



LIVING INNOVATION

Genome Canada
2017-18 Annual Report

Genome Canada is a not-for-profit organization that harnesses the transformative power of genomics for the benefit of Canadians. We connect ideas and people across public and private sectors to find new uses for genomics. We also invest in large-scale science and technology to fuel innovation and translate discoveries into solutions across key sectors of national importance. These key sectors include health, agriculture and agri-food, forestry, fisheries and aquaculture, the environment, energy and mining.

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Message from the Chair



“We are delighted that genomics is deeply embedded in many of the Government of Canada’s new superclusters, such as those devoted to digital technologies, protein industries and oceans. The superclusters will drive Canadian innovation and prosperity in industries and benefit regional economies that depend on them.”

Moura Quayle, chair

Photos credit: Ben Welland

There is an increasingly intense international race to foster the next wave of research advances and innovations. The Council of Canadian Academies describes this in its 2018 report *Competing in a Global Innovation Economy: The Current State of R&D in Canada*.

It is true that countries around the world are boosting their efforts and investments in research and innovation. And while Canada’s performance in this race raises some concerns, there is also hope. Canada can continue to be a world leader by building on a strong foundation of research talent and considerable research and development assets.

Significantly, the Government of Canada has taken some key steps to reinvigorate the science, technology and innovation ecosystem in this country.

Canada’s Innovation and Skills Plan was launched as part of Budget 2017. The Chief Science Advisor was appointed in September 2017. Five innovation superclusters were announced in February 2018. Canada’s Fundamental Science Review was completed and informed the 2018 federal budget, which demonstrated the government’s strong commitment to research and innovation with historic investments in science.

Such policies and investments point Canada in the right direction and lay the groundwork for strengthened research capacity and homegrown innovation.

My optimism also stems from what I observe within the Canadian genomics research community. Because genomes are found in all living things, genomics research cuts across multiple sectors of Canada's growing bioeconomy. Sectors as diverse as health, agriculture and agri-food, forestry, fisheries and aquaculture, the environment, energy and mining recognize the value of genomics as a competitive asset.

Through its diverse portfolio of programs, Genome Canada continues to fuel the pipeline of innovation by supporting applied genomics research and technology platforms. Genome Canada also facilitates the translation of research through partnerships between genomics scientists and users of the science in industry, and in the public and not-for-profit sectors.

This approach is resulting in Canadian startup companies that spring from research projects we have funded. Toronto-based Biotagenics – a clinical microbiomics company focused on improved management and treatment of inflammatory bowel disease – is a spinoff from Genome Canada-funded large-scale applied research.

MRM Proteomics, meanwhile, is a spinoff from the Genome Canada-funded [University of Victoria-Genome BC Proteomics Centre](#). The company was launched in 2010 to commercialize cutting-edge proteomics technologies, tools and know-how developed at the Centre. Since then, MRM Proteomics has opened independent laboratories in Victoria and Montreal, providing proteomics services to many clients. It has established its own in-house technology development program, and developed and launched new commercial products.

We are excited that Canadian genomics research is boosting existing Canadian industries and export markets such as wheat, pulses and fish. These industry sectors are worth billions to Canada's economy and have significant growth potential.

We are delighted that genomics is deeply embedded in many of the Government of Canada's new superclusters, such as those devoted to digital technologies, protein industries and oceans. The superclusters will drive Canadian innovation and prosperity in industries and benefit regional economies that depend on them.

Genomics is a relatively young area of science and technology that is rapidly evolving. Given this, and our commitment to help address Canadian research and innovation challenges, Genome Canada is developing an ambitious new strategic plan. We are engaging with national and international stakeholders over a year-long consultation, analysis and strategy development process. It will determine the best way forward to ensure Canada fully leverages genomics for the benefit of Canadians now and for future generations.

I wish to thank the Government of Canada for its continued support through fiscal year 2017-18, and my fellow board members and members of the science and industry advisory committee for their dedication and sage guidance. I also wish to thank the hard-working staff at

Genome Canada and the regional Genome Centres, genomics researchers across Canada and many other partners. All are crucial to the success of Canada’s genomics enterprise.



Moura Quayle
Chair
Genome Canada

Message from the President and Chief Executive Officer



Photos credit: Ben Welland

“By allowing us to *read* DNA, genomics empowers us to work with the code to inform decisions in health care and other sectors of the bioeconomy.”

Marc LePage, president and chief

Genomics seeks to understand the entire genetic information of an organism – whether it be a human, animal, plant or microbe – encoded in its DNA. I like to describe DNA as the “operating software” of all living things. By allowing us to read DNA, genomics empowers us to work with the code to inform decisions in health care and other sectors of the bioeconomy.

