences with this first program will inform the creation of additional educational projects needed to support users to implement genomics in other sectors.

Over the next three years these innovation programs will be resourced and integrated into our ongoing and expanding program offerings. During this time systematic reviews of these initiatives, including outcomes and impacts, will be conducted to inform modifications and to round out Genome BC's longer term innovation programming.

The broad support Genome BC provides to entrepreneurship and commercialization is a foundational element of our strategy to accelerate innovative ventures in the life sciences. Genome BC works to mobilize BC's brightest minds from science to engineering and social science to entrepreneurs to create and support the practical and commercial use of genomics.

Genome BC's Industry Innovation (I^2) Fund began as a pilot initiative in 2016. The idea behind this unique venture was to provide commercialization support for companies developing innovative life science technologies in a way that could become self-sustaining. The fund provides risk capital (as much as $1.5M per company) at the early stages of commercial development that is concurrently matched by other public or private funding sources. The early-stage capital takes the form of debt, equity and royalties. Initiatives targeted within this program need to demonstrate a clear pathway to commercialization. Once a company is funded, Genome BC works with them to help establish this pathway and link them to other stakeholders in the industry. The aim is to help companies reach near-term milestones — sometimes by tying a portion of funding to the successful execution of these milestones. The funds are repayable payments that commence within four years of disbursement. As the I^2 Fund enters its sixth year, the program has begun to receive royalties from its investments. Two companies, Anandia Labs and Alavida have fully repaid the loans and are contributing to BC's life sciences sector.

Commercializing companies in BC

Genome BC helps foster collaboration between academia and industry, builds networks and attracts co-investment. To date, we have helped advance 152 companies, supported BC job growth and contributed to international recognition of British Columbia for its genomics and life sciences capabilities. Some of the companies advanced through Genome BC's support of entrepreneurship and commercialization include:

AbCellera · ACUVA · ALAViDA · ANANDIALABS · Aspect biosystems · AugureX

BOREAL GENOMICS · ContextualGenomics · GenXys Health Care Systems · MRM Proteomics

PRECISION NANOSYSTEMS · Sonic Incytes · Starling · Stōkō · REHABTRONICS

Supporting entrepreneurship

Genome BC proudly supports several acceleration and venture programs. These programs enhance the development of the next generation of entrepreneurs — affording mentorship and advisory support from industry leaders and practicing executives at some of Vancouver's top companies. These programs provide critical resources for the acceleration and realization of ideas that produce meaningful social and economic impact in BC and across Canada.

entrepreneurship@UBC — Lab2Launch Venture Building Program supports the next generation of science based entrepreneurs in developing viable, transformative ventures built around UBC research innovation. During formal programming and one-on-one mentoring, teams are partnered with mentors who guide them through the business model discovery and validation process.

SFU Innovates — From incubation to acceleration, SFU Innovates provides a continuum of resources and support for students and researchers to mobilize their ideas for positive social and economic impact in British Columbia. Genome BC supports SFU Innovates' Life Science Stream that runs pre-incubation and incubator programs. Pre-incubation programs, such as SPARK and i2I offers very early-stage start-ups entrepreneurship training, mentorship and resources to move an initial idea through to validation. The Incubator programs, such as Venture Connection Incubators, offer validation and growth stage programs for entrepreneurs and ventures.

Creative Destruction Labs (CDL-Vancouver) — CDL-Vancouver serves ambitious teams pursuing commercial opportunities predicated on translational science and technology innovations that improve human health and wellness. This includes innovation areas such as biotechnology, bioinformatics, therapeutics, devices and diagnostics as well as digital care and education. The stream is tailored towards early-stage companies (early venture or growth) or even projects (pre-incorporation) however, start-ups at all levels of maturity are considered.

Praxis Spinal Cord Institute (SCI) — Praxis is a Canadian-based not-for-profit organization that leads global collaboration in spinal cord injury research, innovation and care. It accelerates the translation of discoveries and best practices into improved treatments for people with spinal cord injuries. Genome BC supports SCI Accelerate Program to bridge the gap from prototype to commercialization in this area.

FORESIGHT Canada — Foresight is Canada's cleantech accelerator. Working in partnership with global paper products leader CMPC and with Genome BC, Foresight launched the bioNEXT program — a sector-specific, ecosystem-based accelerator established to drive the development and scaling of Canadian ventures in the bioeconomy. BioNEXT brings partners together to explore how to use renewable biological resources to provide products, processes and services that align with a sustainable economic system.

The Coast Capital Innovation Centre — The University of Victoria's on-campus venture incubator helps entrepreneurs receive fundamental support and mentorship to take business concepts from idea to investor-ready. It provides tools, expertise and space on campus to help entrepreneurs develop their ideas and partners clients with advisors and mentors from outside the university who provide valuable input and connections.


PROJECT
ROOM

Genomics and the data challenge

The analysis and interpretation of genomic data are helping to better understand human health and disease. When combined with clinical data, genomic data can help us diagnose and treat illness earlier and more effectively, enable preventative and precision medicine more possible, unlock how environmental factors can determine health outcomes and more.

Genome BC strategically promotes data collection, management, storage, analysis and integration – all of which are essential to the optimization of genomic research and innovation. The abundance of data generated by Genome BC-funded research has value and utility beyond the purpose for which they are originally generated. The challenge is to fully utilize this data in a way that can yield potentially lifesaving discoveries or make informed policy decisions that improve people's lives.

Working with health data carries ethical responsibilities since each person's sequence data are associated with issues related to personal privacy and identity. The key to sharing health data is to anonymize the data so that the individual cannot be identified. Sharing personal health data requires informed consent and the research itself needs to be approved by research ethic boards that pay particular attention to data sharing consent. The person whose data is being shared must agree to the specific use of such data. In clinical care, accepting treatment implies that the data necessary for such treatment is being shared as required. However, this implied consent does not apply to the release of data for research or public health purposes. For instance, a treating physician at BC Cancer has access to the entire health data of patients. The same physician, when conducting research, requires specific consent from these patients to use their data. In addition, the technical solutions that allow data to be shared safely must be approved by privacy commissioners and applying these solutions broadly ultimately requires policy changes.

For British Columbians to fully realize the benefits health data can offer, we need data strategies and digital tools that can use our data for full public benefit, while protecting personal privacy. We need to build resiliency, increase productivity and leverage our data to drive insight to improve public safety, public policy and economic productivity.

Unlocking the potential of these data is an interdisciplinary and translational challenge requiring the engagement of multiple stakeholders. Funders, data providers, innovators, researchers, and citizens must work together to unleash the data's full potential. To this end, Genome BC is committed to purposefully working with stakeholders to enhance the utility of data for the benefit of all British Columbians. We promote, mandate, actively support and rigorously assess — through our funding programs and other activities — clear plans for data governance including management and sharing, as well as the provision of secondary data access. We advocate for robust cyber and privacy security, advanced data sharing and integration tools, as well as decentralized platforms that Canadians can trust.

