

GENOMICS POSITIVELY AFFECTS LIFE, EVERY DAY.



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GENOMICS POSITIVELY

Genomics research has unlocked the code of life — the vast amounts of biological information stored within DNA.

And because all living things have a genome (humans, animals, plants, microbes), this technology is changing how we see and interact with the living world across multiple sectors. Genomics is improving our understanding of biological systems at a molecular level and transforming how society approaches solutions to complex challenges. These applications include health, forestry, fisheries, aquaculture, agrifood, energy, mining and the environment.

However, genomics is still a relatively new science. Many people are excited about the revolutionary advances made possible through genomics research, while others are more cautious. The use of genomics is transformative, eliciting concern from various social groups. Examining and addressing these concerns is essential as new and powerful genomic solutions are developed and applied. As the technology advances, it is critical to view the science through a broader societal lens to understand the impact that omic¹ technologies have on society, now and into the future. Inclusive and transparent dialogue is needed to identify and mitigate barriers while helping to increase understanding of genomics. Stakeholders and the general public need to be engaged in innovative projects at the outset so their views and concerns can be meaningfully addressed, and science can be applied responsibly.

Despite the relative newness of genomics, the science has made rapid advancements since the completion of the Human Genome Project in 2003. Serving as a watershed moment in history, the past two decades have witnessed a revolution where genomics has continued to prove itself as an essential tool in both medical and industrial applications — providing solutions to the rising global demands for food, healthcare and a clean environment. Almost weekly, the genome of any one of the billions of living organisms on earth has been sequenced for the first time. And as more organisms are discovered, sequencing any one of those genomes might unearth a new gene that could potentially cure a disease, make farming more productive, assist with bioremediation or aid in adapting to and mitigating the effects of climate change.

For example, with a rapid increase in global population and climate related challenges, farmers are struggling to grow enough food to feed the world. By applying genomic technologies, some traditional plant breeding practices are giving way to molecular assisted breeding techniques that allow rapid selection of agriculturally and economically important traits that could quickly be put into the hands of farmers to increase yields.

Climate change is also affecting our oceans. Water temperatures are rising, and oxygen is being depleted. In British Columbia this has resulted in declining salmon populations that adversely affect commercial and recreational fishing, as well as Indigenous communities that rely on salmon as a primary food source, and forms an important part of their

IMPACTS LIFE, EVERY DAY.

cultural identity. Genomics is now being used to identify genetic traits in salmon which will help scientists to develop strategies that address the impact of climate change.

The diagnosis and treatment of cancer continues to be difficult for patients. A major concern for doctors and patients is the potential toxicity of cancer medications and their variable effectiveness. Precision health, utilizing omic information, allows for the creation of customized treatment plans tailored to a patient's and tumour's genetic profile – mitigating adverse drug reactions, toxicity and improving patient outcomes.

In order for genomics to successfully provide solutions to challenges such as these, it is vital to understand societal concerns and respond accordingly – adapting technology application to ensure its responsible use. Listening, consultation and citizen participation are key to the adoption of genomics – and all innovative technology – to understand why or why not society accepts particular applications or cutting-edge technologies.

GENOME BC'S CONTINUING WORK IN GENOMICS AND SOCIETY SUPPORTS THE FURTHER DEVELOPMENT OF REGULATORY FRAMEWORKS AND POLICIES TO SAFELY SUPPORT THE IMPLEMENTATION OF GENOMICS.

Genome British Columbia (Genome BC) has been a consistent leader at the intersection of genomics and society. Our belief has always been that while the research and development of genomics based applications is a scientific pursuit, the acceptance and appropriate use of genomics is a societal question. We believe that additional societal research, beyond the application of genomics to a specific project or product, is as important as the genomics research itself.

To this end, the study of the societal impacts of genomics has always been a required research component in Genome Canada's large-scale applied research project funding. In addition, Genome BC has developed its own unique programs to address this important area of research – genomics and the ethical, economic, environmental, legal and societal implications (commonly referred to as GE³LS). We have funded a significant number of research projects that have specifically investigated the implications of using omic technologies and how their applications could potentially impact society.

¹ Omics refers to the collective technologies used to explore the roles, relationships, and actions of the various types of molecules that make up the cells of an organism. These technologies include genomics, proteomics, metabolomics, transcriptomics and other related disciplines.

Genome BC is the only regional centre to fund stand-alone genomics and society research with the goal of expanding BC's research capacity in this area. This focus will ensure genomic scientists look beyond biological sciences and ask how their discoveries and innovations may help ensure efforts in genomics contribute to positive societal impact and the common good.

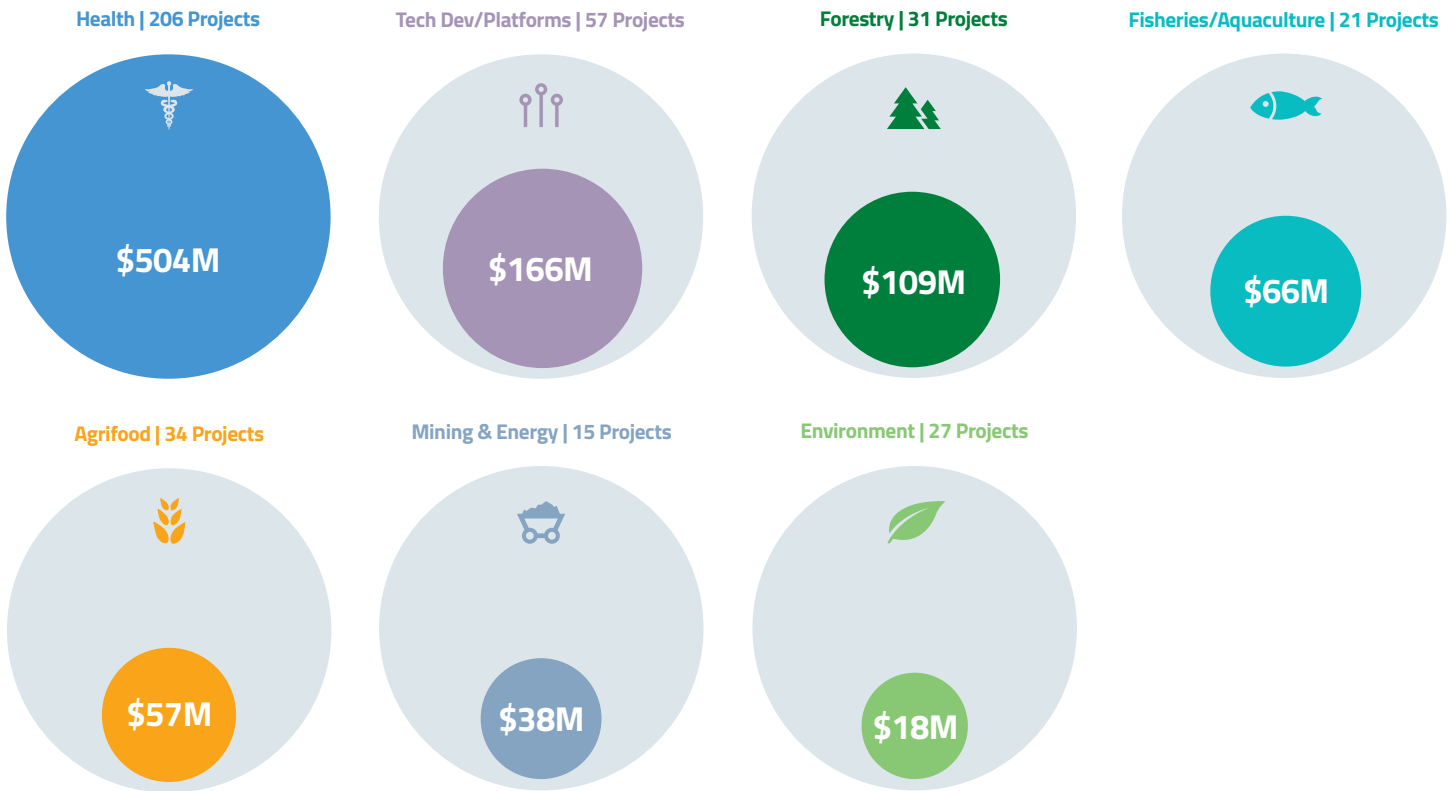
Genomics is a powerful tool that can provide viable solutions to a variety of complex social issues. Its utility is dependent on society's understanding and acceptance of the technology. Genome BC is committed to investigating societal questions and working with genomics researchers, businesses, industry and policy makers to enable the responsible use of this powerful technology to positively impact life, every day.