Just as we’ve seen digital code transform our lives, biological code is having a profound impact on society. Genomics enables *living innovation* that addresses health issues, food production challenges, and renewal of our traditional natural resource and extraction-based industries in an environmentally sustainable manner.

Genomics and precision health was a centrepiece of Genome Canada’s investments in fiscal year 2017-18 and offers a perfect illustration of how genomics is changing lives.

In January, Genome Canada, the Canadian Institutes of Health Research (CIHR) and other partners announced \$255 million in funding. These funds support 15 large-scale applied genomics and precision health projects and 10 genomics technology platforms across Canada. The projects bring new hope for Canadians living with cancer, cystic fibrosis, juvenile arthritis, childhood asthma and other diseases.

What's exciting about these projects is how clinically oriented they are. Most are led by clinical scientists who deal with patients on a day-to-day basis and are well positioned to apply the research to health-care settings. Further, they are not just about developing new therapies to treat diseases. They are also about early diagnosis and intervention to better curb or manage diseases at their onset.

These projects are truly at the cutting edge. The international peer review committee expressed how awestruck they were with the quality of the science and clinical impact the projects will generate. This committee, comprised of the best scientists in the field, is responsible for funding recommendations to the board.

One peer reviewer from the U.K. commented on Canada's global leadership, particularly as it relates to pediatric precision health. "In my view, the quality of genomic-based research in Canada is world class. If I was ill, particularly if I had a sick child, I would want to live in Canada rather than anywhere in the world," said Dr. Brendan Wren, Professor at the London School of Hygiene & Tropical Medicine.

Indeed, these projects launch on the heels of previously supported precision health projects that are delivering significant impact. They include the discovery of new genetic markers for breast cancer, genetic signatures of childhood brain tumours and novel rare disease genes.

Our next step in this regard is to work with partners to advance the implementation of precision health in Canada. We will start with a pilot project focused on rare genetic disorders and then scale up implementation more broadly across the Canadian health-care system.

As well, our scientists are working feverishly in a race against time to address our planet's most pressing challenge – climate change. Genomics provides critical and powerful technology that can help mitigate the effects of climate change and bring solutions to environmental challenges.

At Genome Canada, we are also proud to be living innovation. Our suite of programs and initiatives continues to evolve to meet the needs of a rapidly changing environment. We constantly strive, as well, to rethink and renew our commitment to supporting Canada's best and brightest researchers and innovators.

Genome Canada looks forward to continued partnership with governments, industry, academic administrators, researchers and others as we harness the biological code to Canada's advantage.



Marc LePage
President and chief executive officer
Genome Canada

Living innovation: the stories

INDIGENOUS PRECISION HEALTH

Narrowing the precision health gap for Indigenous peoples in Canada

Precision health enables diagnosis and treatment to be tailored to individuals, based on a patient's unique genetic makeup. Traditionally, it has been hard for people in Indigenous communities to gain access to precision health care. Now a team of British Columbia-based researchers, led by Drs. Laura Arbour, Nadine Caron (pictured), and Wyeth Wasserman, is working to narrow the gap. The team is creating a system within which Indigenous people can oversee their own genetic data to improve diagnoses and health outcomes related to genetic disease. [Learn more.](#)

HARDIER TROUT

Identifying naturally hardy trout to help fisheries breed even hardier stocks

Over the next 50 years, more than 30 per cent of rainbow trout populations in North America will be at risk from climate change. An interdisciplinary British Columbia-based research team led by Drs. Patricia Schulte, Ben Koop and Anthony Farrell, is using genomics to identify trout that natural selection has already made hardier. Those fish can then be bred by hatcheries to produce even hardier stocks, thereby helping to preserve recreational fishing for generations to come. [Learn more.](#)

PORK PROFITABILITY

Maximizing profitability for Canadian pork producers by helping the right pigs go to market

The profitability of pork producers in Canada depends on the ability to create and transfer genetic improvements from the nucleus purebred population to commercial crossbred animals. Pig genetics company Genesis is working with Dr. Graham Plastow of the University of Alberta to develop and

validate a selection tool that could enhance the transfer of genetic improvements to commercial producers by 50 per cent. [Learn more.](#)

BETTER LENTIL VARIETIES

Providing farmers with lentil varieties that will excel under Canadian growing conditions