"Unfortunately, there have been limited opportunities to integrate clinical and imaging information with existing genomic research data in any meaningful way. Our partnership with Genome BC in the Data Access, Integration and Analysis program is an exciting and important step toward enabling new discoveries that will improve patient outcomes and in so doing, provide tangible benefit to BC's health care system."

— **Dr. Darryl Knight,** *Vice President, Research and Academic Affairs, Providence Health Care*

Data sharing challenges must be solved. Next generation technologies allow us to rapidly sequence genomes at a relatively low cost. Data storage, processing power and bandwidth are also cost effective — resulting in the ability to generate very large amounts of powerful data with the enormous potential to improve and save lives. However, we must be able to pool, share and analyze it. If we cannot overcome the legal and political barriers and implement existing technical solutions, genomics and other data-intensive technologies will never be able to live up to their promise and society will not benefit.

The Data Effect

Finding ways to seize the potential power of sharing and integrating health data across silos in British Columbia and nationwide across Canada.

CityAge and Genome BC brought together a select group of leaders in BC's health ecosystem for a focused conversation on the path toward implementation of ameliorated data sharing to accelerate BC's health research cluster. The initial facilitated conversation, "Data-Driven Health Care Breakthroughs," aimed to draw expertise from the assembled participants to begin the process of building a roadmap forward. This was followed by a roundtable discussion where current barriers to effective data sharing were explored further, as were ways to mitigate risk and ensure privacy while sharing health data. As a result of these discussions, a working group has been formed to create a jurisdictional roadmap for integrating clinical, biobanking and genomic data which will be summarized in a white paper.

Events like these are one of the ways Genome BC is working to overcoming these challenges. Through the continued engagement of experts, policy makers and the public we will find workable solutions to ensure privacy and security of data for the benefit of all.

Mining Microbiome Analytics Platform

Microbiome analysis aims to support leading environmental practices across the mining lifecycle. By replacing traditional mining extraction and mine site remediation technologies with breakthrough biomining solutions, the Mining Microbiome Analytics Platform (MMAP) project aims to be the catalyst for new sustainable mining practices.

Over the next decade, major Canadian mining companies, supported by the research, engineering and consulting sectors, are working to accelerate progress towards more sustainable mining practices.

The MMAP project led by Teck will extract the DNA from more than 15,000 mining site samples over the next two years to identify naturally occurring microbes and microbial communities that can biologically transform chemicals used in the extraction process of minerals and metals, or can be used for bioremediation of mine sites. This genomic data will be sequenced and directly linked to geospatial data, climate data and chemical data to support global breakthroughs in biomining solutions for natural resource extraction and green site remediation.

Continuing the conversation

Genomics positively impacts life, every day. Genome BC's vision statement reflects the incredible utility genomics provides to society. Advances in science and technology are rapidly changing our lives; they affect everything from how people engage with new products and services to how students identify careers and prepare for them. While this is true across a broad spectrum of sciences and technologies, advances in the life sciences are having a profound day-to-day impact that may not be immediately recognizable to most people. Engaging society in two-way dialogue about genomic technologies becomes a critical component, not only in creating awareness and understanding of their impact and potential, but also toward informing research and development to ensure they meet societal needs and are accessible to everyone.

Societal perceptions of genomic technologies vary. Those perceptions can be guided by what people hear in the news or find online. Perceptions can also be guided by personal circumstances and hands-on experience with genomic technologies, particularly in a health care setting. Regardless of how perception is gained, a deeper understanding of the factors influencing the public's level of acceptance of genomic technologies is necessary to ensure the responsible application and uptake for this science to have a meaningful impact on society. As genomics tools continue to advance, genuine questions emerge about how such technology can be applied responsibly and effectively to maximize benefit to society. These questions extend far beyond biology and individual projects and require multi-level collaboration between actors and between disciplines.

The public has an important stake in the conversation around genomic technologies. Genome BC has developed several communications and education outreach programs in aid of increasing awareness and understanding of genomics and its impacts. We continually seek to improve our understanding of where British Columbians are in terms of their attitudes and beliefs toward these technologies. Public opinion surveys have helped us recognize where there are information gaps and specific interests, enabling us to adjust accordingly. For example, the pandemic can take some credit for improving public knowledge about genomics as 45% of British Columbians say they have learned a little or a lot about genomics because of COVID-19. Also encouraging is that 55% are interested in learning more about how genomics is applied, particularly to address other health issues, but also across a variety of natural resource sectors.

Genomics positively impacts life, every day.

The value of genomics is ubiquitous. It is disrupting the status quo and transforming society in many ways. Precision health care is changing how we prevent, diagnose and treat disease. Genomics is revolutionizing agricultural practices helping to ensure security of our food supply. Genomics is a key tool in mitigating and adapting to the effects of climate change across our precious natural resources — helping to monitor and identify invasive pests and pathogens; determining which plants have desirable traits for survival in changing climates. Genomics is a clean technology offering solutions to produce cleaner fuels; solutions to replace traditional mining extraction and mine site remediation technologies with breakthrough biomining solutions. The list goes on.

While the past two years of the pandemic may have limited our ability to host in-person events for the public, virtual events have enabled opportunities to bring high quality speakers from around the globe to explore a variety of topics and interact with British Columbians across the province.

Genome BC was proud to present Professor Dame Sue Hill as the speaker for the 12th Annual Don Rix Distinguished Keynote Address. As the Chief Scientific Officer for England, Dr. Hill answered questions from her lived experience in helping to embed this transformative technology into the UK health care infrastructure. She shared how this has helped the UK improve health care delivery and what Canada might learn from this experience.

Our Annual Genomics Forum was tremendously successful as a virtual event. In 2021 we featured many local and international speakers, including Dr. Anthony Fauci, Director of the National Institute of Allergy and Infectious Disease in the US. Over a three-day period, our program examined the important role of genomics throughout the pandemic, including unique challenges of public health delivery and the complexities of science communication and misinformation during a pandemic. While this event traditionally draws leaders in academia, industry and policy makers, more than a third of registrants were from the public, including students and teachers.

Through its research and societal engagement activities, Genome BC aims to create opportunities for dialogue related to the responsible uptake of genomic technologies and society's acceptance of genomic applications. This includes involving end-users and stakeholders to examine and address the societal implications of these technologies as early in the research phase as possible. For example, economic modelling integrated with social and environmental impact research is crucial for policy changes and shifts. Through research, dialogue and partnership, our genomics and society activities focus on understanding answers to societal questions that extend beyond biology to inform new scientific research as well as policymaking and practice.

