





Genomics is the science that aims to decipher and understand the entire genetic information of an organism (i.e. plants, animals, humans, viruses and microorganisms) encoded in DNA and corresponding complements such as RNA, proteins and metabolites. Broadly speaking, this definition includes related disciplines such as bioinformatics, epigenomics, metabolomics, nutrigenomics, pharmacogenomics, proteomics and transcriptomics.

The knowledge and innovations emerging from genomics are finding solutions to complex biological challenges including applications in **health**, **forestry**, **fisheries and aquaculture**, **mining and energy** and **agri-food**. In addition, these new approaches give rise to the need for dialogue regarding societal, economic and ethical implications.



4

Connecting Genomics to the "Real" World 6

Making an Impact 8

Evolution of Funding along the Innovation Chain

10

Community
Outreach and
Education
in 2014–2015

12

Healthcare

16

Mining and Energy 18

Agri-Food

20

Fisheries and Aquaculture 22 Forestry

Tech

24

25

Message from the President and CEO and Board Chair **26**

Financials

Corporate Information

35

2 Genome British Columbia Annual Report 2014 – 2015

Connecting Genomics to the "Real" World

Genome British
Columbia (Genome BC)
is fueling BC's
bioeconomy by
connecting ideas to
funding, research to
industry, BC to the
world and people
to solutions.
The 'digitization of
biology' through
genomics offers
problem solving with
unparalleled efficiency
and precision.

The knowledge and innovation catalyzed by Genome BC is delivering economic and social benefits to BC, Canada and regions around the world.
Genome BC provides an essential link between end-users, researchers and funders, and ensures genomic efforts are tailored to address issues of economic and social concern.



Genomics is Transforming "Patient First" Health Care



BC's health care accounts for 47% of the provincial budget



In 2014, sequencing a human genome cost just under \$1,000



Genome BC has funded 136 projects in health totaling \$335 million



Every day 210 Canadians die from cancer – Genomics has the potential to detect cancer at an early stage thus helping save lives



500,000 Canadian children are diagnosed with a rare disease. Now a single genomic test is capable of identifying between 6,000 and 7,000 known genetic disorders



Genomics has the potential to identify the right treatment for the right patient – with fewer side effects and more effective use of healthcare dollars

Genomics is Helping Protect Our Natural Resource Sector (Forestry)



Forest-related business accounts for approximately \$5.8 billion of BC's GDP and supports 7,300 related businesses



Genome BC has invested **\$77.6 million** in forestry projects, including breeding programs and forest pests and pathogens



Genomics is helping to fight pathogens that cost the forest industry over \$22 million dollars annually



Genome BC has invested **\$14.9 million** in environment projects such as managing watersheds and creating biofuels

Genomics is Helping Protect Our Natural Resource Sector (Mining)



BC's gross mining revenues were \$8.2 billion in 2014



Genome BC has invested \$34 million in mining & energy projects



Genomics is helping drive new long-term strategies for tailing ponds, metal leaching and acidrock drainage risks as well as breaking down pollutants at industrial sites



Genomic research is creating greener production and extraction of hydrocarbon energy (souring control), modeling and pipeline corrosion prevention

Genomics is Helping BC Farms and Fisheries and Aquaculture Feed the World



Each year, BC seafood is served in approximately 2 billion meals in 74 countries



61,600 British Columbians are employed in agriculture, seafood and food processing



BC exports more than \$2 billion a year worth of agri-food products to over 130 countries



Genomics is playing a role in food safety and security



Genome BC has invested in 31 (20 agri-food and 11 fisheries) projects totaling over **\$78 million** in BC's agriculture and fishery sectors with the goal of creating healthier food and increasing productivity

Genome British Columbia Annual Report 2014 – 2015

Making an Impact

Since 2000, Genome BC has been a catalyst for genomics on Canada's West Coast, managing a cumulative portfolio of over \$710M in 254 research projects and science and technology platforms.







\$710





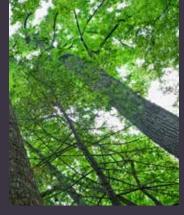
Genome BC invested in

research projects and platforms

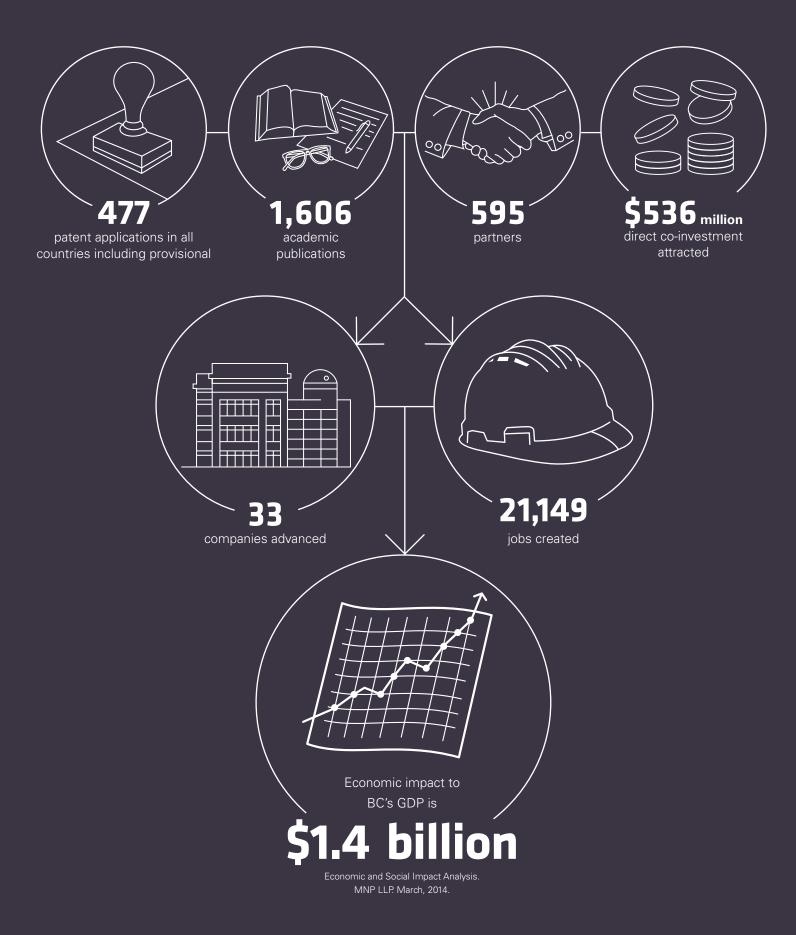












Annual Report 2014 - 2015 Genome British Columbia

Looking Back

Between 2010 and 2015 Genome BC strategically invested over \$340 million to ensure BC's continued capability for world-class scientific and technical excellence in the genome sciences in areas relevant to BC.

2010-2015 saw a significant shift towards applied/translational research leading to sector benefits.

> towards securing benefits from the research

> > **HIGHLIGHTS**

37% applied research

HIGHLIGHT **Genome BC leveraged** every \$1 of provincial funding into \$4

41%

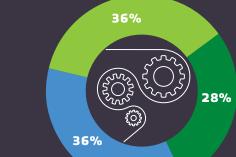
Evolution of Funding along the Innovation Chain

This year Genome BC launches the 2015-2020 strategic plan which will continue to position BC at the forefront of genomic science and harness the economic and societal benefits from BC's growing bioeconomy. This plan supports a sustainable pipeline of research from discovery through to translation. With a new emphasis on commercialization and entrepreneurship, we aim to support the creation of scientific advancements, new companies and new jobs for British Columbians.