A team, led by Drs. Kirstin Bett (pictured) and Albert Vandenberg of the University of Saskatchewan, is working to determine the genetics underlying the ability for lentils to grow well in different global environments. In partnership with world-leading genomic big data company NRGene of Israel, the researchers have already successfully sequenced two wild lentil genomes – the largest legume genomes ever assembled. This project is expected to result in an increase in productivity and export revenues while ensuring Canada’s continued dominance in research, production and marketing of this important crop. [Learn more.](#)



Photo credit: Crystal Chan

STELLAR CHEDDAR

Improving the production capacity of high-quality, competitive aged cheddar cheese

Demand for high-quality aged cheddar keeps rising. Parmalat Canada is working with Dr. Gisele LaPointe of the University of Guelph to validate and implement genomic tools that will significantly increase the

production capacity of high-quality, competitive aged cheddar cheese. This will bring Canada's knowledge base on cheese-making processes into a new era. [Learn more.](#)

PUTTING BOWEL DISEASE IN REMISSION

Designing tests to enable inflammatory bowel disease patients to reach deep and long-lasting remission

Inflammatory bowel disease (IBD) leaves sufferers with serious health issues due to chronic inflammation. There is no cure for this lifelong condition. Drs. Alain Stintzi and David Mack of the University of Ottawa are using genomics to characterize, identify and quantify the microbes that change in IBD patients during treatment. They will use this information to design simple and quick tests to reveal the optimal treatment for each affected patient, thereby improving quality of life and delivering significant cost savings. [Learn more.](#)

A BID TO SAVE CARIBOU

Protecting caribou and the stability of northern ecosystems and communities

Caribou has long been a food staple for communities in northern Quebec, but herd populations are declining rapidly – in some cases, a drop of around 99 per cent. A team led by Drs. Claude Robert and Steve Côté from Université Laval, is working to develop a much-needed genomic tool that will identify specific herds based on a simple tissue sample. The team is also developing a web portal to host a registry of caribou genotypes and a data analysis pipeline to support caribou management in Quebec.

TACKLING CHILDHOOD BRAIN CANCER

Tackling childhood brain cancer at the root

Brain cancer remains the leading cause of cancer-related deaths among children under age 20. To improve survival rates of children afflicted with brain tumours, a team is fast-tracking the use of treatments targeting specific genetic alterations. Drs. Nada Jabado (pictured) and Jacek Majewski of McGill University and Dr. Michael Taylor at The Hospital for Sick Children (SickKids) in Toronto are leading the team. The team is also investigating ways to identify new alterations and specific vulnerabilities that can be targeted for therapy. [Learn more.](#)

SUDDEN HEART ATTACKS, OUTSMARTED

Healing broken hearts through genomics research

A team of researchers led by Mark Samuels at the University of Montreal and Terry Lynn Young at Memorial University in Newfoundland successfully isolated the gene responsible for claiming the lives of seemingly healthy young men through sudden cardiac arrest. Today, a simple blood test can diagnose those with the mutation and defibrillators can then be implanted in these patients as a preventative measure. Hundreds of people around the world have been successfully treated as a result of this genetic testing, preventing countless heart attacks and adding 30-plus years to the lifespan of individuals who receive the device. [Learn more](#) about the research project and watch the video [A Family Curse](#).

Year in review

May 23, 2017 – Researchers publish the [sunflower genome](#) – one of the most challenging genomes decoded to date. Dr. Loren Rieseberg, a senior author of the paper, states that the research team has built physical and genetic maps of the sunflower's structure. The University of British Columbia professor says that this increases the sunflower's value for research and breeding.



Photo credit: iStock

May 26, 2017 – Genome Canada launches five new applied genomics [projects](#) that partner users of genomics with academic research partners. The projects will bestow competitive advantages on the Canadian dairy, canola, pork and turkey industries and address the problem of adverse drug reactions in the health-care system.



Parliamentary Secretary for Science Kate Young (right) tours the University of Guelph's Agriculture and Food Laboratory. Parliamentary Secretary Young earlier announced federal support for new applied genomics projects that partner academia with industry (Photo credit: Genome Canada)

June 12, 2017 – Genome Canada and partners announce funding of \$33 million to support Phase IV of the [Structural Genomics Consortium](#) (SGC). The SGC is a Canadian-led international, public-private open science partnership. This latest investment will help translate scientific discoveries into cures for

patients with a range of diseases such as cancer, amyotrophic lateral sclerosis (also known as Lou Gehrig's disease), Huntington's disease, malaria and tuberculosis.