Genome BC's Geneskool™ is a strong example of how science opportunities for youth can be enhanced, so that children grow up understanding, questioning and responsibly applying new technologies. In addition to a variety of in-person and virtual programs, Geneskool makes it easier for teachers to bring genomics into the classroom by providing hands-on classroom activities and workshops aligned to BC's grade 9–12 curricula. Student engagement goes beyond lab work to include discussion about genomics in society, enabling them to learn about this complex topic in new and interesting ways. Now operating for over a decade, Geneskool has provided access to advanced technology and intensive learning opportunities, often fuelling students' longer-term interest in life science careers.

A new initiative designed to specifically engage Millennials and Gen Z audiences is our podcast. Entering its second season, the podcast, now called 'Nice Genes!,' has been reimagined to inspire these audiences to get involved with science as a way of ensuring a brighter future. Our host, Dr. Kaylee Byers, is a One Health scientist, urban wildlife ecologist and health communications researcher investigating innovative ways to improve the health of people, wildlife and ecosystems. As a science communicator she guides our listeners through fascinating conversations about the what, the why, the how and the 'huh?' of genomics.

For genomics to be broadly adopted, policy makers, regulators and the public must be afforded opportunities to learn about genomics and its potential applications and implications. For this reason, Genome BC continually seeks to understand the diverse views of all people living in British Columbia while tailoring its outreach strategies in a way that supports the public in keeping pace with an everchanging life sciences ecosystem.

Photo Credit: Grady Mitchell

"I'm so excited about this podcast series because it dives deep into questions about what genomics is and the questions it helps us answer, but it also explores the ethical implications and limitations of these technologies."

— **Kaylee Byers,** *Host, Nice Genes! A Genome BC podcast*

Public Engagement, Education and Outreach

All figures represent activities from April 1, 2021 to March 31, 2022 unless noted otherwise.

Communications

70,484
Website Visitors

355,010
Media Views and Podcast Listens

1,017
Visitors to Corporate Events

120
Unique Media Stories

GENESKOOL

1,679
Education Resource Downloads

2,394
Students Engaged Virtually

365
Face to Face Volunteer Hours

107
Teachers Trained

51%
of all BC communities (cities, district municipalities, towns and villages) are reached by Genome BC programs*

*Total is cumulative since Genome BC's inception in 2000.

Social Media Highlights

61,805
Engagements
+56% Growth

27,508
Followers
+8% Growth

Genome BC Project Portfolio

Since 2000, Genome BC has led genomics innovation on Canada's West Coast and facilitated the integration of genomics into society. We manage a cumulative portfolio of $1.27 billion* in more than 498 research projects, technology platforms and innovation initiatives.

HEALTH

265 Projects
$576 Million

TECHNOLOGY & PLATFORMS

71 Projects
$195 Million

FORESTRY

36 Projects
$110 Million

FISHERIES & AQUACULTURE

30 Projects
$74 Million

AGRIFOOD & AGRICULTURE

45 Projects
$84 Million

ENERGY & MINING

17 Projects
$55 Million

ENVIRONMENT

34 Projects
$42 Million

* Includes projects not captured in the categories noted.

Socio-Economic Impact

Economic Impact to BC's GDP

$2.6B

Companies Advanced

152

***Patent Applications**

767

Direct Co-investment Attracted

$969M

Applications Demonstrated and Products and Services Advanced

153 applications demonstrated, of which 102 are products and services advanced

Jobs Created

32,400

Partnerships

1,117

Scientific Publications

3,718

****Total Investment**

$1.27B

Covid-related Applications Demonstrated/ Products and Services Advanced

27

Covid-related applications demonstrated

* in all countries including provisional

** in research funding since 2000

Message from the President and CEO

This past year was unusual and filled with very mixed emotions. We started the year exhausted yet energized by the unifying efforts fighting the first wave of the COVID-19 pandemic. With the urgent first response behind us, we looked to assume a more sustainable and regular mode of operation — all while still in the grip of the pandemic. There were highs due to the miraculous availability of vaccines, however, these were displaced by lows due to the emergence of new variants. Looser public health measures were replaced by tougher ones. The uncertainty was taking its toll. In the most read New York Times article of 2021, Adam Grant, a psychologist and author, aptly defined the dominant emotion of 2021 as, "languishing" and described it as "a sense of stagnation and emptiness" resulting from, "struggling with the emotional long-haul for the pandemic".

At Genome BC we were not immune to this continued impact. Our beautifully renovated offices opened under COVID-19 protocol, but for the most part, we continued to work from home and met virtually. Similarly, our events were hosted online and we did our utmost to creatively connect with colleagues and partners in our regional, national and international ecosystem – but nothing can take the place of in person connections. To the credit of the entire Genome BC team, we persevered in our mission to "apply the power of genomics to the most pressing societal and economic issues".

We boldly moved forward with our innovation mandate. Launching our Pilot Innovation Fund, we invested in six exciting projects. What we learn from this process and pilot will inform our longer-term Genomics Innovation Fund. We partnered with the Investment Agriculture Foundation to create a funding competition for regenerative agriculture, food and fisheries projects. This program provides opportunities to translate specific research outcomes into innovation. Our efforts to strengthen BC's ability to respond to human-animal pathogen interactions led to a One Health initiative in collaboration with the BC Centre for Disease Control and the BC Ministries of Agriculture, and Environment and Climate Change. The implementation of our Genomics Education for Healthcare Professionals initiative is well underway and we launched our data strategy, preparing a call for data related research projects in partnership with Providence Health Care. Nationally we continue to work with our colleagues on Genome Canada's CanCOGen program which continues to inform the federal pandemic response through the broad sequencing of the SARS-CoV-2 virus and infected hosts.

Internally, we re-organized our sectors group, now renamed Research and Innovation, to reflect our commitment to these areas. We strengthened our management capacity and informed Genome Canada's new challenge-based funding strategy. Always working to move genomics forward in our province, we completed a strategy update for 2022-2025 as part of our rolling planning process and aligned our logic model and accountability framework accordingly.

In March 2022, the BC government awarded Genome BC three years of funding. This was the largest single contribution in our history and one for which we are grateful and committed to delivering for all British Columbians. This investment will allow us to continue to invest strategically and solidify BC's academic and business competitiveness in genomics and life sciences. It allows BC to remain at the forefront of genomics — in research, innovation and education — and in parallel, asking the important societal questions that arise through the application of leading edge science.

This year my personal gratitude and thanks have greater significance given that I am stepping down as Genome BC's President and CEO. I have had the great opportunity to work with exemplary colleagues at Genome Canada and across the enterprise. It is a collective of very talented people who work with dedication and commitment in a spirit of collaboration and collegiality. For the past six years, I have had the privilege of working with an amazing Board of Directors, under the leadership of outstanding Chairs. The Board was always engaged, supportive and rightfully held me accountable. My executive colleagues are masters in their respective fields and complement one another very well. Working with them has been very rewarding both professionally and personally. Genome BC is extremely well served by this team. Together we had the opportunity to lead a unique team of highly qualified and driven professionals. Genome BC has a broad and complex mandate requiring an equally diverse team to fulfil its mission. These team members are highly educated, diverse and creative critical thinkers who are proud of what they do and do it very well. They challenged me as needed and delivered always. Thank you all.