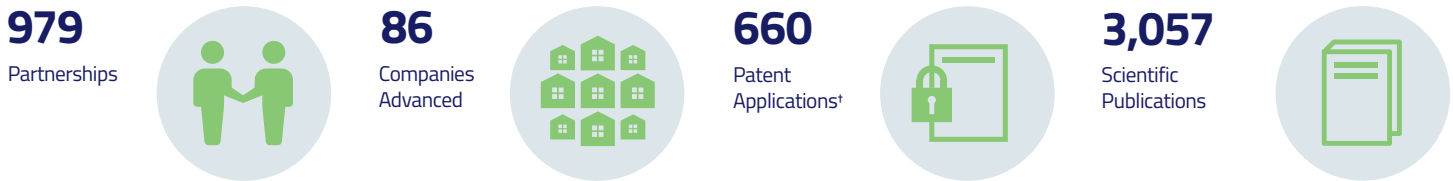


We are a catalyst for the life sciences cluster on Canada's West Coast, managing a cumulative portfolio of over \$1B in genomics research projects and science and technology platforms. We thank our funding partners including the Province of British Columbia, the Government of Canada through Genome Canada and Western Economic Diversification Canada, and project co-funders.

Research Portfolio



Economic Impact



2.6 BILLION

Economic Impact to BC's GDP*



32,400
Jobs Created*

\$805M
Direct Co-investment Attracted

Figures are cumulative as of March 31, 2019
 * All countries including provisional patents
 * Economic and Social Impact Analysis, MNP LLP, 2018



Photo: Cindy Goodman

SPARKING AN INTEREST IN SCIENCE

Engaging our youth will change lives. Through the hopes and dreams of young people will come the innovation and new opportunities that propel society forward. Today's youth are the researchers, teachers, artists, business leaders, physicians, and entrepreneurs of tomorrow.

Advances in science and technology are rapidly changing society; they are affecting everything from how people engage with new products and services, to how students identify career paths and prepare for them. It is our youth who will benefit most from a greater knowledge and understanding of the relevance and impact that science and technology have on our everyday lives.

Increasingly, people from all walks of life require a basic understanding of the principles of science, technology, engineering, art & design and math (STEAM) and how they are applied. These skills, combined with other disciplines, teach us how to think critically, problem solve, and make informed decisions. They are becoming integral to every aspect of our lives, from cradle to grave, and are becoming more important with the advent and uptake of things like consumer genomics. Enhancing opportunities for education will empower people to make informed decisions and critically question the interpretation of results.

For over a decade, Genome BC has opened the minds of young people through comprehensive educational programming. Geneskool™ supports teachers by providing hands-on classroom activities and workshops aligned to BC's grade 9–12 curricula to help educate students about this complex topic in new and interesting ways. And the Geneskool Summer Science Program is a week-long immersive experience where students learn the molecular biology techniques that scientists use every day. Through lab experiments and guest speakers, teens explore aspects of biotechnology, genomics, inheritance, virology, forensics and microbiology to solve a murder mystery. Geneskool is an extraordinary example of how science opportunities for youth can be enhanced, so that future generations grow up understanding, questioning and responsibly applying new technologies.

The opportunities to explore science extend beyond the classroom. For example, Genome BC provides activities and volunteers to Science World's long-running Community Science Celebrations. These events, held around BC throughout the year, encourage people of all ages to participate in and discover the amazing science happening right in their own community. And with topics ranging from the mountain pine beetle to disappearing bees to salmon biology and ecology, our interactive exhibits focus on how genomics tools and technologies can help solve challenges in many of BC's communities.

Through strategic partnerships, Genome BC has positioned genomics within the larger science learning ecosystem. We've helped foster collaboration and synergies between organizations committed to promoting the importance and the relevance of science in our lives. Genome BC is a founding signatory of the BC Science Charter and a partner of Symbiosis — a deeply collaborative, cross-sector initiative to develop a STEAM learning ecosystem. Symbiosis aims to become a vibrant, sustainable model with equitable access, for scaling the kinds of learning and careers needed in a knowledge-based economy.

The comprehensive education and community outreach programming Genome BC provides goes beyond increasing the awareness, understanding and value of genomics research and applications — our investment has helped our youth build character and confidence while preparing them to lead society into a future where science and technology expand our imaginations and enrich our lives.



Photo: Scott Pownall



Genome BC at the Science Jamboree

Genome BC lends its network of expertise to the Open Science Network's "Science and Maker Jamboree". Once a year, kids of all ages, science scholars, and enthusiasts converge on Granville Island to interact with amazing science. This is always a fun day, full of exploration, discovery and of course, the basics of DNA with Genome BC's volunteers!



**Alone we can do so little;
together we can do so much.**

—Helen Keller

Volunteers play an integral role in making Geneskoool a success! Our volunteers visit classrooms, facilitate day-long and week-long workshops and engage the public at community science celebrations across the province. We appreciate the time and effort provided by our many volunteers.



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.

35

Communities Visited



88

Schools Visited



27,082

Students Engaged

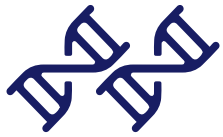


213

Teachers Trained



Public Engagement Highlights



851,000+

Visitors to Science World's BodyWorks. Genome BC sponsors The LabZone, providing multiple years of funding and content expertise. The LabZone is a central hub of the exhibit that explores DNA, genetics and the field of genomics.



9th Annual

Don Rix Distinguished Keynote Address. Pamela Ronald presented to a sold-out crowd.



5,902

Visitors to our booths at Community Science Celebrations.

19

Community Events



20,862

People reached through events



112

Unique stories in the media



Social Media

10,188



Twitter Followers

3,105



Facebook Likes

2,333



LinkedIn Followers

2,826



YouTube Subscribers

2.1M



YouTube Views

552



Instagram Followers

All figures represent activities from April 1, 2018 to March 31, 2019, unless noted otherwise.



CREATING THE CONDITIONS FOR A HEALTHY SOCIETY

Innovations introduced by entrepreneurs have the potential to change the way we live and work. When successful, the products and services they bring to market may improve our standard of living, improve our health, increase efficiency and productivity for industry and possibly even enhance environmental health. Entrepreneurs create the conditions for a healthy and prosperous society through products, services and job creation.

Genome BC initiated its Entrepreneurship Partnership Program (EPP) as part of its 2015–2020 strategic plan. The initiative was in response to an identified need for enhanced support of entrepreneurship, specifically within life sciences. This program has provided critical support through the enhancement of ventures in support of life sciences — all designed to help build a strong life science ecosystem.

One of the initial investments Genome BC made under the EPP helped launch entrepreneurship@UBC (e@UBC) — a contribution that, at the time, represented about 25% of e@UBC's annual budget. Five years later, this venture accelerator based out of the University of British Columbia (UBC), has supported over 100 active ventures that have raised \$155M in equity financing and now employ more than 550 people. e@UBC has established a solid track record of successful venture building, combining cohort programming with deep and intense mentoring.

Almost half of the ventures that e@UBC supports are focused in life science. The overall objective of the life science stream is to support the next generation of entrepreneurs working in this area by helping them to develop transformative, investable ventures. The design of the program requires researchers to step out of their technical comfort zone and investigate, with the guidance and mentorship of experienced entrepreneurs, a multi-faceted business model for a venture in which their technical innovation will be developed and launched as a commercially viable product or service.

The EPP provides Genome BC with important insights and access to the entrepreneurial community and strengthens the pipeline of opportunities for Genome BC's Industry Innovation Program (I²) — another initiative designed to support entrepreneurial activities in BC. The I² Program fills a critical gap in the pipeline to commercialization. This one-of-a-kind program helps companies make financial transitions during the early stages of commercial development — a pivotal time in their evolution. In addition to providing funding, the I² Program's rigorous due diligence process helps developing companies establish a clear pathway to commercialization with near-term milestones. Additionally, the program helps companies tap into a network of expertise, through senior leaders and resources. The result is a stronger foundation for entrepreneurship and economic development in British Columbia.



Seeing Green

Anandia Labs, recently acquired by Aurora for \$115 Million, was one of the first ventures to graduate from the e@UBC program. Subsequently, Anandia was also the first investment made through Genome BC's I² Program. Anandia used Genome BC's investment to aggressively expand analytical testing services, a critical service to ensure cannabis safety and meet regulatory standards.

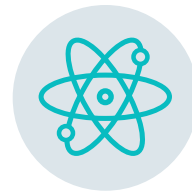


Accelerating Ideas

In addition to e@UBC, Genome BC supports other accelerator programs including SFU Innovates, HyperGrowth:Life, in partnership with the BC Tech Association and Creative Destruction Labs – West. These programs provide a critical resource for the acceleration of ideas that produce meaningful social and economic impact to BC and Canada.



SOME OF THE COMPANIES ADVANCED THROUGH GENOME BC'S SUPPORT OF ENTREPRENEURSHIP AND COMMERCIALIZATION



GENOME BC'S I² PROGRAM INVESTING IN A HEALTHIER BC



Aspect Biosystems' Lab-on-a-Printer™ 3D bioprinting platform technology enables the rapid creation of functional living tissues. The therapeutic applications are broad and profound. Aspect's 3D technology is enabling the development of next generation engineered tissue products addressing multiple applications in therapeutic discovery and regenerative medicine.