June 28, 2017 – Leukemia researchers trace the [origins of relapse in acute myeloid leukemia](#) to rare therapy-resistant leukemia stem cells that are already present at diagnosis and before chemotherapy begins. The research team is led by Dr. John Dick of the Princess Margaret Cancer Centre in Toronto. The findings provide significant insights into cell types fated to relapse and can help accelerate the quest for new, targeted therapies.

June 28, 2017 – Led by Dr. John Rioux, Montreal scientists and their international colleagues close in on specific genes responsible for inflammatory bowel disease. This forms a basis for more effective current treatments for the disease and the discovery of new drug targets.

September 7, 2017 – Genome Canada welcomes [Dr. Rob Annan](#) as vice-president, public affairs and communications.

October 7, 2017 – [Genome: Unlocking Life's Code](#) – a North American travelling exhibit – opens at Science North in Sudbury. It is sponsored by Genome Canada and Ontario Genomics among others.

GENOME
UNLOCKING
LIFE'S
CODE



“Genomics and Society – What do you think?” an interactive program available at the Genome: Unlocking Life's Code exhibition. The program invites people to consider different opinions about some issues surrounding genomic technologies and how these technologies relate to their lives (Photo credit: Science North)

October 15, 2017 – The Global Alliance for Genomics and Health (GA4GH) strikes formal collaborations with [15 international genomic data initiatives](#), three of which are Canadian, that will help identify, develop and pilot data-sharing frameworks and standards in real-world settings. Genome Canada is a founding member of the alliance and pledges continued investment in GA4GH operations. This ensures

Canada's multiple health-care systems will more quickly share and use genomic and clinical data for the benefit of Canadian patients.

October 23, 2017 – A major international collaboration that includes Dr. Jacques Simard of Université Laval in Quebec City identifies [72 common genetic variants that predispose to breast cancer](#). The findings could help women at high risk for breast cancer get more intensive screening at a younger age. This would allow for early detection and prevention of the disease.



Breast cancer researcher Dr. Jacques Simard, Université Laval (Photo credit: Génome Québec)

November 6 to 8, 2017 – Genome Canada sponsors and participates in Gender Summit 11 North America 2017, held in Montreal. The summit aims to make gender equality in research and innovation the norm and to embed gender as a primary dimension of quality.



A participant at Gender Summit 11 North America 2017 (Photo credit: Gender Summit)

November 8, 2017 – University of Saskatchewan scientists Dr. Kirstin Bett and Dr. Bert Vandenberg, in partnership with genomic big data company NRGene of Israel, successfully sequence [two wild lentil genomes](#). These are the largest legume genomes ever assembled. Researchers now have a much broader view of genes and pathways that enable lentils to thrive in volatile climactic conditions.



Lentil researcher Dr. Kirstin Bett, University of Saskatchewan (Photo credit: Genome Canada)

November 15, 2017 – Genome Canada and the Social Sciences and Humanities Research Council of Canada invest \$600,000 in five new projects exploring [societal implications of genomics research](#). Such research is critical in maximizing the benefits and minimizing the risks associated with this emerging area of science and technology, said Marc LePage, Genome Canada’s president and chief executive officer.

November 29 to 30, 2017 – Building on regional consultations undertaken across Canada from June to September, Genome Canada and partners host the Canadian Agriculture & Agri-Food Genomics Forum in Toronto. The forum brings together experts and other stakeholders in the field to help define the role of genomics in advancing Canada’s agriculture and agri-food sector.



December 1, 2017 – Genome Canada and partners announce another slate of five Genomic Applications Partnership Program (GAPP) [projects](#). A total of \$24.5 million in federal, provincial, industry and other partner funding is invested in projects that will improve cancer treatments and reduce greenhouse gas emissions.

January 15, 2018 – Genome Canada, Genome British Columbia and Genome Prairie collaborate to support the development of a DivSeek [online bioinformatics resource](#) that will help accelerate plant breeding in Canada. This includes the development of high-yielding, climate-adapted, planet-friendly crop varieties. DivSeek, an international initiative, is a community-driven volunteer effort to unlock the potential of crop diversity to enhance productivity, sustainability and resilience of crops and agricultural systems.

January 23, 2018 – The Government of Canada, Genome Canada, CIHR and other partners announce an [investment of \\$255 million](#) in 15 new large-scale applied [genomics and precision health](#) projects and 10 genomics [technology platforms](#). This investment brings new hope to Canadians living with cancer, cystic fibrosis, juvenile arthritis, childhood asthma and other diseases. (Watch [video](#) of the national announcement.)