Finally, I have had the amazing opportunity to work across the science and technology ecosystem in British Columbia and thank my colleagues past and present for their trust, collaboration and friendship over the many years — you have made my career so special.

PASCAL SPOTHELFER

Message from the Board Chair

The incredible speed at which genomics has advanced is nothing short of remarkable. We often speak about how genomics is revolutionizing, disrupting or transforming processes and services in multiple fields. In applications from health care to natural resources to agriculture, we hear stories almost every day about how genomics is tackling real world challenges and providing impactful solutions — saving lives, adapting to climate change, creating clean energy, preserving the environment and more. Genomics is truly a platform that emerged and has now arrived.

Scientific research and its pursuit of discovery have brought us here and are what will continue to drive social and economic benefits for society. The process is iterative. Scientists uncover the facts, clarify the idea, uncover more facts and so forth. It is in our nature to be curious — to seek understanding. And the more we understand, the more we can advance. We can apply new approaches, identify new processes and open doors to new possibilities. We can innovate.

The evolution of Genome BC as an organization could also be described this way. Six years ago, when Pascal Spothelfer took on the role of Chief Executive Officer, he inherited a reputable foundation built upon strong relationships and a credible track record. Pascal brought new perspectives and defined the path forward. Under his leadership, Genome BC has sought to better understand the ecosystem and identified and removed barriers to the adoption of genomics, while expanding programs that advance the direct implementation of solutions across key economic sectors. With his team, Pascal identified new approaches, necessary partnerships, funding, and operational models that further define the important role Genome BC plays as a convener and facilitator in BC's life sciences ecosystem. Under his watch, programs such as Sector Innovation and Genesolve have strengthened the link between academia and industry. The launch of the recent Pilot Innovation Fund further demonstrates Genome BC's ongoing evolution and will increase the competitiveness and success of made in BC solutions.

Pascal has helped transform Genome BC by initiating an inclusive and collaborative process to identify organizational values that reflect the beliefs and aspirations of the people who are Genome BC and inform its long term strategy. He worked with his executive team to champion a culture developed and driven by the people who work here – working to build trust, equity, diversity and inclusion.

On behalf of my Board colleagues, I thank Pascal for his remarkable leadership. He is leaving Genome BC in a strong position – a leader in the ecosystem and with a team ready for the next chapter. The success of Genome BC has always been rooted in its people – the talented and committed staff who work collaboratively across the life sciences ecosystem to facilitate great research and the responsible adoption of genomics into society and drive BC's bioeconomy.

Finally, we are ever thankful to the Government of British Columbia, as well as other funding partners and stakeholders. BC is an amazing province. The important work we do for the people who live here would not be possible without the continued support from these invaluable partners.

JOHN SHEPHERD

INDEPENDENT AUDITORS' REPORT

TO THE BOARD OF DIRECTORS OF GENOME BRITISH COLUMBIA

OPINION

We have audited the financial statements of Genome British Columbia (the Entity), which comprise:

- the Statement of Financial Position as at March 31, 2022
- the Statement of Operations and Changes in Net Assets for the year then ended
- the Statement of Cash Flows for the year then ended
- and Notes to Financial Statements, including a summary of significant accounting policies

(hereinafter referred to as the "financial statements").

In our opinion, the accompanying financial statements present fairly, in all material respects, the financial position of the Entity as at March 31, 2022, and its results of operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

BASIS FOR OPINION

We conducted our audit in accordance with Canadian generally accepted auditing standards. Our responsibilities under those standards are further described in the "*Auditors' Responsibilities for the Audit of the Financial Statements*" section of our auditors' report.

We are independent of the Entity in accordance with the ethical requirements that are relevant to our audit of the financial statements in Canada and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

RESPONSIBILITIES OF MANAGEMENT AND THOSE CHARGED WITH GOVERNANCE FOR THE FINANCIAL STATEMENTS

Management is responsible for the preparation and fair presentation of the financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the Entity's ability to continue as a going concern, disclosing as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Entity or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Entity's financial reporting process.

AUDITORS' RESPONSIBILITIES FOR THE AUDIT OF THE FINANCIAL STATEMENTS

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditors' report that includes our opinion.

Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists.

Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial statements.

As part of an audit in accordance with Canadian generally accepted auditing standards, we exercise professional judgment and maintain professional skepticism throughout the audit.

We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion.

  The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Entity's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Entity to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

KPMG LLP

CHARTERED PROFESSIONAL ACCOUNTANTS

Vancouver, Canada

June 10, 2022

FINANCIAL STATEMENTS

Statement of Financial Position (Expressed in Canadian Dollars)
March 31, 2022, with comparative information for 2021

		2022		2021
Assets				
Current assets:				
Cash	**$**	**1,008,897**	$	2,576,520
Short-term investments (notes 3 and 4)		**90,929,411**		92,414,490
Funding receivable (notes 3 and 8)		**79,000,000**		15,000,000
Other receivables (note 5)		**37,715**		51,744
Project advances		**5,347,847**		4,844,414
Prepaid expenses		**212,218**		254,200
		176,536,088		115,141,368
Capital assets (note 6)		**1,545,915**		1,173,611
	$	**178,082,003**	$	116,314,979
Liabilities and Net Assets				
Current liabilities:				
Accounts payable and accrued liabilities (note 7)	**$**	**6,268,866**	$	8,184,740
Deferred lease inducement		**416,580**		–
Deferred contributions:				
Future expenses (note 8)		**169,850,642**		106,956,628
Capital assets (note 9)		**1,545,915**		1,173,611
	$	**178,082,003**	$	116,314,979

Commitments (note 10)
See accompanying notes to financial statements.

Approved on behalf of the Board:

JOHN SHEPHERD, MD FRCPC
Director

LENARD F. BOGGIO
Director

Statement of Operations and Changes in Net Assets (Expressed in Canadian Dollars)
Year ended March 31, 2022, with comparative information for 2021

		2022		2021
Revenues:				
Amortization of deferred contributions related to future expenses (note 8)	**$**	**28,806,846**	$	11,763,244
Amortization of deferred contributions related to capital assets (note 9)		**341,330**		111,549
Recoveries from commercialization projects (note 4)		**2,720,579**		15,788
Investment income (note 3)		**2,476,812**		21,366,497
		34,345,567		33,257,078
Expenses:				
Corporate programs and management	**$**	**8,183,454**	$	8,244,436
Project expenditures		**25,820,783**		24,901,093
Depreciation		**341,330**		111,549
	$	**34,345,567**	$	33,257,078
Excess of revenues over expenses, being net assets, beginning and end of year	**$**	**–**	$	–

See accompanying notes to financial statements.