Platelets are a key component in blood and are necessary for clotting and immune defense. LightIntegra's ThromboLUX can be used to rapidly determine platelet quality, thus avoiding ineffective transfusions and potentially reducing the failure to achieve the desired level of blood platelets in a patient following a platelet transfusion. The expected results are improved patient outcomes, safety, and reduced healthcare costs.



SEEKING TRUTHS

Genomics has disrupted how society approaches solutions to many pressing social issues — the impacts of climate change on the environment, cancer, rare disease, hunger, water treatment, and the development of renewable, clean energy to name just a few.

And while these advancements have provided value to society, western culture has the tendency to interpret the world in terms of Eurocentric values and experiences. Yet society is multi-cultural with many unique perspectives. Speaking in very general terms, the views of Indigenous peoples can vary greatly from the views of modern Eurocentric culture. Indigenous communities are spiritually oriented with beliefs where there can be many truths, while western society has adopted an approach where there is only one truth, based on science². However, recognizing the importance of ancestral Indigenous ways of knowing, while raising awareness of scientific innovation across biological sciences, has potential to add value to both ways of knowing.

A SPIRITUAL CONNECTION TO THE LAND

In Canada, Indigenous people constitute approximately 5% of the population. More than a century of colonialism has shaped the relationship Canadian society has with Indigenous peoples. European policies and attitudes cut Indigenous peoples off from their traditional cultures, languages, spirituality, economies, systems of governance and other important parts of their identity³ — devastating to those communities whose languages, cultural practices and oral traditions form a spiritual connection with, and stewardship of, the land, air, water and all living creatures.

Indigenous peoples' long-standing use and traditional knowledge of ecosystems can play an important role as unceded lands and territories continue to be of interest to extractive industries such as mining, oil exploration, and logging. Indigenous perspectives have the potential to provide insight, guidance and the environmental stewardship needed to solve the increasingly complex problems of the 21st century. It is largely accepted that marrying science with this ancestral knowledge fosters a greatly improved standard of natural resource management⁴. However, for Indigenous and non-Indigenous approaches to co-exist, it will require a shared decision-making process.

² Indigenous Peoples Worldviews vs Western Worldviews (Jan.26, 2016) www.ictinc.ca/blog/indigenous-peoples-worldviews-vs-western-worldviews

³ Steckley, J.L. & Cummins, B.D. (2008.) Full circle: Canada's First Nations.

⁴ Who Owns TEK? (Nov. 26, 2013) www.ictinc.ca/blog/owns-tek

⁵ 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>

NARROWING THE PRECISION HEALTH GAP FOR INDIGENOUS PEOPLES

In the era of precision health, the use of genomic testing to deliver more precise diagnosis and effective treatments must be accessible to everyone as it is taken up into clinical practice. Genomic test results are compared to anonymized reference databases, holding thousands of individual genomes, in the search for variants that could be linked to rare diseases and disorders.

However, the results of 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. This can make it challenging to identify a genetic variant associated with a rare disease affecting an Indigenous person in Canada. 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 normal variants within any population. Yet overcoming the inequity created by the lack of genomic data for Indigenous peoples presents a significant challenge. Many Indigenous peoples hold an inherent distrust of western institutions — one that is borne out 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.⁵

At the forefront of change is a need to demystify the science within Indigenous communities. Building trust will require an acknowledgment of past injustices and a commitment to understanding spiritual traditions and beliefs. Indigenous clinicians and researchers can lead the way, as champions of this transformative technology, while understanding the needs and values of Indigenous communities. Narrowing the precision health gap begins with dialogue that puts the perspectives of Indigenous Canadians at the forefront while helping these communities understand the value of genomic data to create equity that improves health outcomes.

1.7M Indigenous People in Canada are Underrepresented in Genomic Databases

The stark underrepresentation of Indigenous people in genomic databases has led to inequity in access to precision health. Three BC-led projects are helping to address this issue.

One small-scale project, co-led by Patricia Birch, a Clinical Associate Professor for the Department of Medical Genetics at UBC and Jenny Morgan, Director of Indigenous Health at BC Women's Hospital + Health Centre, held four sharing circle focus groups with Indigenous participants in the Vancouver area to discuss issues surrounding the inequity in genomic healthcare for Indigenous peoples. The views of the participants about the issue and possible solutions are shared in a video produced by the project. This unique video uses a story of weaving traditional blankets as a metaphor to explain genomics and why cultural diversity in databases is imperative to ensure equitable access to healthcare for all people in BC.

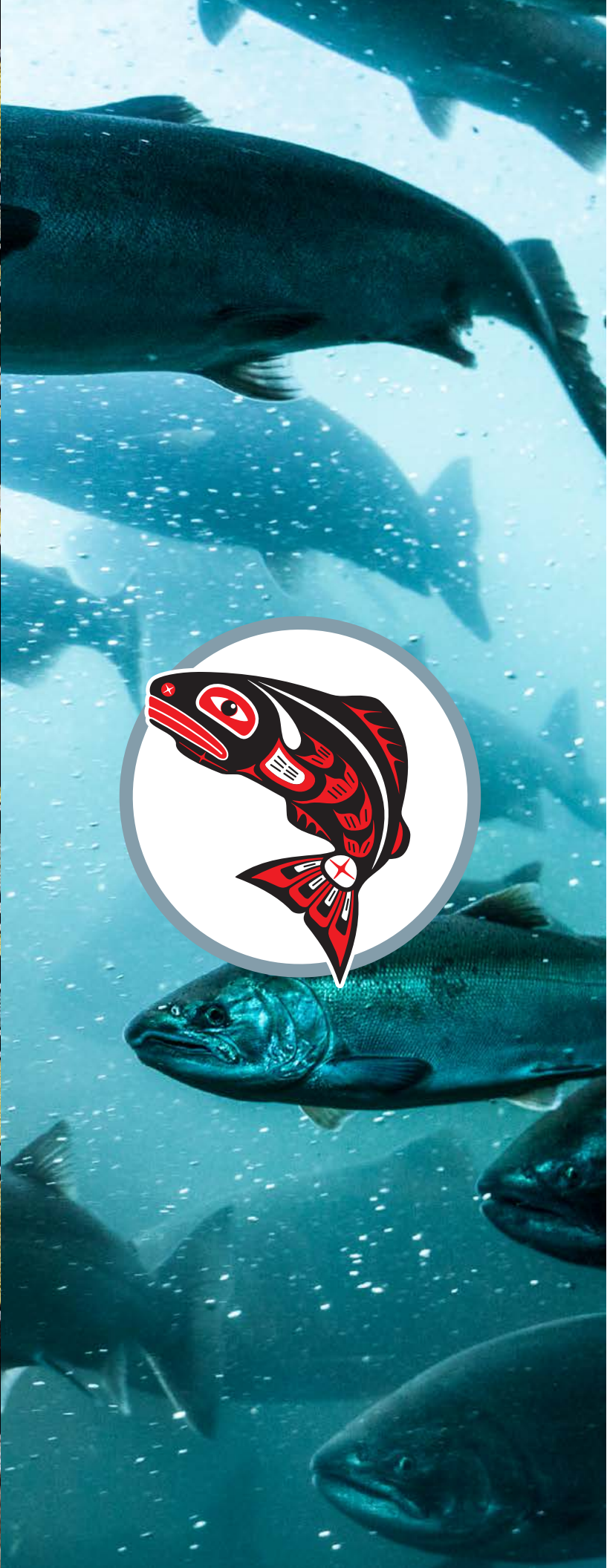
Another project seeks to reduce healthcare disparities and improve diagnostic success for Indigenous children with genetic disease on a larger scale. Co-led by Drs. Laura Arbour, Affiliate Professor, Division of Medical Sciences, University of Victoria, Nadine Caron, Associate Professor, UNBC Northern Medical Program and Co-Director, UBC Centre for Excellence in Indigenous Health and Wyeth Wasserman, Director, BC Children's Hospital Research Institute, Silent Genomes is a game-changing partnership with First Nations, Inuit and Métis peoples. The project aims to establish processes for Indigenous governance of biological samples and genomic data, lead to policy guidelines and best practice models to bring equitable genomic testing to Indigenous children with suspected genetic diagnosis and develop an Indigenous genetic library from a diverse group of First Nations in Canada.

Finally, the Northern Biobank Initiative, led by Dr. Caron, will improve access for BC's northern Indigenous population to participate in, and reap the benefits of clinical research that focuses on community specific needs, diagnosis, and treatment. The Northern Biobank is critical to understanding the nuances of these distinct populations to better develop health programs and improve health outcomes for Indigenous peoples.



Above photo: Silent Genomes Project team and partners at the Gathering Ceremony, July 2018.