The Honourable Kirsty Duncan, Minister of Science and Minister of Sport and Persons with Disabilities (right), meets with nine-year-old juvenile arthritis patient Aida Kelf-Kowal and her father Ed Kowal. They are in the lab of Dr. Rae Yeung (centre) at The Hospital for Sick Children (SickKids) in Toronto, on January 23, 2018. Dr. Yeung has received funding to improve treatment for children with arthritis as part of Genome Canada's genomics and precision health program, a partnership with the Canadian Institutes of Health Research. (Photo credit: Genome Canada)



The Honourable Jody Wilson-Raybould, Minister of Justice and Attorney General of Canada, at BC Children's Hospital on January 23, 2018. The Minister announced major investments in genomics and precision health research in British Columbia (Photo credit: Genome Canada)



The Honourable Kent Hehr, Member of Parliament for Calgary Centre, meets with genomics researchers at the University of Calgary on January 23, 2018. Earlier, Hehr announced major investments in Alberta-based genomics and precision health research (Photo credit: Cindy Bell)

February 5, 2018 – The Genetics Society of America announces that [Dr. Philip Hieter](#) is the recipient of the 2018 George W. Beadle Award. The award was bestowed in honour of Dr. Hieter’s outstanding contributions to the genetics research community. Dr. Hieter, a Genome Canada-funded researcher, is professor of medical genetics in the Michael Smith Laboratories at the University of British Columbia.

February 15, 2018 – Genome Atlantic, Genome Alberta, Genome Canada and partners release [De-Risking Offshore Oil and Gas Exploration](#), a two-minute video illustrating how genomics is driving innovation in the ocean economy. The project in question aligns with the objectives of the Atlantic Canada-based Ocean supercluster, announced in February 2018 by the Government of Canada as one of five new collaborations aimed at fostering growth and creating jobs.



March 6, 2018 – Ontario Genomics hosts [Canada SynBio 2018](#), Canada’s first national conference on engineering biology, in partnership with Innovation, Science and Economic Development Canada, Genome Canada and others. More than 275 people fill the MaRS Discovery District auditorium in Toronto for the event. Engineering biology, participants are told, is a platform that can play a significant role in addressing some of the biggest challenges facing Canada and the world today. Read the [discussion paper](#).



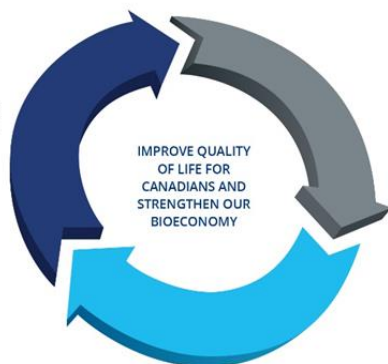
Genome Canada president and CEO Marc LePage delivers opening remarks at Canada SynBio 2018 (Photo credit: Connie Tsang)

Pursuing our mission and objectives

Figure 1

OUR MISSION

CONNECT ideas and people across public and private sectors to find new uses and applications for genomics



INVEST in large-scale science and technology to fuel innovation

TRANSLATE discoveries into applications to maximize impact across all sectors

Our Objectives

- Respond to societal needs by generating genomics discoveries and accelerating their translation into applications.
- Attract greater investment in genomics research from a broad range of stakeholders, in particular the private sector.
- Enhance the impact of genomics by transforming knowledge of the ethical, environmental, economic, legal and social challenges and opportunities (GE³LS) into sound policies and practices.
- Enhance the recognition of the value of genomics by increasing stakeholder appreciation of genome science, its applications and implications.

Genome Canada seeks to harness the transformative power of genomics to deliver benefits to Canadians.

Genome Canada is placing increasing emphasis on innovation by supporting the application of genomics research to address challenges and opportunities in sectors vital to Canada's growing bioeconomy. At the same time, we remain invested in fundamental science that fuels the innovation pipeline. Our programs and initiatives are purpose-driven, supporting projects with the greatest potential for social and economic benefits to Canadians.

Connect ideas and people across public and private sectors

Structural Genomics Consortium

The SGC's core mandate is to determine the three dimensional structures of human proteins of therapeutic relevance to diseases and place them in the public domain. Once in the public domain, industry and academia can use this information without restriction.

With a new \$33-million investment from Genome Canada and partners, SGC has launched into Phase IV. This phase has a new partnership model that allows disease foundations to gain access to chemical probes with relevance to their disease as they emerge from the SGC pipeline. Such access enables the more rapid translation of discoveries into cures for patients.

Regional Priorities Partnership Program

This new program was launched in August 2017, with the first project being approved in March 2018. The program supports the six regional Genome Centres in developing initiatives that advance genomics research and translation capacity in areas of strategic priority to their regions.