Statement of Cash Flows (Expressed in Canadian Dollars)
Year ended March 31, 2022, with comparative information for 2021

		2022		2021
Cash provided by (used in):				
Operations:				
Excess of revenues over expenses	**$**	**–**	$	–
Items not involving cash:				
Depreciation		**341,330**		111,549
Amortization of deferred contributions related to future expenses (note 8)		**(28,806,846)**		(11,763,244)
Amortization of deferred contributions related to capital assets (note 9)		**(341,330)**		(111,549)
Unrealized losses (gains) on short-term investments		**5,442,534**		(15,542,493)
		(23,364,312)		(27,305,737)
Funding (note 8)		**92,376,623**		31,499,465
Change in operating assets and liabilities:				
Funding receivable		**(64,000,000)**		(14,898,750)
Other receivables		**14,029**		(6,113)
Project advances		**(503,433)**		(1,476,487)
Prepaid expenses		**41,982**		(144,321)
Accounts payable and accrued liabilities		**(1,915,874)**		106,264
Deferred lease inducements		**454,451**		–
		3,103,466		(12,225,679)
Investments:				
Proceeds from sale of short-term investments		**16,859,673**		20,752,703
Purchase of short-term investments		**(20,817,128)**		(5,777,965)
Purchase of capital assets		**(713,634)**		(1,100,643)
		(4,671,089)		13,874,095
(Decrease) increase in cash		**(1,567,623)**		1,648,416
Cash, beginning of year		**2,576,520**		928,104
Cash, end of year	**$**	**1,008,897**	$	2,576,520

See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS

1. Operations:

Genome British Columbia (the Corporation) was incorporated on July 31, 2000 under the Canada Corporations Act and continued under the Canada Not-For-Profit Corporations Act as a not-for-profit organization and is exempt from income taxes. The Corporation has the following objectives:

(a) develop and establish a coordinated approach and integrated strategy in British Columbia to enable British Columbia to become a world leader in selected areas of genomic and proteomic research and innovation, including agriculture, aquaculture, environment, forestry and human health, among others, by bringing together universities, research hospitals, other research centres and industry, as well as government and private agencies for the benefit of British Columbia;

(b) participate in national approaches and strategies to strengthen genomics research capabilities in Canada for the benefit of all Canadians;

(c) maintain a genome centre in British Columbia to ensure that researchers can undertake research and development projects offering significant socio-economic benefits to British Columbia and Canada, to provide access to necessary equipment and facilities, and to provide opportunities for training of scientists and technologists;

(d) establish a contractual relationship with Genome Canada, and contractual and collaborative relationships with others (including private and voluntary sectors and federal and provincial governments) in order to provide financial and personnel resources for the Corporation;

(e) address public concerns about genomics research through the organization of intellectual resources regarding ethical, environmental, legal and societal issues related to genomics;

(f) increase public awareness of the need for genomics research and of the uses and implications of the results of such research, thereby helping Canadians understand the relative risks and rewards of genomics;

(g) leverage the organization's speed and agility to provide emerging issues funding that enables researchers and innovators to address previously unforeseen challenges in British Columbia; and

(h) support entrepreneurial, commercialization and innovation activities that help to grow the life sciences sector in British Columbia.

2. Significant accounting policies:

(a) Basis of presentation:
These financial statements have been prepared in accordance with Canadian Accounting Standards for Not-for-Profit Organizations (Accounting Standards for NPO's).

(b) Short-term investments:
Short-term investments are recorded at fair value with gains and losses recorded in the statement of operations and changes in net assets in the period in which they arise. Short-term investments are comprised of a portfolio of funds managed by investment professionals.

(c) Project advances:
Project advances are comprised of amounts provided by the Corporation to approved research projects and platforms, which have not yet been spent.

(d) Capital assets:
Capital assets are initially recorded at cost. Depreciation is provided using the straight-line method as follows:

Asset	Years
Furniture and fixtures	5
Computers and software	3
Telecommunications equipment	5
Leasehold improvements	Remaining lease term

(e) Revenue recognition:
The Corporation follows the deferral method of accounting for contributions.

Externally restricted contributions:
Deferred contributions related to expenses of future periods represent unspent externally restricted funding, which are for the purposes of providing funding to eligible recipients and the payment of operating and capital expenditures in future periods. Externally restricted contributions for expenses of a future period and related investment income are deferred and recognized as revenue in the year in which the related expenses are incurred. Externally restricted contributions for the purchase of capital assets are initially recorded as deferred contributions related to future expenses, and transfer to and recorded as deferred contributions related to capital assets when the amounts have been spent on capital assets. Deferred contributions related to capital assets are amortized to revenue in the statement of operations and changes in net assets using the same methods and amortization rates of the related capital assets.

Unrestricted contributions:
Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Investment income, which includes interest, dividends, realized gains and losses, and unrealized gains and losses, is recognized as it is earned.

2. Significant accounting policies (continued):

(f) Investment in commercialization projects:
The Corporation seeks to drive commercialization through partnerships with early stage companies. The Industry Innovation Program (the "Program") was established for the purpose of investing in companies involved in early stage research and development, where technologies have not yet reached commercialization. The value of any underlying security on these investments is limited. The Corporation expenses all amounts invested in these projects as advanced. Recovery of amounts invested are recorded as revenue when the funds are received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

(g) Use of estimates:
The preparation of financial statements requires the use of estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure of contingent assets and liabilities and the reported amounts of revenues and expenses. Areas requiring the use of management's estimates relate to the determination of accruals for project expenditures and the recoverable amounts of investments in commercialization projects. Accordingly, actual results could differ from these estimates.

(h) Valuation of long-lived assets:
Management reviews the carrying amount of capital assets for impairment whenever events or changes in circumstances indicate that the asset no longer contributes to the Corporation's ability to provide services, or that the value of future economic benefits or service potential associated with the asset is less than its carrying amount. If such conditions exist, an impairment loss is measured and recorded in the statement of operations and changes in net assets at the amount by which the carrying amount of the capital asset exceeds its fair value or replacement cost.

(i) Deferred lease inducement:
Tenant inducements received that are associated with leased premises are deferred and amortized on a straight-line basis over the term of the lease.

(j) Related foundation:
The financial information of Genome British Columbia Foundation, a not-for-profit entity that is controlled by the Corporation, is not consolidated but is disclosed in these financial statements.

(k) Financial instruments:
Financial instruments are recorded at fair value on initial recognition. All financial instruments are subsequently measured at cost or amortized cost, unless management has elected to carry the instruments at fair value. The Corporation has elected to carry its short-term investments at fair value.