Enhancing Production in Coho: Culture, Community, Catch (EPIC4)

The serious decline of the Coho salmon population that occurred in the late 1990s essentially closed the commercial fishing industry. From 1998 to 2007, survival rates for hatchery-raised Coho salmon in the ocean had a less than 5% return rate for tagged smolts – processes associated with the poor early marine survival remained unidentified. However, marine climatic changes were implicated, and it was found that hatchery fish were less able to survive than wild fish.

Just as genomic tools and techniques have enabled significant advances in the diagnosis and treatment of various human diseases, they can also play an equally important role in environmental management, conservation, and food production. Led by Drs. Ben Koop, Professor, Department of Biological Science, University of Victoria, Louis Bernatchez, Professor, Department of Biology, Université Laval, and Willie Davidson, Professor, Department of Molecular Biology and Biochemistry, Simon Fraser University, the researchers of the EPIC4 project have been using genomics to address challenges facing the sustainable management and production of Coho salmon.

As this BC-led interdisciplinary team of natural and social scientists enter the final year of this large-scale project, they have documented the genetic diversity of thousands of individual salmon to determine how Coho salmon from different geographic regions vary genetically. This newly found knowledge will be applied to help sustain wild Coho salmon fisheries, improve hatchery production of the species, and could help develop BC's Coho salmon land-based aquaculture industry to make it more productive.

A critical component of this project is the work with First Nations, non-Indigenous communities and recreational fisheries to identify concerns and perceived benefits of genomics tools in wild fisheries and hatcheries. This work will assess the responses of industry and regulatory agencies to using and managing the new tools, in the context of conservation, community, economic, Indigenous and regulatory concerns.



THE IMPORTANCE OF RESEARCHING SOCIETAL IMPLICATIONS OF GENOMICS

The underlying science of genomics is the same whether researchers are working in healthcare, agrifood or natural resources. Scientists can now read, edit or write DNA and their research can dramatically reshape how we tackle the most basic issues affecting humanity such as disease, hunger, and climate change.

As with any transformative technology, society's acceptance of genomics based applications has varied. Some genomics technology, like genetically engineering microorganisms to produce drugs like insulin for diabetes patients or artemisinin to fight malaria, is readily accepted and utilized. However, other applications, like genetically modifying agricultural crops to produce a higher yield is highly contested in many parts of the world.

So why are there different attitudes toward the application of genomic tools and techniques to food security or production and human health? The differing attitudes have a large influence on how and if these technologies are used. These ethical questions are just one type of issue that societal research tries to answer.

There are many other societal questions that genomics based applications can bring to the forefront. First, the application of genomic tools can completely revolutionize how goods and services are produced and distributed. It is important that appropriate economic analyses be performed to understand how these changes will affect producer and distributors' costs and the price to end users. Second, the effects of genomic technology on society may not be uniform. Some segments of society will receive a positive benefit while others could be negatively affected. Researching these societal implications helps identify these trade-offs and their potential impacts. Third, some genomics based applications are at the cutting edge of technology. This can raise concerns as to whether current policy and regulations adequately ensure that the technology is safe for humans and the environment. Investigating these concerns can provide policy and regulatory recommendations.

In Canada, investigating the impact of genomics on society is often labeled GE³LS research. This stands for *genomics* and its *ethical, economic, environmental, legal* and *social* aspects. GE³LS research is an essential part of furthering genomic applications. It recognizes that society must be consulted in how genomics technology will be used, addressing concerns in order to optimize the responsible application to benefit all of society. Integrated GE³LS research has always been a required component of all large-scale applied research projects (LSARP) funded through Canada's genomics enterprise⁶ – a unique distinction and competitive advantage among Canadian research funders.

While GE³LS is consistently integrated within LSARPs, it is not a criterion in all research competitions. However, Genome BC, recognizing the need, has funded a variety of stand-alone genomics and society studies and has integrated this research into its portfolio of Genome BC programs. This research is not necessarily tied to genomics applications stemming from specific projects but has provided social scientists and other researchers – who focus on how society functions and interacts with the rest of the world – with additional opportunities to explore and better understand pressing societal issues.

Societal research ensures societal perceptions, concerns, and questions are considered. It assists scientists, companies, government regulators, and policy makers to better understand how new genomic technology will impact society. And when integrated appropriately, societal research helps optimize applications – through enhanced knowledge and understanding comes responsible application, greater benefit and acceptance of genomics in society.

⁶ The genomics enterprise refers to Genome Canada and the six regional genome centres across the country including: Genome Atlantic, Genome Quebec, Ontario Genomics, Genome Prairie, Genome Alberta and Genome BC.

Dairy 2.0 Exploring Policy Implications and Public Perceptions of Cellular Agriculture

Cellular agriculture is the production of agricultural products from cell cultures. Products harvested from cell cultures are the same as those harvested from an animal or a plant; the only difference is how they are made. The production of milk through cellular agriculture potentially could increase the supply of dairy products in remote regions where dairy is expensive or unavailable, supporting individual nutrition and advancing community food security. It may also address pressing environmental and ethical concerns associated with conventional dairy production. However, to realize such benefits, an understanding of public perception and potential barriers to adoption is necessary.

Dr. Lenore Newman, Associate Professor, University of the Fraser Valley and Canada Research Chair, Food Security and Environment is examining questions raised by cellular agriculture to better understand both the real and perceived impacts of these emerging technologies.

This research could contribute to the understanding of how cellular agriculture fits within existing policy and regulatory regimes in British Columbia, including dairy supply management, food safety policies, and agricultural land policies. It also aims to increase the understanding of the potential for local production, and the governance of production and distribution in BC, while providing awareness of any legislative or regulatory gaps.

Project Leader:

Lenore Newman, *University of the Fraser Valley*

Project Value: \$45,600

ASSESSING PUBLIC PREFERENCES FOR NEXT-GENERATION SEQUENCING TECHNOLOGIES

Genomics is demonstrating the potential to revolutionize everyday clinical healthcare. However, large amounts of complex genomic data can be difficult for patients to understand, and it can be expensive to generate. This project seeks to assess the value the public attaches to the benefits that innovations in precision health provide to society. This knowledge will inform policy development and decisions based on an understanding of which precision health technologies provide the most benefit to patients and society, given their cost.

Project Leader:

Dean Regier, *BC Cancer*

Project Value: \$50,000



UNDERSTANDING ETHICAL ISSUES USING WHOLE GENOME SEQUENCING FOR TUBERCULOSIS SURVEILLANCE AND OUTBREAK INVESTIGATIONS

Public health surveillance programs and outbreak investigations have been dramatically enhanced using whole genome sequencing (WGS), which aids in understanding transmission pathways, providing critical information when controlling tuberculosis outbreaks. However, there are unanswered questions around privacy and confidentiality of information generated. These concerns are amplified when the technology is used within socially marginalized populations, which are most affected by outbreaks. This project seeks to clarify and provide policy guidance to address societal concerns over the use of WGS in public health efforts.

Project Leader:

Diego Silva, *Simon Fraser University*

Project Value: \$50,000

IMPLEMENTING GENOMICS IN THE NEONATAL PERIOD

Many infants cared for in the neonatal intensive care unit at BC Women's Hospital + Health Centre have underlying genetic disorders – the leading cause of infant mortality. While genomic tests can dramatically increase the rate of diagnosis, many parents decline testing when presented with this option. This project is investigating factors influencing decision making for parents considering genomic tests, to determine whether they are receiving appropriate supportive counselling and adequate information in order to make informed decisions, consistent with their values.

Project Leaders:

Alison Elliott, Pascal Lavoie, *BC Children's Hospital Research Institute*

Project Value: \$50,000

UNDERSTANDING THE PERCEIVED RISKS AND BENEFITS OF AGRICULTURAL APPLICATIONS OF GENE EDITING

Advances in gene editing are raising questions similar to the discussion around Genetically Modified Organisms (GMOs) – a controversial subject characterized by the notion of disrupting the natural order of things. With respect to gene editing in agricultural products, public sensitivity remains high which could lead to the stigmatization or rejection of classes of food products.

This project is investigating how a spectrum of emerging gene editing techniques, in an agricultural context, are perceived by different public groups with the aim of contributing to responsible governance of biotechnology.

Project Leaders:

Terre Satterfield, Milind Kandlikar, *University of British Columbia*

Project Value: \$50,000

EXAMINING PUBLIC BELIEFS ABOUT THE ETHICS OF GENETICALLY MODIFYING LIVESTOCK

Genomic technologies could address challenges such as livestock disease susceptibility, environmental concerns and animal welfare. Yet many people remain cautious and concerned about the production and consumption of genetically modified farm animals.

This project aims to identify different types of ethical concerns and perceived risks that influence views on the acceptability of genetically modified animals. (E.g. harm to animals, violation of naturalness, or potential health risks related to human consumption.) If successful, this project could help the agriculture sector better respect and respond to public values relating to the genetic modification of livestock.