Annual Report 2014 - 2015

10% 2000 - 2005 PLAN **Building the Foundation** 2005 - 2010 PLAN **International Recognition** for Excellence 22% 2010 - 2015 PLAN **Strategic Investment for** \$ \$ **Applications** 37%



\$

41%

90%

2015 - 2020 PLAN

Sector-Driven User Co-investment

Genome British Columbia

Community Outreach and Education in 2014–2015

Bringing Genomics Home





PEOPLE REACHED

Education

36 COMMUNITIES VISITED BY **GENESKOOL** PROGRAM











Geneskool

Abbotsford Ashcroft Bella Bella Burnaby Burns Lake Carcross, YT Chemainus Chilliwack

Delta Duncan Enderby Fort Nelson Gold River Kamloops Kelowna Lake Cowichan Langley Courtenay

Maple Ridge Mayo, YT Nanaimo Nelson Osovoos

New Westminister Ucluelet North Vancouver Pelly Crossing, YT Port Coquitlam

Port McNeill Prince George Richmond Surrey Vancouver West Vancouver Whistler Whitehorse, YT



2014-2015 Year in Review

Public Events and Outreach

Public Dialogue on Personalized Medicine Around the Dome in 30 Days



19,786 **VISITORS TO GENOME BC BOOTH AT COMMUNITY SCIENCE CELEBRATION**

YOURSELF' WEEKEND BOOTH

AT 'MEET THE **SCIENTIST' EVENT**

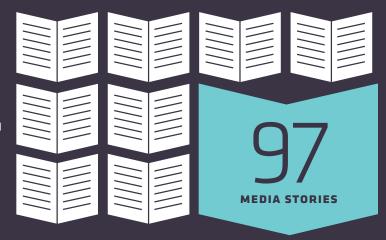
5th Annual Don Rix Distinguished Keynote Address - Dame Sally Davies



FURTHER PUBLIC ENGAGEMENT VIA SOCIAL MEDIA & YOUTUBE VIDEO



Press Coverage



Social Media Highlights



YouTube.com /GenomicsEducation



@GenomeBC

FOLLOWERS



LinkedIn.com /GenomeBC

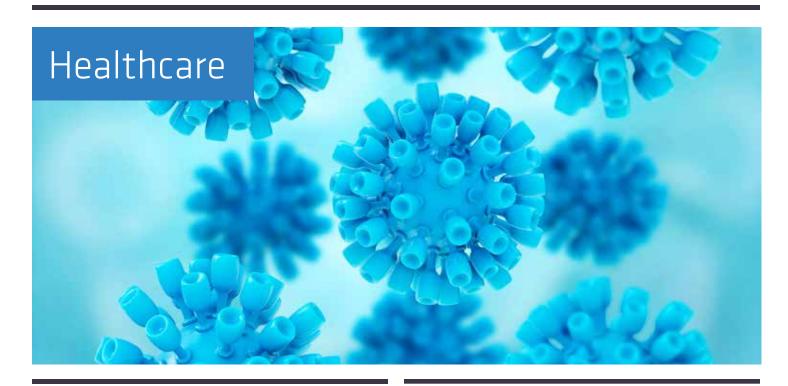
FOLLOWERS



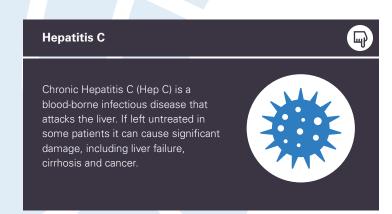
/GenomeBC

LIKES

10 Genome British Columbia Annual Report 2014 - 2015 11



Imagine the possibility of saving millions of dollars while making BC health outcomes the best in Canada. Genomic tools have the potential to do this through personalized medicine by enabling the right treatment to reach the right patients at the right time; improving outcomes, and reducing inefficiencies.



A New Approach to a Chronic Disease

Today approximately 300,000 Canadians are infected with the Hep C virus and a further 5,000 new infections are estimated to occur annually. The burden on the healthcare system is growing in tandem with this rise in infections. Hep C is a relatively 'curable' disease with roughly 90% of cases managed by drug therapy: genomics can help determine which drug is best for whom.

One of the newer Hep C treatments, simeprevir, promises high efficacy but only for certain people. To mitigate against the expense of using treatments (roughly \$36,000 for a 12-week course) that will not work, a team of researchers at the BC Centre for Excellence in HIV/AIDS (BC-CfE) has developed a screening process to ensure that this effective, but expensive, Hep C treatment will be given to only those patients who can derive benefit from it. Until recently this screening test has not been available in Canada.

Dr. Richard Harrigan, Director of the Laboratory Program at the BC-CfE, leads the translational research project which is mirroring the approach to managing HIV and AIDS – specifically tailoring treatments to match individuals which means that we have the best chance of mitigating the Hep C virus. Co-led by the BC Centre for Disease Control's Dr. Mel Krajden, Medical Head of Clinical Prevention Services and Hepatitis Associate Medical Director, the project will provide information for Hep C management and budgetary decision-making.

Knowledge is Power

Understanding hereditary cancer is life and death for Chiquita Hessels. In 2011, just ten months after her mother's death from breast cancer and one month after her maternal aunt's passing from bowel and jaw cancer, Chiquita was herself diagnosed with breast cancer. Identifying the familial linkages is critical for Chiquita and her family.



What was needed was a full-screening test to look at the most common mutations, of which there are 14, that affect hereditary cancers. Genome BC invested in the initial project, then with Provincial Health Services Authority (PHSA) on a follow-through project. The Centre for Clinical Genomics at the BC Cancer Agency has been able to develop this new genetic panel test with research support from the BC Cancer Agency's Dr. Aly Karsan.

The use of a panel is a significant advance because previously a pattern like that found in Chiquita's family could fit a number of inherited conditions meaning she would need to have separate, serial tests for each possible gene responsible; taking many months and costing our health system a great deal of resources. Having a screening test that looked for mutations in all 14 genes at the same time sped up the final result for Chiquita, which was a positive test for the gene causing Li

Fraumeni Syndrome, a rare hereditary cancer disorder.

"For Chiquita, this means that we know what other cancers she is at risk of in the future, what screening tests would be best for her and what tests and cancer treatments she needs to avoid as they could be harmful to her," says Dr. Gillian Mitchell, Medical Director of the Hereditary Cancer Program at the BC Cancer Agency. "Using a 14 gene panel rather

than testing one gene at a time has really shortened the time needed to give Chiquita and her family the answers they need to look after their health, and the cost savings to the healthcare system means that we are able to offer genetic testing to more patients."

Genome BC is investing in this area in hopes of making this test part of a Canada-wide hereditary cancer screening program like in other countries such as Australia, United Kingdom and the US. Savings to the healthcare system will be significant in terms of the cost of one test compared to multiple tests but also in terms of reduced numbers of appointments and the reduced time to get a final test result for patients and their healthcare providers.

We For Chiquita, this means that we know what other cancers she is at risk of in the future, what screening tests would be best for her and what tests and cancer treatments she needs to avoid as they could be harmful to her.

— Dr. Gillian Mitchell, Medical Director of the Hereditary Cancer Program at the BC Cancer Agency



Genome BC Hosts International Luminary

Genome BC's speaker at the 5th Annual Don Rix Distinguished Keynote Address was **Dame Sally Davies**, Chief Medical Officer (CMO) for England.

Dame Sally is the UK's principal medical adviser and guides government decisions on diverse subjects such as superbugs, drug trials, obesity, addiction and mental health. And, according to Dame Sally, "public health is everyone's business".

At her talk she covered several public health issues, focusing most notably on the rise of antimicrobial resistance (AMR) to currently available antibiotics. She discussed what can and should be done globally to preserve our remaining antibiotics and how genomics will play a key role in the effectiveness of new antibiotics as they are developed.

In addition to her public talk, Dame Sally held several roundtable discussions with various members of the life sciences and medical communities to share ideas around genomic medicine. A reception at the British Consulate in her honour also provided a forum for people to engage and speak with Dame Sally about her belief in the role of genomics in treating patients with rare diseases.