At period-end, the Corporation assesses whether there are any indications that a financial asset measured at cost or amortized cost may be impaired. Financial assets measured at cost include funding receivable and other receivables. If there is an indicator of impairment, the Corporation determines if there is a significant adverse change in the expected amount or timing of future cash flows from the financial asset. If there is a significant adverse change in the expected cash flows, the carrying value of the financial asset is reduced to the highest of the present value of the expected cash flows, the amount that could be realized from selling the financial asset or the amount the Corporation expects to realize by exercising its right to any collateral. If events and circumstances reverse in a future period, an impairment loss will be reversed to the extent of the improvement, not exceeding the initial impairment charge.

(l) Foreign exchange:
The Corporation's monetary assets and liabilities denominated in foreign currencies are translated into Canadian dollars using exchange rates in effect at the statement of financial position date. Revenue and expense items are translated at the rate of exchange prevailing on the date of the transaction. Foreign exchange gains and losses are included in the statement of operations and changes in net assets.

3. Short-term investments:

The Board of Directors has overall responsibility for the oversight of the Corporation's short-term investments. The Board has established an Investment Committee, which is responsible for developing and monitoring the Corporation's investment policy. The overall objectives of the Corporation's investment policy are to achieve security of principal that ensures a return of the capital invested, to maintain the liquidity necessary to meet the cash flow requirements of the Corporation and to maximize the rate of return without affecting liquidity or incurring undue risk.

The Corporation's short-term investments are comprised of a portfolio of funds and other investments. The portfolio consists of investments in fixed income funds and Canadian and international equity funds. The portfolio is managed by independent investment professionals in accordance with the Corporation's investment policy. All short-term investments are measured at fair value. The Corporation's short-term investments are subject to interest rate, market and liquidity risks.

Both the risk of significant changes in interest rates and the risk of significant changes in market prices are mitigated by the Corporation's policy that permits its portfolio managers to change the level of investment in the funds at short notice and the fact that interest earned on the portfolio is reinvested monthly at prevailing rates. The Corporation limits exposure to liquid asset credit risk through maintaining its short-term investments with high-credit quality financial institutions.

3. Short-term investments (continued):

The Corporation's short-term investments are as follows:

		2022		2021
Fixed income funds	**$**	**52,521,065**	$	53,628,174
Canadian and international equity funds		**38,408,346**		38,786,316
	$	**90,929,411**	$	92,414,490

The fixed income funds invest in a mixture of bonds and debentures with a minimum average credit rating of BBB. The Canadian and international equity funds invest in a mixture of Canadian, U.S. and international equities. Fair values of the Corporation's portfolio investments are based on quoted bid price at the reporting date.

In April, 2022 the Corporation obtained funding of $78,000,000, which was recorded as receivable as at March 31, 2022, from the Province of British Columbia to support its mandate and strategic plan. Upon receipt, these funds were invested in accordance with the Corporation's investment policy.

Investment income is comprised of the following:

		2022		2021
Interest and dividend income	**$**	**6,599,502**	$	5,362,403
Realized gains		**1,230,354**		440,353
Unrealized (losses) gains		**(5,442,534)**		15,542,493
Other		**89,490**		21,248
	$	**2,476,812**	$	21,366,497

4. Industry Innovation Program:

		2022		2021
Balance, beginning of year	**$**	**7,484,100**	$	9,518,312
Recoveries from commercialization projects		**2,720,579**		15,788
Investments in commercialization projects		**(2,050,000)**		(2,050,000)
Balance, end of year	**$**	**8,154,679**	$	7,484,100

Changes in investing activities since inception of the Program are as follows:

	Investment made (recovered)		Amount
Total investment fund		$	17,000,000
Investments made	16		(12,712,500)
Investments recovered	(3)		2,350,000
Interest received			549,048
Royalties received			968,131
Balance, end of year		$	8,154,679

The program balance of $8,154,679 is included in deferred contributions and is invested with the Corporation's short-term investments.

Investments in commercialization projects consist of loans which are secured by a general security interest in all assets of the companies. Interest accrues on the outstanding balances at prime plus 3% compounded annually. Repayment of principal and accrued interest over a two year period commences after the earlier of (a) an agreed annual gross revenue threshold; (b) a change of control of the company; or (c) a date that is four years from the date of the loan was advanced. The Company may also receive royalty and other payments contingent upon the success of the investee's commercialization efforts and the balance of the loan outstanding.

During the year ended March 31, 2022, an investee company repaid its loan and accumulated interest. The amount of $1,113,754 recovered from this project included loan principal of $850,000 plus interest paid and accrued of $263,754 in accordance with the loan agreement. The investee company also paid a royalty of $88,131.

During the year ended March 31, 2022, an investee company repaid the loan and accumulated interest. The amount of $1,518,694 recovered included the loan principal of $1,000,000 plus accrued interest of $138,694 and a royalty buyout of $380,000 in accordance with the loan agreement.

5. Other receivables:

		2022		2021
Sales tax	**$**	**31,633**	$	47,322
Other accounts receivables		**6,082**		4,422
	$	**37,715**	$	51,744

6. Capital assets:

March 31, 2022		**Cost**		**Accumulated depreciation**		**Net book value**
Furniture and fixtures	**$**	**315,439**	**$**	**92,945**	**$**	**222,494**
Computers and software		**520,179**		**233,246**		**286,933**
Telecommunications equipment		**28,205**		**12,328**		**15,877**
Leasehold improvements		**1,211,864**		**191,253**		**1,020,611**
	$	**2,075,687**	**$**	**529,772**	**$**	**1,545,915**

March 31, 2021		Cost		Accumulated depreciation		Net book value
Furniture and fixtures	$	277,382	$	43,772	$	233,610
Computers and software		389,559		198,216		191,343
Telecommunications equipment		21,273		11,477		9,796
Leasehold improvements		771,976		33,114		738,862
	$	1,460,190	$	286,579	$	1,173,611

During the year ended March 31, 2022, fully amortized capital assets of $ 98,137 (2021 – $635,080) were removed from the Corporation's accounting records.

7. Accounts payable and accrued liabilities:

		2022		2021
Accounts payable	**$**	**209,643**	$	583,477
Accrued liabilities – projects		**4,961,285**		6,578,289
Accrued liabilities – others		**1,097,938**		1,022,974
	$	**6,268,866**	$	8,184,740

Included in accrued liabilities as at March 31, 2022 are government remittances payable of $27,718 (2021 – $26,424) relating to payroll and health taxes.

8. Deferred contributions related to future expenses:

The Corporation receives funding from Genome Canada, the Province of British Columbia and from other sources to be held, administered and distributed in accordance with the related funding agreements between the Corporation and other parties (note 10).