Genome Canada-Mitacs partnership

This partnership supports placements and funding for graduate students and post-doctoral fellows to work on GAPP projects within industry partners' operations. This prepares Canada's next generation of innovators to advance the field of genomics by allowing candidates to apply their knowledge and skills in a real-world setting. Companies, meanwhile, benefit from high-quality research expertise.

2015 E-Rare-3 Joint Transnational Call: Translational Research Projects on Rare Diseases (partnership with Canadian Institutes of Health Research)

This joint international funding mechanism brings together scientists in different countries to share expertise around a common interdisciplinary research project. This initiative is supporting nine projects involving multiple Canadian organizations with a total investment of \$13.4 million over three years. Genome Canada directly funds three of the projects.

Joint Initiative on Societal Implications of Genomics Research (partnership with Social Sciences and Humanities Research Council of Canada)

Genome Canada and the Social Sciences and Humanities Research Council of Canada have partnered to invest approximately \$600,000 in five projects as part of this initiative. The five projects, announced in November 2017, examine diverse issues, including:

- consumer attitudes toward genetically modified foods,
- the role of communication in developing genomic technologies, and
- patient perspectives on the disclosure of incidental findings from clinical genomics.

Invest in large-scale science and technology

Large-scale applied research project competitions

2017 Large-Scale Applied Research Project Competition: Genomics and Precision Health

The 2017 Large-Scale Applied Research Project (LSARP) Competition was launched in partnership with CIHR in January 2017. In December 2017, Genome Canada's board of directors approved funding for 15 projects with a total investment of \$162 million, including co-funding. These [projects](#) – spanning multiple disease areas – demonstrate how genomics-based research can contribute to a more evidence-based approach to health. This will ultimately improve health outcomes for patients and enhance the cost-effectiveness of Canada's health-care system. The projects formally begin in fiscal year 2018-19.

2015 Large-Scale Applied Research Project Competition – Natural Resources and the Environment: Sector Challenges – Genomic Solutions

Genome Canada and co-funding partners have invested \$110 million in 13 [projects](#) focused on using genomic approaches to address challenges and opportunities of importance to Canada's natural resources and environment sectors. This includes interactions between natural resources and the environment. The results of these projects will contribute to the Canadian bioeconomy and well-being of Canadians.

2014 Large-Scale Applied Research Project Competition – Genomics and Feeding the Future (partnership with Western Grains Research Foundation)

Genome Canada continues to support 11 [projects](#) that were part of this competition, launched in 2014 in partnership with Western Grains Research Foundation. Genome Canada and co-funding partners awarded the projects approximately \$90 million. These projects will create new knowledge and inform public policy on Canada's agriculture and agri-food sector and fisheries and aquaculture sector. This will contribute solutions to helping feed the world's growing population.

2012 Large-Scale Applied Research Project Competition – Genomics and Personalized Health (partnership with Canadian Institutes of Health Research)

Genome Canada, CIHR and partners continued to invest in the 17 [projects](#) from this 2012 competition. Approximately \$150 million, including co-funding, has been provided over the complete term of these projects. The projects have been geared to tailoring patient treatments and therapies through the application of genomics in diverse fields. These fields include epilepsy, autism, HIV/AIDS, cancer, cardiovascular disease, rare neurological diseases and stroke, among others.

Emerging issues

Genome Canada also funds emerging issues projects that address important and timely needs. Currently funded projects include research aimed at addressing the porcine epidemic diarrhea virus, avian influenza in the wild bird population, maternal/fetal transmission of the Zika virus and development of climate-adapted crop varieties.

Leading-edge technologies

2016 Genomics Technology Platforms Competition for Operations Support and Technology Development Funds

Starting in April 2017, Genome Canada and partners began investing \$93 million over three years to support operations and technology development at [10 genomics technology platforms](#) across Canada. The technology platforms provide the research community with the highest-quality genomics technologies and advice.

2015 Bioinformatics and Computational Biology (B/CB) Competition and launch of 2017 Bioinformatics and Computational Biology (B/CB) Competition (partnership with Canadian Institutes of Health Research)

These competitions support projects that produce the next generation of tools and methodologies to deal with the influx of large amounts of data produced by modern genomics technologies. The projects will also provide the research community with broad access to these tools. In the 2015 edition, 16 [projects](#) received a total of \$4 million over two years. In December 2017, Genome Canada launched the 2017 competition with \$24 million in total funding available from Genome Canada and co-funding partners.