44 Genomics and DNA are the foundation of our health.

— Dame Sally Davies

1 2 Genome British Columbia Annual Report 2014 – 2015

Pharmacists and Personalized Medicine

The genetic make-up of each individual can predict how each person responds to drug therapies. Data from a patient's genome can be used to determine the appropriateness of a particular medication for them.

Rapid, inexpensive, nextgeneration sequencing (NGS) has already changed the way we treat diseases such as cancer, and now promises to revolutionize health care by providing a comprehensive record of each individual's genetic disposition. A key challenge though is to develop a streamlined, efficient means to capture, assess, and deliver that information.

The Genomics for Precision Drug Therapy in the Community Pharmacy project is the first of its kind in Canada. Funded by Genome BC and the BC Pharmacy Association (BCPhA) with the research component led by Dr. Corey Nislow and his team at UBC's Faculty of Pharmaceutical Sciences, this project will position the pharmacist as one of several groups evaluating the best pathway for assessment and implementation of genomics through which patient genetic information can be acquired, renewed, and used to guide drug therapy decisions.

Widespread adoption of this technology will help usher in a new era of personalized medicine – targeting the right treatment to the right patient at the right time with the potential to reduce drug therapy costs and manage health care sustainability. During the project's first phase the team will develop robust operating procedures for

sample collection, processing and sequencing. Training and educational tools for patient awareness will also be developed. The project will focus on the drug warfarin, used widely for anticoagulation therapy, with information extracted from patient saliva samples.

If Phase I successfully demonstrates the feasibility of community pharmacist-based pharmacogenomic testing, Phase II would be launched in a broader base of community pharmacies and would offer patients the opportunity to provide their genetic information to guide therapeutic dosing decisions.



the right treatment to the right patient



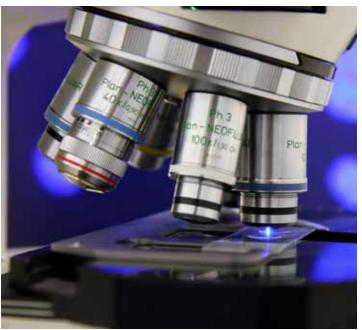


at the right time

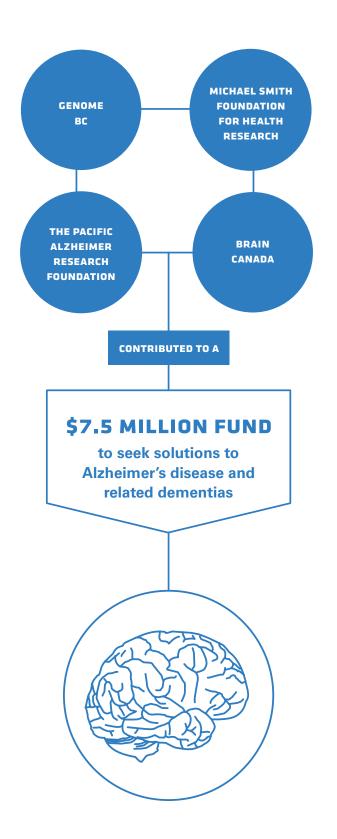




improving outcomes and increasing efficiency







A Beautiful Mind: New Pathways for Alzheimer's Disease Research

The most common form of dementia, Alzheimer's disease, affects men and women of all races, religions and socioeconomic backgrounds. Alzheimer's disease is a fatal, progressive and degenerative disease that destroys brain cells: it is not a normal part of aging and no one is immune. Alzheimer's accounts for 64 per cent of all dementias in Canada and in BC affects up to 70,000 people.

Along with three other organizations, Genome BC is a founder of the British Columbia Alzheimer's Research Award Program. Together with Brain Canada, the Michael Smith Foundation for Health Research (MSFHR) and The Pacific Alzheimer Research Foundation (PARF), Genome BC contributed to a \$7.5 million fund to seek solutions to Alzheimer's disease and related dementias. Five awardees from the University of British Columbia (UBC) and Simon Fraser University (SFU) are working towards creative and visionary solutions for this devastating disease.

The research projects include Novel Retinal Biomarkers for Alzheimer's disease led by SFU's Dr. Mizra Faisal Beg; Structures, Immunology in Alzheimer's disease led by UBC's Dr. Neil Cashman; Does reduced brain insulin production underlie common forms of Alzheimer's disease? led by UBC's Dr. James Johnson; Improving the neighbourhood for brain cells in Alzheimer's disease led by UBC's Christian Naus; and, Moving Alzheimer's therapeutic strategy to the clinic led by SFU's Dr. David Vocadlo.



44 As someone who is living with a diagnosis of Alzheimer's disease, my passion is advocating for myself and others while shattering stereotypes around the disease.

These research projects are key to advancing therapies and diagnostic tools for people with Alzheimer's disease and other forms of dementia: investment into research is critical to our struggle and offers us greater hope than before.

— Jim Mann, Alzheimer's Advocate

1 4 Genome British Columbia Annual Report 2014 – 2015

Mining and Energy





Bacteria can influence certain mining and energy processes. The successful practical applications of technologies exploiting bacteria or other biological processes can be an important contributor to cost competitiveness, safety and environmental performance in these industries.

Widespread usage of these technologies is often hampered by a lack of understanding of the biological contribution, thus, outreach and industry partnership are key in advancing the role of genomic technologies in mining and energy.



James O'Hanley

44 As a regulator, the BC Oil and Gas Commission is responsible for ensuring responsible development and conservation of BC's oil and gas resources. ??

Genomic based research led by Dr. Hallam and his research team could allow us to better understand the role microbial communities play in long-term gas production and provide more precise monitoring opportunities. This would help us fulfill our regulatory mandate to the benefit of all British Columbians.

James O'Hanley, Deputy
 Commissioner, Resource
 Stewardship & Major Projects
 at the Oil And Gas Commission

Mining and Energy Timeline

Genome BC is digging in with the mining community; conferences, networking and new projects are all contributing towards a prosperous partnership, between academic innovators and industry.

May 12, 2014:

New Dimensions in Mining Roundtable at Canadian Institute of Mining (CIM) Vancouver Convention – Genome BC initiative with national scope, all Genome Centres and Genome Canada invited: strategic discussion about genomic tools applied in mining and identifying opportunities for early wins

June 26, 2014:

National partnership formed with Genome BC leadership to fund and oversee genomicsbased research project(s) with a focus on 3-4 most promising project outcomes from May CIM session

August 29, 2014:

Pipelines Best Practices
Workshop with BC Innovation
Council: goal was to
establish BC leadership in
collaborative projects that
increase safety and reduce
environmental impact

November 13/14, 2014:

LNG Workshop / Focus Group to increase awareness of BC's academic achievements, creating a hub for shale gas and energy expertise in BC and bringing funding to BC research

January 28, 2015:

Genome BC Roundtable at Roundup - Priority areas are water, processing, remediation: industry interest secured

February 19, 2015:

"Rock Talk" with Smithers Exploration group

February 24, 2015:

Genome BC Energy sector Committee establishment and first meeting

February 25, 2015:

Genome BC Mining Sector Steering Committee Meeting This year Genome BC funded five mining projects valued at ~\$1.25 million.

Emerging Issues

Addressing Urgent Needs



In August of 2014 the Mount Polley Mine tailings dam breached, sending large amounts of mine-influenced, untreated water and sediment into the natural watershed and local lakes. The knock-on effects are still being assessed, but what is known is that better tools are needed to reclaim mine wastes.

With funding from Genome BC and Genome Canada, Drs. Lauchlan Fraser and Heath Garris from Thompson Rivers University (TRU), and University of British Columbia's Dr. Sue Baldwin came together to determine new strategies for monitoring the impact of Mount Polley Mine tailings breach on the ecosystem and make recommendations for environmental remediation as needed.