Deferred contributions related to expenses of future periods represent these unspent externally restricted funds, which are for the purposes of providing funding to eligible recipients and the payment of operating and capital expenditures in future periods. The changes in the deferred contributions balance for the year are as follows:

		2022		2021
Balance, beginning of year	**$**	**106,956,628**	$	88,297,485
Funding received or receivable during the year:				
Genome Canada		**13,376,076**		15,616,207
Province of British Columbia		**78,000,000**		3,969
Provincial Health Services Authority		**–**		15,000,000
Industry Partners		**1,000,000**		280,000
Other		**547**		599,289
		199,333,251		119,796,950
Lease inducement amortization		**37,871**		23,565
		199,371,122		119,820,515
Less:				
Amount amortized to revenue		**(28,806,846)**		(11,763,244)
Amount transferred to fund capital assets purchased during the year (note 9)		**(713,634)**		(1,100,643)
		(29,520,480)		(12,863,887)
Balance, end of year	**$**	**169,850,642**	$	106,956,628

9. Deferred contributions related to capital assets:

Deferred contributions related to capital assets represent the unamortized amount of contributions received and spent for the purchase of capital assets. The amortization of such contributions is recorded as revenue in the statement of operations and changes in net assets.

The changes in the deferred contributions related to capital assets balance for the year are as follows:

		2022		2021
Balance, beginning of year	**$**	**1,173,611**	$	184,517
Funding spent on capital asset purchases		**713,634**		1,100,643
		1,887,245		1,285,160
Less amount amortized to revenue		**(341,330)**		(111,549)
Balance, end of year	**$**	**1,545,915**	$	1,173,611

10. Commitments:

(a) Funding:

(i) Genome Canada:
The Corporation enters into funding agreements with Genome Canada (the agreements). In accordance with these agreements the Corporation secures on an on-going basis cash or cash equivalent commitments from other parties representing at least 50% of the total costs of the projects covered by the agreements. In addition, Genome Canada agrees to disburse an amount only up to the amount of the formal commitments from other parties. However, Genome Canada may provide funding notwithstanding the fact that formal commitments from other parties have not yet been secured. Genome Canada has also agreed that funds, provided in good faith, where commitments from other parties have not yet been secured, shall not be reimbursable to Genome Canada.

In accordance with each respective agreement, the Corporation has agreed, among other things, to provide Genome Canada with a co-funding plan for each project. A co-funding plan for each project has been provided to and accepted by Genome Canada.

The list of active research funding agreements with Genome Canada by program, and the supporting commitments from other parties for the active research projects covered by these agreements, as at March 31, 2022 is as follows:

Funding agreement description		**Support commitment**
Genomic Applications Partnership Program	$	17,961,579
2014 Large-Scale Applied Research Project Competition		9,225,311
2015 Large-Scale Applied Research Project Competition		20,679,633
2017 Large-Scale Applied Research Project Competition		29,336,729
2017 Bioinformatics and Computational Biology		3,066,427
2017 Genomics Technology Platforms		21,107,989
2018 Large-Scale Applied Research Project Competition		3,445,880
2020 Large-Scale Applied Research Project Competition		8,979,761
Other		8,770,578

(ii) Province of British Columbia:
In accordance with an agreement for funding received, dated March 30, 2015, and updated on March 24, 2017, March 29, 2018 and March 26, 2019, the Corporation received funding of $85,000,000 to support its 2015 to 2020 strategic plan: Powering British Columbia's Bioeconomy. In accordance with the Agreement, the Corporation completed and submitted to the funder an accountability framework that included robust and detailed performance metrics on November 27, 2015. The Corporation launched its Industry Innovation Program in October 2015 as part of its commercialization strategy. Included as part of that strategy, and contingent upon the success thereof, is the intent to repay the Province $10,800,000 over the next decade (note 4).

Pursuant to a funding agreement dated March 18, 2022, the Corporation was provided funding of $78,000,000 to support its strategic plans.

(b) Project commitments:
In the normal course of business, the Corporation enters into Collaborative Research Agreements for the completion of milestone based research projects. Detailed below is the estimated remaining commitment of the Corporation's funds relating to active research programs. The Corporation typically provides co-funding to research projects, whereby its funds are combined with funds from other sources to provide the total project award amount. Funds provided directly to the research institution by third parties are included in the total award amount shown in the table below.

10. Commitments (continued):

(b) Project commitments (continued):

The total award amount and estimated remaining commitment of the Corporation by program as of March 31, 2022 is as follows:

Approved programs	Total award amount	Estimated remaining Corporation commitment
Current programs:		
2014 Large-Scale Applied Research Project Competition	$ 32,637,826	$ 598,456
2015 Large-Scale Applied Research Project Competition	32,350,187	85,815
2017 Large-Scale Applied Research Project Competition	59,526,781	4,066,677
2018 Large-Scale Applied Research Project Competition	10,541,563	1,711,166
2020 Large-Scale Applied Research Project Competition	13,183,764	1,608,984
2017 Bioinformatics and Computational Biology	6,499,056	238,637
Genomic Applications Partnership Program	34,308,678	2,199,591
Canadian COVID-19 Genomics Network (CanCOGeN)	3,731,727	–
Genome Canada Pilot Projects	12,027,514	455,338
2017 Genomics Technology Platforms	41,176,826	198,697
Applied Genomics Consortium Program	31,193,623	96,784
Human Epigenome (CIHR)	15,228,992	80,000
Transplantation (CIHR)	4,000,000	50,000
Quantitative Imaging Network (CIHR)	3,964,127	274,532
Canadian Rare Diseases (CIHR)	3,979,500	–
Environment and Genes (CIHR)	2,000,000	–
User Partnership Program	12,775,337	138,375
Sector Innovation Program	7,655,983	1,458,009
Societal Issues	445,333	35,000
ERA-MBT	780,119	193,119
GenSolve Program	5,882,212	690,927
Genome British Columbia Pilot Programs	38,493,589	241,447
COVID-19 Regional Genomic Initiatives	3,601,167	238,665
Entrepreneurship Partnership Program	12,278,179	100,000
Innovation Pilot Fund	750,000	500,000
	389,012,083	15,260,219
Closed programs:		
Competition I, II, III	186,363,352	–
Competition in Applied Genomics Research in Bio-products or Crops	24,346,330	–
International Competition	12,881,913	–
Applied Genomics and Proteomics in Human Health	44,099,840	–
Applied Genomics Innovation Program	24,437,610	–
Translational Program for Applied Health	17,891,275	–
New Technology Development Projects	5,509,566	–
Technology Development Initiatives Fund	706,536	–
2015 Technology Development	5,926,633	–
Personalized Medicine Program	8,168,169	–
2010–2012 Large-Scale Applied Research Project Competition	90,528,960	–
2012–2015 Bioinformatics and Computational Biology	6,526,023	–
2015 Disruptive Innovation in Genomics Competition	8,007,398	–
Science and Technology Platforms	71,061,922	–
2015–2017 Science and Technology Platform	7,999,946	–
Entrepreneurship Education in Genomics Program	979,966	–
Strategic Opportunities Fund	14,305,078	–
Strategic Opportunities Fund for Industry	6,745,443	–
Other Pilot Programs	3,561,133	–
Pacific Economic Development Canada Programs	20,743,088	–
Canadian Institutes of Health Research: Human Microbiome/ATID	10,529,437	–
Brain Canada: Alzheimer's/MIRI 1&2/PSG	18,123,152	–
Centre for Drug Research and Development Fund	4,823,919	–
Science World British Columbia Outreach Program	200,000	–
	594,466,689	–
Total	$ 983,478,772	$ 15,260,219