Project Leaders:

Daniel Weary, Adam Shriver, *University of British Columbia*

Project Value: \$49,700

A CROSS-NATIONAL COMPARISON OF REGULATORY ENVIRONMENTS FOR GENE EDITED CROPS

Editing genes in seeds has the potential to revolutionize agriculture. Precise gene modifications enable the development of more robust and higher yielding varieties of grain, fruits and vegetables. To fully realize the social benefits of these innovations in agriculture, these technologies must be effectively regulated.

This project aims to understand the suitability and preparedness of existing regulatory frameworks for gene editing in agriculture in Canada, the European Union, and the United States. This could clarify policy debates by providing evidence-based insights into the range of expert opinion on the regulation of gene editing in agriculture.

Project Leaders:

Milind Kandlikar, Terre Satterfield, *University of British Columbia*

Project Value: \$50,000

CONNECTING GENOMICS AND FIRST NATIONS VALUES AND INTERESTS

First Nations are essential to the long-term management of forests in BC. In turn, forest management can be enhanced by applying genomics based strategies to select for desirable traits. However, some Indigenous peoples are unaware of, or distrust, genomics. Considering that a significant portion of BC forests is managed by First Nations, their perceptions of genomics could significantly affect forest policy development.

This initiative seeks to better understand First Nations' needs, values, and concerns regarding genomics and how genomic strategies can be aligned with their values before they are applied within First Nations' forests.

Project Leaders:

Gary Bull, Stefania Pizzirani, *University of British Columbia*

Project Value: \$50,000



RESILIENCY IN THE FACE OF CHANGE

British Columbia has seen its share of climate change events that have impacted our natural resources and environment. We've witnessed the devastation of our forests by invasive pests who thrive in warmer temperatures.

Seasonal droughts have heightened the vulnerability of irrigation water supplies, putting agriculture at risk. This could have significant consequences for farmers, crop yield and food supply. Rising water temperatures have compromised food sources for salmon, while decreased river flows have impacted their migration and spawning.

Scientists around the world have been calling for governments and industries to adopt evidence-based policies and take action to address climate change before it's too late. Survival will be dependent on our ability to adapt to an evolving climate, while identifying ways to help slow the rapid progression of change. Locked away inside the cells of every living organism is the key to survival — the genome. We already know that some species are slow to adapt while others are more resilient. Genomics could unlock the answers, helping us understand, adapt and mitigate the effects of climate change.

Decision makers will need evidence-based information to ensure policy and long-term investments contribute, not only to the preservation of environment, but to the maintenance and protection of precious natural resources that fuel the economy.

As a diagnostic tool, genomics can decipher the specific genetic traits of living organisms that determine why certain animal or plant species can adapt and survive the effects of change. Genomics can also answer questions like how species adapt, survive, interact and thrive in various climate conditions. Moving beyond diagnostics, genomics can offer ways to mitigate climate change before it happens. For example, genomics can be used to identify bacteria for the conversion of cellulosic biomass into biofuels or lead to the discovery of new enzymes to produce less carbon-intensive fuels.

People, industries, and environment are already benefiting from BC's global leadership in research and the application of genomic technologies to mitigate and adapt to climate change. Agriculture and forestry are directly affected by the new normals we are experiencing in seasonal weather patterns. Genomics is already helping to determine which plants and trees will be better able to adapt to new environmental conditions. Genomic tools are not only helping prevent invasive pests from destroying economically important forests, they are informing reforestation strategies by helping to predict tree populations at high risk from the effects of climate change.

While much progress has been made in genomic research, there is still urgent and important work to do. Genome BC is committed to innovative research, entrepreneurship and commercialization to address these societal challenges. We are equally committed to the inclusive and transparent engagement that is required to remove barriers and identify effective genomic solutions to some of the challenges facing us today.

Responding to a Growing Infestation

Climate change is shifting spruce beetle populations in BC toward massive outbreaks. Without cold winters to kill the beetles, more survive each season and hotter summers have doubled how fast the beetles reproduce. The province estimates that the total infested area in BC has doubled to 501,873 from 2016 to 2017. The large outbreak near Prince George and elevated populations throughout BC are evidence of these shifts.

To help defend BC's spruce stands, Drs. Dezene Huber and Ward Strong of the University of Northern British Columbia (UNBC) and the BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development (MFLNRORD) respectively, have developed a plan to mitigate damage in the context of a shifting climate.

With a team that includes colleagues from the University of British Columbia (UBC), UNBC, MFLNRORD and the Canadian Forest Service, Huber and Strong are studying the genetic sequence of both spruce beetles and spruce trees across western North America.

By combining this information with previous experience gained through mountain pine beetle infestations they hope to identify traits for breeding more durable and diverse pest-resistant spruce forests for the future, as well as learn how spruce beetle populations differ across the landscape. This collaborative research will help inform new management techniques that will leave foresters more prepared to battle climate change.

Project Leaders:

Dezene Huber, *University of Northern British Columbia*
Ward Strong, *BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development*

Project Value: \$125,000

GENOMICS OF VIRUSES AND MICROBIAL SYMBIONTS OF SPOTTED WING DROSOPHILA

Insects introduced to BC from other parts of the world can cause major crop yield losses and keeping them at bay often requires the application of costly and non-specific chemical pesticides. Spotted wing Drosophila (SWD), which arrived in BC in 2009, lays its eggs in small fruits and berries, causing them to rot and become unmarketable. There are currently no effective and environmentally friendly tools to reliably manage this pest. This project will look to identify what viruses infect SWD in different fruit crops and natural habitats in BC. The information gathered by this project will help build a foundation for the development of biopesticides to help fruit growers manage SWD.

Project Leaders:

Steve Perlman, *University of Victoria*
Paul Abram, *Agriculture & Agri-Food Canada*

Project Value: \$200,000



PROFILING TOMATO CROPS FOR PEST INTERACTIONS UNDER ELEVATED CO₂

With projected record-high CO₂ levels, and 70% higher demand for food production by mid-century, BC's agricultural sector must prepare for ongoing environmental change to remain competitive. Tomatoes, an important food crop worldwide, are also a model for plant-insect interactions and crop genomics. Researchers at UBC are identifying specific genes of the tomato related to defense signalling that perform well under elevated CO₂ and can be targeted for plant breeding. The findings of this research will be shared and discussed with BC growers to help inform and prepare producers for related variability in pest pressure resulting from climate change.

Project Leaders:

Juli Carrillo, Simone Diego Castellarin, *University of British Columbia*

Project Value: \$125,000

UNDERSTANDING THE ALGAL MICROBIOMES LIVING ON ALPINE SNOWFIELDS IN SOUTH-WESTERN BC

The red snow observed in BC's alpine and polar regions during the summer is caused by blooms of microscopic algae and their associated microbiome. While white snow reflects solar radiation, red snow absorbs up to 20% more energy from the sun, which accelerates snowmelt and increases global heat retention affecting BC's watersheds. This research aims to provide a better understanding of how this microbe persists in this harsh environment, and its effect on the larger ecosystem, paving the way for future assessment of climate change impacts and informing water management practices in the changing climate.

Project Leader:

Lynne Quarmby, *Simon Fraser University*

Project Value: \$117,000

CLIMATE CHANGE MITIGATION THROUGH ALGAL BIOPRODUCTION

Canadian demand for biofuels is growing, creating a need that could be best met by sustainable algae production. Much of the ethanol and biodiesel produced today is derived from canola, which yields ~20 GJ/hectare per year and displaces food crops. In contrast, algal production can yield up to 800 GJ/hectare per year using non-arable land, or even aquatic or marine cultivation sites, and non-potable water. This project seeks to identify an algal species that is tolerant to a wide range of growth conditions, understand its molecular responses to a variety of stresses, and engineer its metabolism to make it more productive.

Project Leader:

Stephen Rader, *University of Northern British Columbia*

Project Value: \$125,000

EPIGENETIC ADAPTATIONS OF PLANTS TO CLIMATE CHANGE

Epigenetic mechanisms such as DNA methylation, which affect gene function without changes in DNA sequence, could help plants to quickly mitigate the effects of climate change, while providing time for them to naturally evolve. Using artificially warmed plots at sites across the Arctic, this project will identify differences in DNA methylation in Snow Whitlow-grass that are consistently associated with artificial warming. This knowledge will be useful to policymakers in sectors of the BC economy where adaptation to climate change is desired and may have longer term implications for farming and natural resources sectors in BC.