Genomic technologies may provide the key to both understanding the elements necessary to recreate functional ecosystems and provide sufficient benchmarks for success.

What is Metagenomics?



Metagenomics combines molecular biology and genetics in an attempt to identify and characterize the genetic material from environmental samples and apply that knowledge to reveal important characteristics of that particular microbial community.

Metagenomics to assess impacts of the Mount Polley Mine tailings dam breach on associated ecosystems is valued at close to \$300,000 and was funded through Genome BC's Emerging Opportunities Fund.

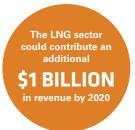
Contributing to BC's Economy

British Columbia's natural gas strategy centres on development of a liquified natural gas (LNG) sector fuelled by shale gas and the Province estimates that LNG could contribute an additional \$1 billion in revenue by 2020.

Another pillar of British Columbia's energy strategy mandates the use of blended biofuels including ethanol, methanol and biodiesel. Despite the promise of using shale gas and blended biofuels to offset climate impacts of fossil fuel consumption, recent studies indicate that both alternatives are not without social and environmental hazards.

Genomics is a relatively new tool to the energy sector but one that may be a game-changer when applied to operations, risk assessment and environmental co-monitoring. Along with key industry partners Genome BC is funding two research projects, co-led by UBC's Drs. Steven Hallam, Sean Crowe and Uli Mayer, to address sustainable development challenges from the perspective of the microbial world.





From a microbial ecology perspective, every time a well is drilled or biofuels released into the subsurface, a growth experiment is initiated. Our ability to interpret these experiments and harness the results requires detailed understanding of the environmental conditions before, during and after perturbation. Working closely with forward thinking industrial partners, Dr. Hallam and his team are working to bring microbial ecology and genome sciences to the energy sector in disruptive ways that promote more efficient resource recovery with reduced environmental costs.

Disappearing Copper

Social license to operate a mine has become more and more onerous, with mine development companies having to seriously consider the safety of the surrounding community and environment before putting a shovel in the ground. When complex geology and potential metal leaching is involved, it can make this process even more difficult.

Casino Mining Corporation is planning to build a 22-year open pit copper-gold-molybdenum-silver operation in the Yukon. As with all mining operations, the environmental concerns are paramount: as well as recovering as much of the gold and copper as possible, it also has to treat effluent that results from operations. An early environmental analysis found something very interesting in the mineralized area of Casino Creek: high copper concentrations exist upstream near the mineralized zone of the deposit, however, as the water progresses downstream, there is a marked reduction in copper concentrations – considerably more than would be expected from just simple dilution.

It is thought that a local community of microbes is contributing to the observed downstream reductions in copper in Casino Creek. The use of community biofilm profiles taken at different sites in the watershed will determine to what extent microbial processes drive copper removal. If present, this natural process may be harnessed within passive treatment systems at Casino, as a complementary process, or as a risk mitigation tool available to safeguard against contamination of the natural environment.

This project offers Casino Mining Corporation high-quality data for a potential natural remediation process that may augment environmental models used for the prediction of metal concentrations over time. Additionally, this research has the potential to supplement or replace current best available technologies for water treatment systems, and could save mining companies and governments millions of dollars, while effectively protecting the environment from contaminated effluent streams.

1 6 Genome British Columbia Annual Report 2014 – 2015









BC exported \$2.7 billion worth of agricultural and seafood products to over 140 countries last year and this sector continues to enhance the economic diversity of the province. Genomic innovations can help BC to remain environmentally responsible and sustainable: genomics can augment food production by providing insight into milk production, crop pollination and many more challenges faced by mounting demand.

Milking It

BC is home to 545 dairy farmers and approximately 72,000 dairy cows that produce over 650 million litres of milk per year. British Columbians keep the industry busy with a per capita consumption of over 77 litres per year. The dairy industry also provides employment for over 11,000 people and contributes an estimated \$1 billion per year to the provincial and federal economies.

Sustaining this volume is challenging and the ability to identify which young heifers will develop to be the best milk producers is important to the dairy industry.

UBC researcher, Dr. Ronaldo Cerri, in partnership with veterinarian Dr. Martin Darrow, believe that there is a genomic solution. Through a simple hair sample, a genomic test will provide the genetic markers of desirable traits like volume, fat content and protein. This data will allow farmers to make informed breeding and selection management decisions that will result in a more productive herd and improved dairy profitability.

Other objectives of the research project are to demonstrate the increased reliability of genetic ranking of the young heifer stock through use of genomics; to perform an economic analysis of the financial benefit to dairy farm operators who use genomics; and to increase the acceptance of genomic technology by

dairy producers through their direct involvement with the research project.

If we can accurately rank the animals according to production then we can derive significant benefits from these genomic tools. The collaboration between researchers and the farmers participating in this project demonstrates the applicability of genomic science to help BC dairy farmers gain a competitive edge in the global marketplace.

Avian influenza (AI) is a contagious viral infection that can affect all species of birds (chickens, turkeys, quinea fowl, pet birds and wild birds) Some AI strains can also cause illness in humans. From **December 2014 to January** 2015 there was an outbreak of a highly-pathogenic avian influenza (HPAI) in the Fraser Valley which involved 11 commercial and two nonregulated residential farms, leading to the death or destruction of approximately 240,000 birds.

The outbreak virus was identified as highly pathogenic avian influenza H5N2. Genomic sequencing revealed that this virus was created from a 'reassortment', or mixing, between a North American Al virus and the Eurasian H5N8 virus. The H5N2 virus is unique in its ability to cause immediate high mortality in domestic poultry. Although

the H5N2 virus is not zoonotic (transmissible from animals to people), other Eurasian H5 viruses have caused significant human morbidity and mortality. For this reason, the arrival of a Eurasian H5 virus in North America has potential public health implications.

As part of an Emerging

Opportunities Fund, Genome BC, Genome Canada and other partners funded research to shed light on the source of the H5N2 strain and develop better tools to predict future outbreaks. The project will seek to determine whether wild waterfowl (i.e., ducks and geese) were the source of the virus, and whether analysis of wetland sediments using advanced molecular techniques can be used as an early warning system for arrival of dangerous influenza viruses in the Fraser Valley, and elsewhere in Canada



develop an annual wetland sediment surveillance program as early as October 2015, so that we can be ready for the fall influx of migratory waterfowl....and the influenza viruses they may bring with them. Not only will this project shed light on the origin of the most recent Al outbreak, but it will also allow us to develop an effective and efficient way to monitor Al viruses in waterfowl, and to predict and prevent future Al outbreaks.

 Dr. Chelsea Himsworth
 A co-leader of the research project and Leader of Veterinary
 Science and Diagnostics at the BC Ministry of Agriculture's
 Animal Health Centre



Molecular techniques can be used as an early warning system for dangerous viruses like Avian Flu



Protecting Pollinators

Since 2006, North America has lost nearly one third of its honeybee population due to infectious diseases and climate change. As honeybees are one of the most important pollinators in Canadian agriculture, countless crops across the country – including blueberries in British Columbia and canola in Alberta – are at risk.

Bees' importance to us goes far beyond honey: without them we'll depend more on imports and have to pay more for our fruits and vegetables. Dr. Leonard Foster of UBC is researching some of the most interesting aspects of bee biology and trying to support bee health

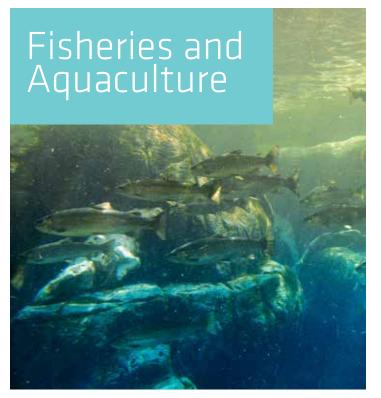
His main research has been Bee Integrated Pest Management (IPM), a project he works on with a group comprised of scientists, bee breeders and researchers from across Canada. The IPM's research addresses the fact that many bacteria, viruses, fungi and mites responsible for bee-specific infectious diseases are becoming resistant to pesticides, which means science needs to find new approaches to protect bee populations.