10. Commitments (continued):

(c) Operating lease:

The Corporation has entered into operating lease agreements for office premises which expire at various dates until September 30, 2027. Minimum payments for the next six fiscal years are as follows:

2023	$	637,305
2024		637,305
2025		648,807
2026		660,308
2027		660,308
2028		330,154
Total	$	3,574,187

11. Genome British Columbia Foundation:

Genome British Columbia Foundation (the "Foundation") is a registered charity established to promote and foster life sciences research for the public benefit by coordinating, sponsoring and carrying educational conferences, seminars, workshops and symposiums. The Foundation is exempt from income and capital taxes.

The majority of the Foundation's Board of Directors are also members of the Corporation, and as such, the Corporation controls the Foundation. In accordance with the CPA Canada Handbook Section 4450, the Corporation has chosen not to consolidate the Foundation but has followed the disclosure requirements. The Corporation has no economic interest in the Foundation.

Financial information of the Foundation as at March 31, 2022 and March 31, 2021 and for the years ended March 31, 2022 and March 31, 2021 are as follows:

		2022		2021
Cash	**$**	**6,400**	$	20,688
Deferred contributions		**(6,400)**		(20,688)
Net assets	**$**	**–**	$	–
Revenues	**$**	**14,290**	$	14,285
Expenses		**(14,290)**		(14,285)
	$	**–**	$	–
Cash used in:				
Operations	**$**	**(14,288)**	$	(14,282)
Net change in cash	**$**	**(14,288)**	$	(14,282)

There are no significant differences in accounting policies between the Foundation and the Corporation.

12. Financial risks:

(a) Liquidity risk:

Liquidity risk is the risk that the Corporation will be unable to fulfill its obligations on a timely basis or at a reasonable cost. The Corporation manages its liquidity risk by monitoring its operating requirements. The Corporation prepares budget and cash forecasts to ensure it has sufficient funds to fulfill its obligations.

(b) Credit risk:

Credit risk refers to the risk that a counterparty may default on its contractual obligations resulting in a financial loss. The Corporation deals with creditworthy counterparties to mitigate the risk of financial loss from defaults.

(c) Market risk:

Market risk is the risk that changes in market prices, as a result of changes in foreign exchange rates, interest rates and equity prices, will affect the Corporation's income or the value of its holdings of financial instruments. The objective of market risk management is to manage and control market risk exposures within acceptable parameters, while maximizing the return.

(i) Currency risk:

Investments in foreign securities are exposed to currency risk due to fluctuations in foreign exchange rates. The Corporation is exposed to currency risk on its foreign currencies held within its cash accounts and through its investments in the international equity funds.

(ii) Interest rate risk:

Interest rate risk is the risk that the fair value of the Corporation's investments will fluctuate due to changes in market interest rates.

(iii) Other price risk:

Other price risk relates to the possibility that the fair value of future cash flows from financial instruments will change due to market fluctuations (other than due to currency or interest rate movements). The diversification across various asset classes is designed to decrease the volatility of portfolio returns.

There has been no significant change to the risk exposures during the year ended March 31, 2022.

In March 2020, the COVID-19 outbreak was declared a pandemic by the World Health Organization. As a result of the pandemic, there was significant market volatility experienced with respect to equity prices, interest rates, bond yields and foreign exchange rates, which impacted the market value of the Corporation's investments throughout the year.

The Corporation has not experienced a reduction in any of its major funding sources. However, the impact of the pandemic continues to create uncertainty over future cash flows from investment income, may cause significant changes to the assets or liabilities and may have a significant impact on future operations. An estimate of the financial effect is not predictable at this time. The Corporation continues to closely monitor the impact of the pandemic on its financial results and continuing operations.

CORPORATE INFORMATION

Board of Directors (for fiscal year ended March 31, 2022)

John Shepherd
Chair
Past Director, Leukemia/Bone Marrow Transplant Program of BC
University of British Columbia

Margaret (Peggy) Johnston
Vice-Chair
Independent Consultant
Former Senior Program Officer
Bill & Melinda Gates Foundation

Judi Beck
Director General
Pacific Forestry Centre
Natural Resources Canada

Lenard F. Boggio
Retired Partner
PricewaterhouseCoopers LLP

Christine Dean
Strategy Advisor & Consultant
Formerly VP Global Timberlands Technology
Weyerhaeuser Company

Janet Grove
Partner, Head of Canadian Life Sciences and Healthcare Group
Norton Rose Fulbright Canada LLP

Nadja Kunz
Canada Research Chair in Mine Water Management and Stewardship
The University of British Columbia

Charlotte Loppie
Professor – School of Public Health and Social Policy
Associate Dean, Research – Faculty of Human and Social Development
University of Victoria

Nancy Olewiler
Director
School of Public Policy
Simon Fraser University

Kausar N. Samli
Executive, Expert, Consultant

Pascal Spothelfer
President and Chief Executive Officer
Genome British Columbia

Gavin Stuart
Professor
Faculty of Medicine
University of British Columbia

Kory Wilson
Executive Director, Indigenous Initiatives and Partnerships
British Columbia Institute of Technology

Board Observers

Rob Annan
President and Chief Executive Officer
Genome Canada

Christian Hansen
Regional Director General (Pacific Region)
Innovation, Science & Economic Development Canada (ISED)

Ian Rongve
Assistant Deputy Minister
Strategy and Innovation Division
Ministry of Health, Province of British Columbia

Management

Pascal Spothelfer
President and Chief Executive Officer

Tony Brooks
Chief Financial Officer and VP Entrepreneurship & Commercialization

Federica Di Palma
Chief Scientific Officer and Vice President, Sectors

Sally Greenwood
Vice President, Communications and Societal Engagement

Quinn Newcomb
Vice President, Corporate Development

Auditors

KPMG LLP
Vancouver, BC

Legal Counsel

Richards Buell Sutton LLP
Vancouver, BC

Thanks to our Funders

Genome BC thanks its funding partners including the Province of British Columbia, the Government of Canada through Genome Canada, Pacific Economic Development Canada (PacifiCan) and project co-funders.

Acknowledgements

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