Project Leaders:

Greg Henry, Loren Rieseberg, *University of British Columbia*

Project Value: \$125,000

TESTING THE CONCEPTUAL FOUNDATIONS OF ASSISTED MIGRATION FOR SPECIES FACING CLIMATE CHANGE

Climate change threatens Canada's biodiversity, with important economic and conservation implications. Many species will not migrate or adapt quickly enough to persist. Assisted migration, the intentional movement of genotypes amongst populations or to new locations, is a bold technique to rescue species imperilled by rapid climate change, however, data is unclear on whether the benefits outweigh risks. This project will advance the science of assisted migration and promote evidence-based policy for conservation in BC by developing a clearer understanding of how to use the technique.

Project Leaders:

Amy Angert, Loren Rieseberg, *University of British Columbia*

Project Value: \$125,000

CONVERTING WASTEWATER GROWN MICROALGAE INTO BIOMETHANE

Municipal wastewater treatment emits substantial greenhouse gas and is the largest source of nutrient-based pollution into Canada's clean natural waters. This study aims to demonstrate how CO₂ and waste organic material can be used to grow algae-biofilms and use anaerobic digesters to convert the algae biomass into biomethane. While this process could transform wastewater treatment plants into bioenergy production facilities, it may also provide valuable new data on the energy production potential of the algae-to-methane and characterize the performance of an emerging biotechnology platform that reduces the environmental impacts of wastewater, while producing a carbon-neutral biofuel that can help to mitigate climate change.

Project Leaders:

Ryan Ziels, Steve Hallam, *University of British Columbia*

Project Value: \$125,000



BC AT THE FOREFRONT OF BIOINFORMATICS AND COMPUTATIONAL BIOLOGY

BC researchers will lead seven projects awarded funding through Genome Canada's recent competition in Bioinformatics and Computational Biology. The investment in these projects will allow scientists to use tools such as machine learning and other advanced computational techniques to analyze enormous data sets produced by modern genomics technologies. In all, 25 projects were selected across Canada for a total of \$23.1 million in funding

ANNOVIS: ANNOTATION AND VISUALIZATION OF *DE NOVO* GENOME AND TRANSCRIPTOME ASSEMBLIES

Project Leader: Inanc Birol, *BC Cancer*
Total Funding: \$1 Million

GLOBAL SCALE METABOLIC PATHWAY RECONSTRUCTION FROM ENVIRONMENTAL GENOMES

Project Leader: Steven Hallam, *University of British Columbia*
Total Funding: \$1 Million

PROTEOGENOMICS-IMPROVED AND GUIDED QUANTIFICATION PIPELINE: TARGETED PROTEOMICS WITH INTERNAL PROTEOGENO-TYPIC PEPTIDE STANDARDS TO QUANTIFY VARIANTS IDENTIFIED BY PROTEOGENOMIC EXPERIMENTS

Project Leaders: Christoph Borchers, Yassene Mohammed, *University of Victoria*
Total Funding: \$556,472

BIOINFORMATICS TOOLS TO ENABLE FEDERATED, REAL TIME GENOMIC EPIDEMIOLOGY DATA SHARING AND ANALYSIS IN A ONE HEALTH FRAMEWORK

Project Leaders: William Hsiao, *University of British Columbia*
Gary Van Domselaar, *Public Health Agency of Canada*
Total Funding: \$1.16 Million

MACHINE LEARNING METHODS TO PREDICT DRUG RESISTANCE IN PATHOGENIC BACTERIA

Project Leaders: Leonid Chindelevitch, Maxwell Libbrecht, *Simon Fraser University*, and Jesse Shapiro, *University of Montreal*
Total Funding: \$1 Million

DEVELOPMENT AND IMPLEMENTATION OF BIOINFORMATICS TOOLS FOR HIV AND HCV PHYLOGENETIC MONITORING PLATFORMS

Project Leaders: Jeffrey B. Joy, Julio S.G. Montaner, *University of British Columbia*
Total Funding: \$1.2 Million

ILLUMINATING THE DARK MATTER OF THE METABOLOME WITH CONVOLUTIONAL NEURAL NETWORKS

Project Leaders: Leonard Foster, *University of British Columbia*
David Wishart, *University of Alberta*
Total Funding: \$500,000



British Columbia is home to an extraordinary genome sciences cluster. Our researchers' work is globally recognized as validated by a Science-Metrix report commissioned earlier in the year⁷.

Therefore, not surprisingly, our research teams were once again very successful in this year's main Genome Canada funding competition. Seven out of 25 projects funded under the Bioinformatics and Computational Biology program came from BC and even more remarkable, all agrifoods and natural resources proposals from BC were funded, capturing 31% of federally available funds.

Such results are the consequence of the systematic strengthening of British Columbia's genomic research ecosystem over consecutive strategic plans. In addition to participating in Genome Canada competitions, BC researchers have access to Genome BC's own portfolio of funding programs. We use these to build capacity, invest in areas of particular provincial interest and to advance new researchers. Our current Sector Innovation and GeneSolve programs are smaller than the Genome Canada programs, but by selecting strategic topics like climate change and the microbiome, these programs provide an opportunity for researchers to prepare for future large-scale competitions while ensuring we continue supporting issues of importance to British Columbia.

The current 2019/20 is the final year in our 2015–2020 strategic plan. We are on track to achieve or exceed the targets we are accountable for under this plan. While we have been executing on our current mandate, we have also developed our vision for the future and formalized our next strategic plan 2020–2023. The deliberate translation of research outcomes through knowledge mobilization and commercialization is a key tenet of our future work.

The adoption of genomic research outcomes, and those of any transformational science, not only depends on the excellence of the research, the knowledge mobilization and commercialization, but also on

our society's understanding of and capacity for innovation. We have a long history in genomics and society research activities and over the past two years we have increased our investments in this area as reflected in the main section of this annual report. We will expand these efforts further going forward – in parallel with Geneskool and our outreach programs.

Given our strategic direction toward more knowledge mobilization and commercialization, the federal Supercluster program is very timely. The BC-based Canada's Digital Technology Supercluster (CDTS) has progressed very well and the first projects are in the process of being launched. We have partnered with a number of industry and academic partners on two precision health projects that deal with establishing a secure health and genomics data platform in Canada and the adoption of pharmacogenomic tools in primary care, respectively. Both are areas of strategic importance to us and the CDTS gives us the opportunity to work with industry leaders such as Microsoft, Deloitte, TELUS Health and GenXys. We are also engaged in the early stages of agrifood and water monitoring projects, which both afford us great cooperation opportunities in areas of keen interest.

These initiatives are made possible through the continued support of the Government of British Columbia. In March we were pleased to receive an additional \$29M as part of the province's Supplementary Budget Estimates. \$14M of this funding allows us to complete our current strategic plan and to deliver on our commitment to leverage the five year overall provincial funding of \$85M into well over \$300M in investments in genomic research and innovation in BC. The additional \$15M will enable us to initiate our 2020-2023 plan this coming year.

Nothing we achieve happens in isolation. We depend on our partners locally, regionally, nationally and internationally. As part of Canada's genomic enterprise, we benefit not only from federal funding, but also the excellent relationships we have with Genome Canada and the other five regional genome centres across the country.

Internally, we pushed hard as a team this year. A new strategy also requires the right organization to execute it and we worked diligently to ready ourselves for new mandates while delivering on our annual goals. We have also collaboratively identified our stated values and are committing ourselves to Equity, Diversity and Inclusion principles. The Genome BC team has again risen to the task and I am confident that we not only have the right plan, but that we have the right people. I am grateful to my team for their dedication and efforts. I also recognize the engagement and many important contributions from our Board of Directors – all of whom challenge and support us. We greatly benefit from their guidance in our work – and we are grateful to each of them for lending their time, talent and expertise.

PASCAL SPOTHELFER

⁷ https://www.genomebc.ca/wp-content/uploads/2019/04/0120_SciMetrix_Executive-Summary_final.pdf

BC based research teams continue to have tremendous success in Genome Canada and other funding competitions, certainly in part thanks to the support Genome BC provides to researchers in the preparation and presentation of their proposals.

Genome BC has gained deep expertise over many years on how to catalyze, promote and fund research as well as providing guidance and financial support for projects. Outstanding research outcomes are the result of these efforts.

Looking ahead, we realize that translating research outcomes into real life impacts needs to become a focus for our organization. Genome BC's team has worked extensively over the past two years to develop a strategic plan that includes this additional mandate and defines the kind of organization necessary to deliver on this plan.

Developing strategy is the mandate of management, but the Board plays important roles in the planning process, contributing ideas, providing a critical sounding board, and ultimately approving the plan. We did so earlier this year with the confidence that Genome BC has the right plan to meet current and future needs, and we look forward to management executing in their usual dedicated and professional manner.

The Government of British Columbia continues to support Genome BC with a further investment of \$29M made in the spring. We greatly appreciate this vote of confidence. We are committed to justifying this trust and continuing to provide results that will benefit the people of British Columbia.

On behalf of my Board colleagues, I would like to recognize the efforts and excellent performance of the entire Genome BC team. I would like to thank my fellow directors for the counsel and diligence they provide to the organization and recognize our departing Board members, including Ida Goodreau in particular, who is stepping down as our Past Chair after eight years of service to Genome BC.