Biologists, beekeepers and economists are working together to design and evaluate these IPM practices and help beekeepers deal with the challenges facing the honey bee industry. The success of this project and its implementation will result in a decrease in colony losses, increased honev production and greater availability of bees for pollination. Consumers, crop growers and beekeepers will benefit from improved food security and healthier, more abundant, more effective pollinators.



North America has lost nearly one third of its honeybee population due to infectious diseases and climate change

1 8 Genome British Columbia Annual Report 2014 – 2015





Mapping the Salmon Genome

On June 10, 2014 the International Cooperation to Sequence the Atlantic Salmon Genome (ICSASG) announced completion of a fully mapped and openly accessible salmon genome. This reference genome will provide crucial information to improve the production and sustainability of aquaculture operations, and address challenges around conservation of wild stocks, preservation of at-risk fish populations and environmental sustainability.

The fisheries and aquaculture sector is one of the economic engines of BC: seafood is the province's largest agri-food export, valued at \$870 million. High value species such as salmon make a significant contribution to the economy. Salmonids are also an important piece of the social fabric of communities on BC's coastline and many other countries including Norway and Chile.

Until this breakthrough, some salmon genetic information was known but many fundamental questions remained. A fully assembled reference sequence available for researchers worldwide will have a major impact on revealing information about salmon and other salmonids, such as rainbow trout and Pacific salmon.

The international collaboration involves researchers, funding bodies and industry from Canada, Chile and Norway. The successful completion of the salmon genome provides a basis for continued partnerships between these and other countries involved in research and industrial development of salmonids.

Protecting Against the 'Invisible Collapse'

Freshwater fisheries are an integral part of BC's social and economic fabric. Direct, indirect and induced impacts of sport fishing totals more than \$950 million in revenue. Kokanee, a freshwater form of sockeye salmon, supports very popular recreational fisheries in lakes across BC's Okanagan region and the Pacific Northwest and is also a traditional food source for First Nations.

Cumulative impacts of population growth and land use practices may be leading to the "invisible collapse" of Canada's freshwater fisheries like those in BC. This is shown by a dramatic decline in most high yield fisheries in recent decades. (Andrusak et al., 2008) Insight into how freshwater fisheries can be better informed and subsequently managed is needed: genomics is providing some options.

According to project leader Dr. Michael Russello of UBC Okanagan, applying genomics to migratory sockeye and native kokanee salmon will allow for better monitoring of stock health, enhancement, and improved stock delineation and prioritization for conservation, thereby enhancing the effectiveness of hatchery programs.

This project includes user partners and stakeholders in freshwater fisheries including the Okanagan Nation Alliance (ONA), the BC Ministry of Forests, Land and Natural Resource Operations (MFLNRO) and BC Hydro. Project findings could guide the development of best practices for fish stock management and policy for the environment and fisheries at the MFLNRO, regulations that would be of interest to ONA and BC Hydro.

Emerging Issues

Strategic Salmon Health Initiative



Viruses and pathogens can be hazardous for both wild and farmed fish species. The Strategic Salmon Health Initiative (SSHI), a project that intends to clarify the presence and/or absence of microbes in Pacific salmon, has moved from data collection to validation. Now in the second phase, the team has a new technology platform that underwent rigorous, peer-reviewed assessment.

This technology offers an ability to analyze samples on a scale never done before at Fisheries and Oceans Canada (DFO). The platform is able to analyze up to 96 unique fish simultaneously. With appropriate controls more than 200 salmon samples can be analyzed in a day. The analysis will be looking at over 90% of infectious agents known to cause disease in salmon – no other known study is doing quantitative analysis at this level.

After rigorous analysis of the platform, it will now play a critical role in molecular monitoring of the BC salmon fishery. This review process was remarkable and has demonstrated the breadth and scope of the group working on the SSHI.



Dr. Brian Riddell, President and CEO of the Pacific Salmon Foundation and project co-lead on the Strategic Salmon Health Initiative





2 0 Genome British Columbia Annual Report 2014 – 2015 2 1





Forests play a pivotal role in our nation's history and are a key economic driver and societal resource in BC. Faced with multiple interests and overlapping demands, the priority for jobs and the need for a healthy environment, challenges abound in forestry. Genomic science can help: climate change and invasive pests and pathogens are just two of the areas where applications are occurring.

Changing Climate Requires New Breeding Strategies

In BC and Alberta, about 150 million spruce and lodgepole pine trees are planted annually by forest companies and provincial agencies. Typically, foresters use local seed from breeding programs or from native populations for this planting. In the past, the resulting seedlings were well adapted to the locations in which they were planted. However, a rapidly changing climate threatens forest health and productivity and is predicted to result in widespread maladaptation of trees. Evidence for this maladaptation can be seen with higher losses to pests, such as the mountain pine beetle in BC, and aspen and spruce dieback in Alberta over the past decade.

An ongoing research project, led by UBC's Dr. Sally Aitken, has undertaken a large-scale effort to apply state-of-the-art genomics and climate-mapping technologies to the problem of matching genetic populations of interior spruce and lodgepole pine with the appropriate geographic areas under climate change. This research has made large strides working with professional foresters, tree breeders and policy makers on understanding and using genomic tools to assess the best places to plant young trees.

Another advance was the work done by co-Project Leader Dr. Andreas Hamann at the University of Alberta. His team incorporated climate with topography to determine distances and directions for climate-based seed transfer to improve adaptation. A major breakthrough in methodology enabled geographic mapping tools, available as a public resource, to inform those working in forest management or conservation.

This project is providing scientific information for new climatebased seed transfer policies currently being developed by the BC Ministry of Forests, Lands and Natural Resource Operations. The data collected by the research group will inform and populate the framework for the interior spruce and lodgepole pine. The team has also sifted through millions of genetic markers in each species and selected tens of thousands that are being used in new lodgepole pine and interior spruce breeding projects.

With direction from appropriate, knowledge-based policy, foresters working to replant harvested areas will be able to make informed decisions regarding seed source and climate change, thereby improving the long-term health of public forests. This, in turn, will lead to significant economic impact.



Brian Barber

What practical applications are genomics having for forestry planning and management today?

Presently genomics is not being used to guide operations or reforestations but the time for this is quickly approaching. The projects funded by Genome BC support our research and policy needs.

What are the biggest challenges facing the Ministry over the next decade?

We have many challenges including: managing multiple resource values for multiple users; assessing the cumulative impacts of resource uses; accommodating First Nations rights and titles; conserving species at risk; and climate change. Genomics can assist with some of these challenges.

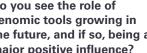
Do you see the role of genomic tools growing in the future, and if so, being a major positive influence?

Absolutely – genomics will be integrated into our seed transfer standards and tree breeding programs. The information garnered from Sally Aitken's AdapTree project will inform where to plant tree species and seed sources suitable for today's and future climates.

Genomics is a very powerful tool that will also help reduce the time and cost of selecting trees with desirable traits, dealing with invasive insects and pathogens, and developing new products for the lumber, pulp and paper, and bioenergy sectors.

Genomics allows us the ability to screen large populations to identify individuals with specific traits, such as climatic responses. This will help us select the right trees for each planting site.

- Brian Barber Director, Tree Improvement Branch, Ministry of Forests. Lands and Natural Resource Operations



Canada's forests and urban trees cover more than 400 million hectares and provide a huge variety of economic, social and environmental benefits. Invasive Alien Species (IAS) are an increasing threat that can cause irreversible damage to the environment impacting agriculture, forestry, urban and natural environments and are thereby responsible for losses of hundreds of millions of dollars to the Canadian economy. Preventing the introduction and establishment of IAS such as the Asian Gypsy Moth and other forest pests, will protect forests and trees and also maintain Canada's pest-free status to ensure market access for Canadian forest exports.