2015 Disruptive Innovation in Genomics Competition and launch of 2017 Disruptive Innovation in Genomics Competition

The projects funded through these competitions have the potential to displace existing technologies, disrupt existing markets and create new markets. In the 2015 competition, 20 [projects](#) were selected for funding in Phase 1 and five [projects](#) were selected for funding in Phase 2. The total investment was \$18.5 million, including co-funding.

In July 2017, Genome Canada released a request for applications inviting Phase 1 projects to advance to Phase 2. Decisions will be made in June 2018 for the second tranche, where Genome Canada and co-funding partners will invest approximately \$16.5 million.

Translate discoveries into applications

Genomic Applications Partnership Program

In May and December of 2017, the results of two new rounds of the GAPP program were announced ([Round 7](#) and [Round 8](#)). Total investment in the program since its 2013 inception stands at \$162.7 million. GAPP has invested in 41 projects that address real-world challenges and opportunities as identified by industry, government, not-for-profits and other “receptors” of genomics knowledge and technology.

GE³LS network in genomics and personalized health

This network is a way to cross-fertilize the GE³LS components across the 17 projects selected by the 2012 LSARP: Genomics and Personalized Health Competition. This is done to share best practices, enhance future collaborations and accelerate the progress to implementation of genomic technologies. A three-year investment in the network of up to \$2 million, including co-funding, began in 2016.

Showcasing Canada’s genomics enterprise on the world stage

Genome Canada and the regional Genome Centres combined efforts to highlight Canada’s unique national and regional genomics model at the June 2017 BIO International Convention in San Diego. This convention attracts more than 15,000 biotechnology and pharmaceutical leaders from around the globe.

Canadian leadership was on full display again in San Diego at the Plant and Animal Genome (PAG) XXVI Conference from January 13 to 17, 2018. PAG is the largest agricultural genomics meeting in the world, bringing together more than 3,000 leading genetic scientists and researchers in plant and animal research. Genome Canada and the regional Genome Centres, along with many of our funded researchers, have a significant presence at this conference each year. Collectively, we raise our profile through exhibits, receptions, workshops, posters and abstracts, and as speakers throughout the conference program.

Public outreach and engagement

Genome Canada sponsored genomics exhibits at two museums: Science North in Sudbury and the Canada Science and Technology Museum in Ottawa. Our funded projects and corporate announcements generated considerable national and regional media attention.

We were also active participants at thought leadership events, including Canada SynBio 2018 – Canada’s first national conference focused on engineering biology – and the Canada 2067 National Leadership Conference. Both conferences were held in Toronto. Canada 2067 brought key stakeholders together to shape the future of science, technology, engineering and math learning among elementary and high school students.



McGill University scientist Jérôme Waldispühl at the Canada Science and Technology Museum with the citizen science exhibit he invented called Phylo. Phylo allows visitors to work on DNA puzzles and at the

same time learn how genomics helps crack the code of disease and improve human health. (Photo credit: Andrea Matyas)

Looking ahead to 2018-19

Genome Canada's overarching goal is to put genomic applications into the hands of those who will use them to strengthen Canada's bioeconomy and improve quality of life for Canadians.

To this end, we are in the process of renewing our strategic plan to reaffirm our role in Canadian research and innovation. This will ensure we continue to effectively support genomics researchers and users in the years ahead. Following a broad national and international consultation process, Genome Canada will launch its new strategic plan prior to the end of fiscal year 2018-19.

In the near term, Genome Canada will support current programs and pursue new endeavours based on our three-year \$237.2-million contribution agreement with the Government of Canada. This agreement stems from federal Budget 2016.

2018 Large-Scale Applied Research Project Competition – Genomics Solutions for Agriculture, Agri-Food, Fisheries and Aquaculture

Genome Canada will launch this competition in summer 2018. The program will support projects using genomics to address challenges and opportunities in the agriculture and agri-food sector, and the fisheries and aquaculture sector. The 2018 competition will do so by building on 2014 LSARP: Genomics and Feeding the Future.

Genome Canada intends to invest approximately \$30 million in the 2018 competition, leveraging total funds through co-funding. The competition will be informed by the new Canadian Agriculture and Agri-Food Genomics strategy. Genome Canada is developing this strategy in partnership with federal government departments and agencies, the regional Genome Centres and stakeholders. Input is being gathered through regional consultations and a sector strategy forum.