JOHN F.H. THOMPSON



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, 2019
- 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, 2019, 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.

OTHER INFORMATION

Management is responsible for the other information. Other information comprises the information, other than the financial statements and the auditors' report thereon, included in the annual report.

Our opinion on the financial statements does not cover the other information and we do not and will not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information identified above and, in doing so,

consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit and remain alert for indications that the other information appears to be materially misstated.

We obtained the information, other than the financial statements and the auditors' report thereon, included in the annual report as at the date of this auditors' report.

If, based on the work we have performed on this other information, we conclude that there is a material misstatement of this other information, we are required to report that fact in the auditors' report.

We have nothing to report in this regard.

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.

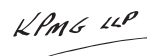
Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Canadian generally accepted auditing standards will always detect a material misstatement when it exists.

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 scepticism 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.



CHARTERED PROFESSIONAL ACCOUNTANTS

Vancouver, Canada

June 7, 2019

Statement of Financial Position (Expressed in Canadian Dollars)
 March 31, 2019, with comparative information for 2018

	2019	2018
Assets		
Current assets:		
Cash	\$ 29,341,415	\$ 770,851
Short-term investments (notes 3 and 4)	89,878,290	84,675,865
Funding receivable (note 10(a)(ii))	–	17,090,624
Other receivables (note 5)	38,767	95,476
Project advances	3,803,520	4,234,498
Prepaid expenses	107,896	145,144
	123,169,888	107,012,458
Capital assets (note 6)	232,472	320,689
	\$ 123,402,360	\$ 107,333,147
Liabilities and Net Assets		
Current liabilities:		
Accounts payable and accrued liabilities (note 7)	\$ 6,705,333	\$ 6,571,305
Deferred lease inducement	70,693	117,821
Deferred contributions:		
Future expenses (note 8)	116,393,862	100,323,332
Capital assets (note 9)	232,472	320,689
	\$ 123,402,360	\$ 107,333,147

Commitments (note 10)

See accompanying notes to financial statements.

Approved on behalf of the Board:



JOHN F.H. THOMPSON
Director



JOE GARCIA
Director

Statement of Operations and Changes in Net Assets (Expressed in Canadian Dollars)

Year ended March 31, 2019, with comparative information for 2018

	2019	2018
Revenues:		
Amortization of deferred contributions related to future expenses (note 8)	\$ 25,318,980	\$ 33,460,603
Amortization of deferred contributions related to capital assets (note 9)	137,370	143,193
Recoveries from commercialization projects (note 4)	1,130,812	–
Investment income	5,137,531	3,014,966
	31,724,693	36,618,762
Expenses:		
Corporate programs and management	8,050,709	7,804,802
Project expenditures	23,536,614	28,670,767
Depreciation	137,370	143,193
	31,724,693	36,618,762
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, 2019, with comparative information for 2018

	2019	2018
Cash provided by (used in):		
Operations:		
Excess of revenues over expenses	\$ –	\$ –
Items not involving cash:		
Depreciation	137,370	143,193
Amortization of deferred contributions related to future expenses (note 8)	(25,318,980)	(33,460,603)
Amortization of deferred contributions related to capital assets (note 9)	(137,370)	(143,193)
Unrealized (gain)/loss on short-term investments	(411,353)	1,489,515
	(25,730,333)	(31,971,088)
Funding (note 8)	41,391,535	32,762,433
Change in operating assets and liabilities:		
Funding receivable	17,090,624	(16,953,360)
Other receivables	56,709	(24,262)
Project advances	430,978	(1,041,191)
Prepaid expenses	37,248	(9,621)
Accounts payable and accrued liabilities	134,028	1,742,814
	33,410,789	(15,494,275)
Investments:		
Proceeds from sale of short-term investments	13,679,188	19,500,000
Purchase of short-term investments	(18,470,260)	(4,448,940)
Purchase of capital assets	(49,153)	(79,990)
	(4,840,225)	14,971,070
Increase/(Decrease) in cash	28,570,564	(523,205)
Cash, beginning of year	770,851	1,294,056
Cash, end of year	\$ 29,341,415	\$ 770,851

See accompanying 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 and capital 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, 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) create 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; and
- (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.

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
Project equipment	3 – 4
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 and related investment income, 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. Deferred contributions related to capital assets represent the unamortized amount of contributions received for the purpose of purchasing capital assets. The amortization of such contributions is recorded as revenue in the statement of operations and changes in net assets. Restricted contributions related to the purchase of capital assets are deferred and recognized as revenue 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.

2. Significant accounting policies (continued):

(f) 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. The Program balance consists of deferred contributions for investment, interest and royalties earned, gains less losses on investments and recoveries from investments less new investment.

(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. Significant areas requiring the use of management's estimates relate to the determination of the useful life of capital assets, 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:

If management determines that a capital asset no longer has any long-term service potential to the Corporation, such assets and related deferred contribution balances are written down to their fair values.

(i) Deferred lease inducement:

Tenant inducement received associated with leased premises is 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 commonly controlled by the Corporation, is not consolidated but 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 balance sheet 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 establishment and 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 policy was updated in December 2015 to expand investment categories to include equities that are publicly traded and listed on major stock exchanges.

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:

	2019	2018
Money Market Fund	\$ –	\$ 6,378,321
Canadian Mortgage Fund	–	36,080,665
Fixed Income Funds	56,523,050	14,559,656
Canadian and International Equity Funds	33,355,240	27,390,224
Other investments	–	266,999
	\$ 89,878,290	\$ 84,675,865

The Fixed Income Fund invests 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.

4. Industry Innovation Program:

	2019	2018
Balance, beginning of year	\$ 6,787,500	\$ 8,950,000
Funding received from Province of British Columbia	6,200,000	–
Recoveries from commercialization projects	1,130,812	–
Investments in commercialization projects	(1,500,000)	(2,162,500)
Balance, end of year	\$ 12,618,312	\$ 6,787,500

Year	Investment made (redeemed)	Amount advanced
2017	3	\$ 1,850,000
2018	3	2,162,500
2019	(1)	(500,000)
2019	2	1,500,000
	7	\$ 5,012,500

The program balance consists of deferred contributions which have been invested along with the Corporation's other 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 Corporation 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, 2019 an investee company was acquired by a third party. The amount of \$1,130,812 recovered from this project included the loan principal, royalty buyout payment, interest accrued and the cash value of common share warrants, in accordance with the loan agreement.

5. Other receivables:

	2019	2018
Sales tax	\$ 29,465	\$ 30,751
Other accounts receivables	9,302	64,725
	\$ 38,767	\$ 95,476

6. Capital assets:

March 31, 2019	Cost	Accumulated depreciation	Net book value
Furniture and fixtures	\$ 115,668	\$ 94,709	\$ 20,959
Computers and software	326,134	236,799	89,335
Telecommunications equipment	18,550	6,353	12,197
Leasehold improvements	545,767	435,786	109,981
	\$ 1,006,119	\$ 773,647	\$ 232,472

March 31, 2018	Cost	Accumulated depreciation	Net book value
Furniture and fixtures	\$ 111,604	\$ 83,767	\$ 27,837
Computers and software	312,398	204,898	107,500
Telecommunications equipment	7,694	5,643	2,051
Leasehold improvements	545,767	362,466	183,301
	\$ 977,463	\$ 656,774	\$ 320,689

During the year ended March 31, 2019, fully amortized capital assets of \$20,497 (March 31, 2018 – \$4,918) were removed from the Corporation's accounting records.

7. Accounts payable and accrued liabilities:

	2019	2018
Accounts payable	\$ 115,052	\$ 130,711
Accrued liabilities – projects	5,709,003	5,116,811
Accrued liabilities – others	881,278	1,323,783
	\$ 6,705,333	\$ 6,571,305

Included in accounts payable and accrued liabilities as at March 31, 2019 are government remittances payable of \$23,176 (2018 – \$nil) relating to payroll taxes 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 funding, 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:

	2019	2018
Balance, beginning of year	\$ 100,323,332	\$ 101,054,364
Funding received or receivable during the year:		
Genome Canada	12,052,871	15,436,746
Province of British Columbia	29,000,000	17,000,000
Western Economic Diversification Canada	–	167,259
Service Canada	–	3,250
University of British Columbia	–	10,000
Industry Partners	338,664	131,518
Other	–	13,660
	141,714,867	133,816,797
Lease inducement amortization	47,128	47,128
	141,761,995	133,863,925
Less:		
Amount amortized to revenue	(25,318,980)	(33,460,603)
Amount transferred to fund capital assets purchased during the year (note 9)	(49,153)	(79,990)
	(25,368,133)	(33,540,593)
Balance, end of year	\$ 116,393,862	\$ 100,323,332

9. Deferred contributions related to capital assets:

Deferred contributions related to capital assets represent the unamortized amount of contributions received 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:

	2019		2018
Balance, beginning of year	\$ 320,689	\$	383,892
Allocation of funding for capital asset purchases (note 8)	49,153		79,990
	369,842		463,882
Less amount amortized to revenue	(137,370)		(143,193)
Balance, end of year	\$ 232,472	\$	320,689

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 agrees to secure 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, 2019 is as follows:

Funding agreement description	Support commitment
Genomic Applications Partnership Program	\$ 7,920,657
2014 Large-Scale Applied Research Project Competition	15,296,041
2015 Disruptive Innovation in Genomics Competition	5,071,275
2015 Large-Scale Applied Research Project Competition	20,700,133
2017 Genomics Technology Platforms	1,679,473
2017 Large-Scale Applied Research Project Competition	28,115,310
2017 Bioinformatics and Computational Biology	3,566,427
DivSeek Canada	555,952

(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 2015-2020 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 the funding agreement dated March 26, 2019, the Corporation received \$15,000,000 to support the Corporation's 2020-2023 strategic plan.