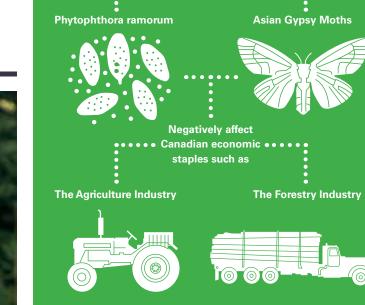
Emerging Issues

Two IAS that represent urgent threats to Canada's forest and agricultural resources are the Asian Gypsy Moth (AGM) and Phytophthora ramorum (PR), a plant pathogen that causes Sudden Oak Death. The establishment of these two species in Canadian forests would represent a significant trade impact and could lead to trade disruption. Given the unprecedented levels of international trade we are seeing as well as a changing climate, the Canadian Food Inspection Agency (CFIA) has the mandate to design and implement programs that protect Canada's forest and trees and the legislative authority to enforce regulations that require foreign trading partners to ensure their shipments are free of IAS.

Invasive Species

A \$2.34 million project, supported by Genome BC, Genome Canada and Génome Québec, was initiated this year and brings together the country. The project demonstrates the value of multi-regional collaboration when contending with pan-Canadian challenges. Adopting DNA detection tools is expected to save Canada's forest and agriculture sectors an estimated \$374 to \$625 million over three to five years.

Pest and Pathogens such as





Annual Report 2014 - 2015 22 Genome British Columbia 23

Tech

Bioinformatics is a necessary interpretive tool in genomics. With advances in sequencing and the acceleration of other technological advances, this has never been more true. Without the interpretation of data, there would be little application of cutting-edge genomic science. Nor would strong research successfully move down the continuum to application and commercial success.



Bioinformatics: Backing Up Genomic Applications

Bioinformatics is defined as the collection, classification, storage, and analysis of biochemical and biological information using computers especially as applied to molecular genetics and genomics. Simply put, bioinformatics is the infrastructure behind genomics research, providing essential mathematical and computational tools to accelerate and enable discovery and application.

Massive amounts of data, otherwise known as "big data," are being generated by genomics technologies across life science sectors including human health, agri-food, forestry, energy and mining, and fisheries and aquaculture. More tools are necessary to effectively access, mine and analyze vast quantities of genomic datasets and integrate them with other knowledge bases is a major challenge for the research community.

Genome BC is involved with developing an internationally renowned cluster of bioinformatics researchers that include teams from the BC Cancer Agency, Simon Fraser University and the University of British Columbia. Up and coming experts include Dr. Sohrab Shah who is using innovative software to improve patient care by identifying and analyzing the mutations involved in cancer progression.

Without the bioinformatic experts, understanding the genetic underpinnings of cancer, tree breeding indicators and honeybee traits would be impossible.

A New Partnership

Genome BC and the Sumas Regional Consortium for High Tech (SRCTec) signed a Memorandum of Understanding (MOU) to collectively advance their goals of entrepreneurship and commercialization. Both organizations focus on accelerating technology innovation through to commercialization - from great idea to tangible product. Genome BC continues to play a role in building accelerators and centres of excellence.



MRMP Leaders in the Field

MRM Proteomics Inc. (MRMP), a leader in the development and provision of advanced proteomics technologies for the pharmaceutical, biotechnology and diagnostics industries took a major step forward this year with the appointment of Dr. Gary Kruppa as President & Chief Executive Officer.

MRMP, a spinoff from the University of Victoria-Genome BC Proteomics Centre, was incorporated in July 2010 to commercialize cutting-edge proteomics technologies. MRMP has become a leader in the proteomics field in key areas of services, products and custom solutions. With Dr. Kruppa at the helm, it is positioned to expand its commercial enterprise globally.

S&T Platforms Get a Boost

Two BC-based science and technology platforms received substantial federal investment through Genome Canada's 2014 Genomics Innovation Network (GIN) program. A third, the Alberta-based Metabolomics platform, is being co-led out of BC. Both BC-based nodes, the sequencing platform at Canada's Michael Smith Genome Sciences Centre (GSC) at the BC Cancer Agency and the Proteomics Centre, received \$2 million in funding over two years.

The GIN is designed to allow innovation centres across Canada to collaborate and harness their collective power for the advancement of genomics research. Each node provides Canadian and international researchers with access to the leading-edge technologies required for research in genomics, metabolomics, proteomics and related areas. These nodes are also well positioned to push the boundaries in terms of developing new technologies in genomics and related sciences.

Furthermore, the highly-qualified personnel within each node will provide the Canadian research community with advice and expertise on use and selection of appropriate technologies, study design, data analysis and bioinformatics, ensuring that Canadian research remains world-class and highly competitive on a global scale.



Message from the Board Chair lan de la Roche

The last 15 years at Genome BC have seen huge changes but I would suggest that the last five, 2010-2015, have been the most transformative.

We have been funding discovery, applied and some translational work and have now shifted to a more balanced portfolio with the addition of a new entrepreneurial stream. Now launching our fourth Strategic Plan, we are taking an even bolder step towards commercialization.

Genome BC is well-positioned to succeed over the next five years and optimize the potential of genomics for the benefit of BC while proactively addressing the societal implications of these advancements. We are focused on linking good science with user needs in BC and demonstrating applications across sectors – from health

to forestry to energy, mining, agriculture, and fisheries and aquaculture.

We will continue to act as a beacon for innovation, work to create jobs, and nurture the bright minds in our province. Our 2015-2020 Strategic Plan lays out a clear roadmap, a blueprint if you will, to guide us and ensure we continue to remain aligned with the priorities of the Province.

I would be remiss if I did not say how honoured I am to chair the Board and note that I do have very big shoes to fill. I want to thank the Board Directors, Alan Winter, the management team and the Genome BC staff for enabling this organization to continue as it has – unwavering, diligent and making a difference in the lives of British Columbians.

We will continue to act as a beacon for innovation, work to create jobs, and nurture the bright minds in our province. ??

Jan de la Roche



Message from the President and CEO Alan E. Winter

This last year has been a time of great effort and transition for Genome BC.

We saw growth in companies advanced, increased our investment into innovation and saw a huge uptake in our public outreach and education initiatives. While achieving these many milestones we have remained steadfast and focused on core objectives.

Some of our most promising projects have come to fruition this year and it has been satisfying to see the linkages between industrial partners and BC scientists blossom into significant relationships. We also expanded our hub to include new stakeholders and partners: our contacts with the mining industry continue to

grow, new health partners like the BC Pharmacy
Association have coinvested with us, and we are expanding our network to include groups like the Sumas Regional Consortium for Hi Tech (SRCTec).

I extend my thanks to Alan Pelman, Board Member for ten years, Board Chair for four years, and trusted adviser throughout. I am grateful to have had the opportunity to work alongside him – all of us at Genome BC have benefited from his energy and wisdom. We are fortunate to have great depth of leadership on our Board and our staff and I look forward to a great year ahead under the leadership of our current Board Chair, lan de la Roche.

While achieving these many milestones we have remained steadfast and focused on core objectives.

Hardinto

2 4 Genome British Columbia Annual Report 2014 – 2015 2 5

Independent Auditors' Report

To the Board of Directors of Genome British Columbia

We have audited the accompanying financial statements of Genome British Columbia, which comprise the statement of financial position as at March 31, 2015, the statements of operations, changes in net assets and cash flows for the year then ended, and notes, comprising a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these 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.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the entity's preparation and fair presentation of the financial statements 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. An audit also

includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

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

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of Genome British Columbia as at March 31, 2015, and its results of operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-forprofit organizations.