(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, 2019 is as follows:

Approved programs	Total award amount	Estimated remaining Corporation commitment
Current programs:		
2014 Large-Scale Applied Research Project Competition	\$ 41,962,926	\$ 3,731,104
2015 Large-Scale Applied Research Project Competition	45,002,369	4,140,177
2017 Large-Scale Applied Research Project Competition	80,166,252	13,826,104
2017 Bioinformatics and Computational Biology	6,499,056	1,487,412
2015 Disruptive Innovation in Genomics Competition	8,007,478	298,913
Genomic Applications Partnership Program	18,628,501	1,243,450
Genome Canada Pilot Projects	14,404,964	197,902
2017 Genomics Technology Platforms	36,952,992	1,022,320
Applied Genomics Consortium Program	31,193,623	100,376
Human Epigenome (CIHR)	9,978,992	104,467
Transplantation (CIHR)	4,096,203	816,451
Quantitative Imaging Network (CIHR)	3,900,074	528,760
Centre for Drug Research and Development Fund	4,823,919	308,259
Brain Canada (MIRI 1 & 2)	9,176,572	63,432
Brain Canada (PSG)	1,391,750	22,314
User Partnership Program	12,775,337	559,885
Sector Innovation Program	3,698,487	2,344,472
Societal Issues	445,333	202,919
Accelerator	6,668,500	1,411,968
ERA-MBT	780,119	573,045
GenSolve Program	1,132,456	763,374
Genome British Columbia Pilot Programs	42,168,989	1,492,530
ScienceWorld British Columbia Outreach Program	200,000	85,713
	384,054,892	35,325,347
Closed programs:		
Competition I	42,707,207	–
Competition II	43,502,482	–
Competition III	100,153,663	–
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	–
Western Economic Diversification Programs	20,743,088	–
Science and Technology Platforms	71,061,922	–
Technology Development Initiatives Fund	706,536	–
Other Pilot Programs	3,561,133	–
Advancing Technology Innovation through Discovery	5,702,315	–
Personalized Medicine Program	8,168,169	–
2010 Large-Scale Applied Research Project Competition	56,374,386	–
2012 Large-Scale Applied Research Project Competition	34,154,574	–
Human Microbiome (CIHR)	4,827,122	–
Entrepreneurship Education in Genomics Program	979,966	–
Bioinformatics and Computational Biology	6,526,023	–
2015-2017 Science and Technology Platform	7,999,946	–
2015 Technology Development	5,926,633	–
Strategic Opportunities Fund	14,305,078	–
Strategic Opportunities Fund for Industry	6,745,443	–
Brain Canada (Alzheimer's)	7,042,580	–
	570,354,800	–
Total	\$ 954,409,692	\$ 35,325,347

10. Commitments (continued):

(c) Operating lease and management agreements:

The Corporation has entered into operating lease agreements for office premises and management contracts which expire at various dates until September 30, 2020. Minimum payments for the next two fiscal years are as follows:

2020	\$	505,038
2021		252,518
Total	\$	757,556

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, 2019 and March 31, 2018 and for the year ended March 31, 2019 and March 31, 2018 are as follows:

	2019		2018	
Cash	\$	49,241	\$	64,724
Accounts payable and accrued liabilities		–		–
Deferred contributions		(49,241)		(64,724)
Net assets	\$	–	\$	–
Revenues	\$	15,490	\$	16,072
Expenses		(15,490)		(16,072)
	\$	–	\$	–
Cash used in:				
Operations	\$	(15,483)	\$	(35,589)
Funding		–		–
Investing		–		–
Net change in cash	\$	(15,483)	\$	(35,589)

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. There has been no significant change to the risk exposures during the year ended March 31, 2019.

(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. There has been no significant change to the risk exposures during the year ended March 31, 2019.

(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 Fund.

(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 have been no significant changes to the exposure to market risk during the year ended March 31, 2019.

CORPORATE INFORMATION

Board of Directors

For fiscal year ended March 31, 2019

John F.H. Thompson

Chair
Consultant, PetraScience Consultants Inc.
and Professor, Cornell University

John Shepherd

Vice-Chair, Past Director, Leukemia/Bone Marrow
Transplant Program of BC
University of British Columbia

Ida Goodreau

Past Chair
Former CEO, Vancouver Coastal Health

Pascal Spothelfer

President and Chief Executive Officer
Genome BC

Lenard F. Boggio

Retired Partner
PricewaterhouseCoopers LLP

Neena L. Chappell

Professor Emeritus, Sociology
Institute on Aging & Lifelong Health
University of Victoria

Jock Finlayson

Executive Vice President & Chief Policy Officer
Business Council of British Columbia

Joseph Garcia

Partner
Blake, Cassels & Graydon LLP

Margaret (Peggy) Johnston

Independent Consultant
Former Senior Program Officer
Bill & Melinda Gates Foundation

Jeffrey Reading

First Nations Health Authority Chair
Heart Health and Wellness at
St. Paul's Hospital Cardiology
Professor, Faculty of Health Sciences
Simon Fraser University

Gavin Stuart

Professor, Faculty of Medicine
University of British Columbia

Greg Taylor

President
Fish First Consulting

Paul Terry

President
NewOak Investments Ltd.

Board Observers

Heather Davidson

Assistant Deputy Minister
Partnerships and Innovation Division
Ministry of Health,
Province of British Columbia

Doug Kinsey

Executive Director (Pacific Region)
Innovation, Science & Economic
Development Canada

Marc LePage

President and Chief Executive Officer
Genome Canada

Management

Pascal Spothelfer

President and Chief Executive Officer

Tony Brooks

Chief Financial Officer and Vice President
Entrepreneurship & Commercialization

Catalina Lopez-Correa

Chief Scientific Officer
and Vice President, Sectors

Sally Greenwood

Vice President, Communications
and Societal Engagement

Quinn Newcomb

Executive Director,
Corporate Development

Auditor

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, Western Economic Diversification Canada, and project co-funders.

Acknowledgments

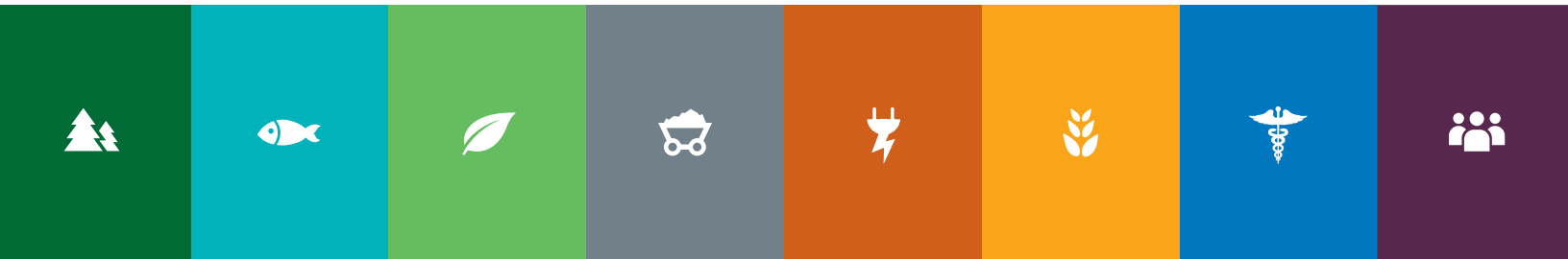
We also thank all those who assisted in developing this annual report, including the management and staff at Genome BC, Genome BC-funded researchers, and the Carter Hales Design Lab team.

We acknowledge that Genome BC is located on the unceded territory of the Coast Salish peoples, including the territories of the Musqueam, Squamish, Tsleil-Waututh Nations. We are honoured to perform the important work of Genome BC on these lands.



Western Economic
Diversification Canada

Diversification de l'économie
de l'Ouest Canada



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