Chartered Accountants June 5, 2015 Vancouver, Canada

KPMG LLP

Statement of Financial Position (Expressed in Canadian Dollars) March 31, 2015, with comparative information for 2014

	2015	2014
Assets		
Current assets:		
Cash	\$ 35,590,444	\$ 1,908,984
Short-term investments (note 3)	67,428,582	76,483,902
Funding receivable	75,735	231,262
Other receivables (note 4)	56,403	67,392
Project advances	2,547,391	3,792,112
Prepaid expenses	186,982	171,808
	105,885,537	82,655,460
Loan receivable (note 5)	187,793	176,332
Capital assets (note 6)	556,894	615,338
Other long-term asset (note 7)	-	246,779
	\$ 106,630,224	\$ 83,693,909
Liabilities and Net Assets		
Current liabilities:		
Accounts payable and accrued liabilities (note 8)	\$ 4,136,683	\$ 3,335,593
Deferred lease inducement	259,205	306,333
Deferred contributions:		
Future expenses (note 9)	101,677,442	79,436,645
Capital assets (note 10)	556,894	615,338
	\$ 106,630,224	\$ 83,693,909

Commitments (note 11)

See accompanying notes to financial statements.

Approved on behalf of the Board:

Dr. lan de la Roche Chair Mr. Joe Garcia Director

26 Genome British Columbia Annual Report 2014 – 2015 27

Statement of Operations and Changes in Net Assets (Expressed in Canadian Dollars)
Year ended March 31, 2015, with comparative information for 2014

	2015	2014
Revenues:		
Amortization of deferred contributions related to future expenses (note 9)	\$ 27,542,159	\$ 33,960,454
Amortization of deferred contributions related to capital assets (note 10)	129,788	171,291
Investment income	2,803,430	2,093,355
	30,475,377	36,225,100
Expenses:		
Corporate programs and management	6,558,639	6,133,364
Project expenditures	23,786,950	29,920,445
Depreciation	129,788	171,291
	30,475,377	36,225,100
Excess of revenues over expenses, being net assets, end of year	\$ -	\$ -

See accompanying notes to financial statements.

Statement of Cash Flows (Expressed in Canadian Dollars) Year ended March 31, 2015, with comparative information for 2014 2015 2014 Cash provided by (used in) Operations: Excess of revenues over expenses Items not involving cash: 129,788 Depreciation 171,291 Amortization of deferred contributions related to future expenses (note 9) (27,542,159) (33,960,454)Amortization of deferred contributions related to capital assets (note 10) (129,788) (171, 291)Accretion of loan receivable (11,461)(10,762)Unrealized discounted fair market value adjustment (1,071,168)Unrealized loss on short-term investments 245,611 80,540 (28,379,177) (33,890,676) Funding (note 9) 49,807,172 19,462,618 Change in operating assets and liabilities: Funding receivable 155,527 820,759 Other receivables 10,989 423,596 Project advances 1,244,721 (383,662)Prepaid expenses (15,174) 4,692 Accounts payable and accrued liabilities 801,090 (121,359)23,625,148 (13,684,032) Investments: Proceeds from sale of short-term investments 12,000,000 17.200.000 Purchase of short-term investments (1,872,344)(2,099,444)Purchase of capital assets (71.344)(107,428) 14,993,128 10,056,312 Increase in cash 33,681,460 1,309,096 Cash, beginning of year 1,908,984 599,888

\$ 35,590,444

\$ 1,908,984

See accompanying notes to financial statements.

Cash, end of year

Notes to Financial Statements

(Expressed in Canadian Dollars) Year ended March 31, 2015

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 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 socioeconomic benefits to British Columbia and Canada, to provide access to necessary equipment and facilities, and to provide opportunities for training of scientists and technologies;
- (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:

The 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 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.

(f) 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 determination of any impairment of the other long-term asset. Accordingly, actual results could differ from these estimates.

2. Significant accounting policies (continued):

(g) Long-term asset:

The Corporation's long-term asset is recorded at discounted fair market value. In prior periods it was recorded at cost which represented the determined fair market value at the date the asset was acquired.

(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.

(i) 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 and long-term asset 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, other receivables, loan receivable and other long-term asset. 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.

(I) 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 Corporation's short-term investments are comprised of a portfolio of funds. The portfolio consists of investments in a Canadian money market fund and a bank guaranteed Canadian mortgage fund. 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 the portfolio manager to change the level of investment in either fund 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 a high-credit quality financial institution.

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

	March 31, 2015	March 31, 2014
Canadian Money Market Fund	\$ 9,950,092	\$ 16,263,574
Canadian Mortgage Fund	56,160,543	60,220,328
Other investments (note 7)	1,317,947	-
	\$ 67,428,582	\$ 76,483,902

The Canadian Money Market Fund invests in a mixture of Treasury Bills, Bankers' Acceptances, Commercial Paper (minimum R-1 low rating) and bonds (minimum BBB rating) with maturities averaging 60-120 days and a minimum Government of Canada, Provincial or cash holding of 25%.

The Canadian Mortgage Fund invests in first mortgages on Canadian residential real property with loan value ratios of 65% or less. The mortgages are purchased by the fund from a Canadian Chartered Bank and in the event that a mortgage is in default for more than 90 days the bank guarantees both the interest and the principal of the mortgage.

Fair values of the Corporation's portfolio investments are based on quoted bid price at the reporting date.

28 Genome British Columbia Annual Report 2014 – 2015 29

4. Other receivables:

	March 31, 201	Ma:	March 31, 2014		
Sales tax	\$ 32,860	\$	66,218		
Other accounts receivables	23,54	3	1,174		
	\$ 56,403	\$	67,392		

Included in other accounts receivable are allowances for doubtful accounts of \$21,800 (March 31, 2014 - \$21,800).

5. Loan receivable:

The Corporation made a loan to a British Columbian academic institution to assist in attracting a senior scientific researcher. The loan is in the amount of \$200,000, bears no interest, and has a term of five years, expiring on May 9, 2016. The loan was measured at fair value on initial recognition, which was estimated using a net present value calculation with a discount rate of 6.50% per annum. The difference between the initial fair value and the principal amount was recorded in the statement of operations as a discount and the loan receivable balance is being accreted over the term of the loan using the effective interest rate method.

6. Capital assets:

March 31, 2015	Cost Accumulated depreciation			Net b	ook value
Furniture and fixtures	\$ 75,325	\$	31,139	\$	44,186
Computers and software	242,925		135,742		107,183
Telecommunications equipment	6,199		3,937		2,262
Leasehold improvements	545,767		142,504		403,263
	\$ 870,216	\$	313,322	\$	556,894

March 31, 2014	Cost Accumulated depreciation		Net b	ook value	
Furniture and fixtures	\$ 63,596	\$	18,188	\$	45,408
Computers and software	187,977		93,358		94,619
Telecommunications equipment	4,145		3,249		896
Project equipment	14,816		14,092		724
Leasehold improvements	543,154		69,463		473,691
	\$ 813,688	\$	198,350	\$	615,338

7. Other long-term asset:

Other long-term asset includes subscription rights and common shares in an early stage biotechnology company (Investee) issued pursuant to a collaborative research agreement. Each subscription right entitled the Corporation to one common share for no additional consideration and was convertible into common shares of the Investee upon certain triggering events or three years from issuance. The subscription rights were converted into common shares in connection with the commencement of trading of the shares of the Investee in an active quoted market in November, 2014. At March 31, 2015, the Corporation held the following common shares of the Investee:

	Number of subscription rights	Number of common shares	Fair value
Balance at March 31, 2014	57,824	268,964	\$ 246,779
Conversions	(57,824)	57,824	-
Reverse stock split		(259,548)	-
Discounted fair market value adjustment			793,760
Foreign exchange adjustment			277,408
Balance at March 31, 2015	-	67,240	\$ 1,317,947

The investment is now carried as a discounted fair market value as the Corporation is subject to a lock-up agreement until May 15, 2015.

8. Accounts payable and accrued liabilities:

	March 31, 2015	March 31, 2014	
Accounts payable Accrued liabilities	\$ 239,184 3,897,499	\$	164,465 3,171,128
Accided habilities	\$ 4,136,683	\$	3,335,593

9. Deferred contributions related to future expenses:

The Corporation receives funding from Genome Canada, the Province of British Columbia, Western Economic Diversification Canada and from other sources to be held, administered and distributed in accordance with the related funding agreements between the Corporation and other parties (note 11).

30 Genome British Columbia

9. Deferred contributions related to future expenses (continued):

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 period are as follows:

	M	arch 31, 2015	March 31, 2014
Balance, beginning of year	\$	79,436,645	\$ 93,952,292
Funding received or receivable during the period:			
Genome Canada		15,063,547	17,676,963
Province of British Columbia		34,000,000	-
Western Economic Diversification Canada		37,085	649,687
International collaboration		334,920	781,970
Provincial Health Services Authority		250,000	-
BC Clinical Research Infrastructure Network partners		118,750	350,000
Service Canada		2,870	3,998
		49,807,172	19,462,618
Lease inducement amortization		47,128	47,128
Other long-term asset		-	42,489
		129,290,945	113,504,527
Less:			
Amount amortized to revenue		(27,542,159)	(33,960,454)
Amount transferred to fund capital assets purchased during the year (note 10)		(71,344)	(107,428)
		(27,613,503)	(34,067,882)
Balance, end of year	\$	101,677,442	\$ 79,436,645

10. 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 period are as follows:

	March 31, 2015	March 31, 2014	
Balance, beginning of year	\$ 615,338	\$	679,201
Allocation of funding for capital asset purchases (note 9)	71,344		107,428
	686,682		786,629
Less: amount amortized to revenue	(129,788)	(171,291)
Balance, end of year	\$ 556,894	\$	615,338

11. Commitments:

(a) Funding:

(i) 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 an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$23,043,282 related to 2010 Large-Scale Applied Research Project Competition, 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.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$571,178 related to Entrepreneurship Education in Genomics Program, 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.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$16,334,035 related to 2012 Large-Scale Applied Research in Genomics and Personalized Health, 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.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$2,563,577 related to Bioinformatics and Computational Genomics, 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.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$1,222,879 related to Genomic Applications Partnership Program, 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.

31

Annual Report 2014 – 2015

11. Commitments (continued):

(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.

The total award amount and estimated remaining commitment of the Corporation by program as of March 31, 2015 is as follows:

Approved programs	Total award amount		Estimated remaining Corporation commitment	
Current programs:				
2010 Large-Scale Applied Research Project Competition (LSARP)	\$	56,374,386	\$	655,406
Advancing Technology Innovation through Discovery		5,702,315		952
Entrepreneurship Education in Genomics Program		979,966		54,348
2012 Large-Scale Applied Research Project Competition - Genomics and Personalized Health		34,036,779		5,393,753
2012 Bioinformatics and Computational Biology		5,276,029		551,899
Genomic Applications Partnership Program (GAPP)		3,670,147		798,467
Applied Genomics Consortium Program		31,193,623		175,021
Personalized Medicine Program		8,168,169		59,366
Human Microbiome (CIHR)		4,827,122		139,019
Human Epigenome (CIHR)		9,978,992		1,617,241
Transplantation (CIHR)		4,096,203		1,000,000
Centre for Drug Research and Development Fund		3,668,919		1,092,927
Brain Canada (MIRI)		3,000,000		370,428
Brian Canada (Alzheimers)		4,045,948		539,462
Strategic Opportunities Fund		12,544,120		234,471
Strategic Opportunities Fund for Industry		2,407,857		-
WED – Proof of Concept		9,542,255		-
User Partnership Program		4,418,495		1,791,018
Science and Technology Platforms (2013 – 2015)		12,964,563		-
Science and Technology Platforms (2015 – 2017)		3,999,973		-
Emerging Projects		286,400		142,296
Pilot Programs		3,127,407		262,042
		224,309,668		14,878,116
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		-
WED Programs		10,713,337		-
Science and Technology Platforms		58,097,359		-
Technology Development Initiatives Fund		706,536		-
Other Pilot Programs		3,561,133		-
		388,608,251		-
Total	\$	612,917,919	\$	14,878,116

32 Genome British Columbia

11. 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 six fiscal years are as follows:

2016	\$ 499,291
2017	499,291
2018	505,038
2019	505,038
2020	505,038
2021	252,518
Total	\$ 2,766,214

12. 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 is presumed to control 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 year ended March 31, 2015 and March 31, 2014 and for the years then ended are as follows:

	2015	2014
Cash, term deposits and receivables	\$ 148,091	\$ 300,853
Accounts payable and accrued liabilities	(22,365)	(6,201)
Deferred contributions	(125,726)	(294,652)
Net assets	\$ -	\$ -
Revenues	\$ 481,959	\$ 22,856
Expenses	(481,959)	(22,856)
Excess of revenues over expenses	\$ -	\$ -
Cash provided by (used in):		
Operations	\$ (454,580)	\$ (47,431)
Funding	312,318	-
Investing	251,460	14
Net change in cash	\$ 109,198	\$ (47,417)

There are no significant differences in accounting policies between the Foundation and the Corporation. The majority of the assets of the Foundation are restricted by the terms of a memorandum of understanding relating to the funding of a research chair at a British Columbia academic institution.

13. 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 change to the risk exposures during the period ended March 31, 2015.

(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 change to the risk exposures during the period ended March 31, 2015.

Annual Report 2014 – 2015

33

13. Financial risks (continued):

(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 investment in the common shares of Investee.

(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.

Corporate Information

Board of Directors

(for fiscal year ended March 31, 2015)

lan de la Roche

Chair Past President

FP Innovations
Forest Resources Management

University of British Columbia

Ida Goodreau

Vice Chair Former CEO, Vancouver Coastal Health

Alan Pelman

Past Chair
Past Vice President,
Technology
Weyerhaeuser Canada Ltd.

Alan E. Winter

President and Chief Executive Officer Genome BC

Neena L. Chappell

Canada Research Chair in Social Gerontology, Professor of Sociology and Centre on Aging University of Victoria

Jock Finlayson

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

Joseph Garcia

Partner
Blake, Cassels & Graydon LLP

Janet Halliwell

Principal
J.E. Halliwell Associates Inc

Victor Ling

President & Scientific Director Terry Fox Research Institute

Edward Safarik

Former President and CEO Ocean Fisheries Ltd.

John Shepherd

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

John F.H. Thompson

Consultant, PetraScience Consultants Inc. and Professor, Cornell University

Management

Alan Winter

President & CEO

Tony Brooks

Chief Financial Officer and Vice President, Research Programs

Suzanne Gill

Director, Corporate Development

Sally Greenwood

Vice President,
Communications & Education

Gabe Kalmar

Vice President, Sector Development

Brad Popovich

Chief Scientific Officer

Auditors

KPMG LLP

Vancouver, BC

Legal Counsel

Richards Buell Sutton LLP

Vancouver, BC

Thanks to Our Funders

Genome BC would like to acknowledge and thank its corporate funding partners including:







Western Economic Diversification Canada Diversification de l'économie de l'Ouest Canada

Acknowledgements

We would like to thank the following groups and individuals who assisted with this annual report:

The management and staff at Genome BC,

Genome BC-funded Researchers

and the team at Carter Hales Design Lab Inc.

34 Genome British Columbia Annual Report 2014 – 2015 3 5

Genome British Columbia

400–575 West 8th Avenue Vancouver, BC V5Z 0C4 Tel 604 738 8072 Fax 604 738 8597 genomebc.ca