Advancing a precision health strategy for Canada

Genome Canada has been building on one of the key recommendations from the Genomics and Precision Health Forum held in late 2016 in Toronto. That was a recommendation to advance the implementation of genomics in the health-care system through a rare disease pilot project. In September 2017, Genome Canada convened national and international stakeholders to provide input into the plan to move forward. An important aspect of our plan involves learning from international precision health initiatives such as those ongoing in England, the United States, France and Australia.

Research Catalyst Network on Rare Diseases II

CIHR, in partnership with Genome Canada, launched this funding opportunity in early 2018 and will invest up to \$3 million with partners. The CIHR-led network will fund small focused projects that enable rapid confirmation of potential disease-causing genes. These projects will also fuel pilot studies to improve understanding of how specific gene mutations cause disease.

Genomic Applications Partnership Program

Genome Canada will offer more rounds of GAPP funding during the 2018-19 fiscal year. We are looking into increasing program flexibility for applicants by providing more frequent opportunities for funding decisions each year.

Translational networks

The Translational Networks Program is intended to strengthen connections between researchers, users and other stakeholders on issues that could impact the uptake and application of genomics technologies, including commercialization. The program is being further developed for launch in 2018-19, providing an opportunity for the support of additional networks. Genome Canada plans to invest \$3 million in these networks.

Genomics in Society – Integrated GE³LS research review

Genome Canada's investments in research on genomics and its ethical, environmental, economic, legal and social (GE³LS) aspects and related activities have helped Canada become a world leader in this field. Still, Genome Canada's Five-Year Evaluation 2014 recommended addressing current information gaps on the effectiveness and weakness of GE³LS research that is integrated into large-scale applied research projects.

As a result, Genome Canada has struck an expert panel to examine this issue in-depth and recommend a path forward. The review, including the final report and its presentation to key stakeholders, is expected to be completed in summer 2018.

Strengthening partnerships, outreach and engagement

Genome Canada is exploring holding more regular public policy discussions on salient genomics-related topics such as gene editing.

We will continue working with partners who were involved in a 2017 workshop on antimicrobial resistance. Together, we are working to implement recommendations and maintain ongoing engagement with key federal partners.

We also plan to continue showcasing Canadian genomics on the national and international stage through participation at select high-impact events. As well, we will continue to explore innovative ways to work with the regional Genome Centres to enhance genomics outreach, engagement and education across Canada.

Active projects funded

A rigorous competitive process determines which research projects and genomics technology platforms will be funded. Projects are selected through a peer review process that features an assessment of the scientific merit of the proposal as well as its potential social and economic benefits for Canada. Selections are also based on a due diligence review of the project's proposed management structure, proposed budget and related financial data, including co-funding.

Reviewers are chosen for their recognized expertise in the science, technology and/or translation arena, and management of large-scale genomics projects. Reviewers are drawn primarily from the international scientific community. This ensures that the research we fund is of the highest international standards and avoids conflict of interest. Over the past year, Genome Canada recruited 129 reviewers from 13 countries. Genome Canada's board of directors makes the final decision on which applications to fund, based on recommendations received from the international panel of reviewers.

The Genome Centres actively monitor all Genome Canada-funded projects through different mechanisms, depending on the nature of the funding program and the type of project. Typically, the Genome Centres create research oversight committees for each funded large-scale research project. These committees assess the progress of the project, provide oversight and advice, and make recommendations regarding continued funding.

Table 1: Active Projects 2017-18 lists active research projects and technology platforms for which funds flowed in the 2017-18 fiscal year. The table shows the total funding, including the required co-funding, as well as the contribution from Genome Canada. Of the active projects and platforms, 28 started their funding in 2017-18.

See Appendix 1 for active projects (2017-18)

Genomics enterprise

Genome Canada operates within a unique and highly effective model. It works collaboratively with six regional Genome Centres, each of which is independently incorporated, in pursuit of agreed-to objectives in genomics research. This approach enables national breadth and regional depth, ensuring collective, pan-Canadian action in determining priorities and delivering programs.

The Genome Centres play a significant role on a number of levels. They:

- foster regional expertise in genomics research,
- develop partnerships to strengthen regional leadership and competitiveness,

- facilitate researcher access to the technology platforms,
- create unique and innovative public outreach programs, and
- secure co-funding for projects from both domestic and international investors.

The Genome Centres pursue their own strategic objectives informed by regional strengths and priorities. Several of the Genome Centres obtain funding from other sources, primarily provincial governments, to support regionally focused research programs.

The operational costs to fulfil the Centres' mandates are supported by many sources of funding, among them Genome Canada. In 2017-18, Genome Canada provided \$880,000 each to [G nome Qu bec](#), [Ontario Genomics](#) and [Genome British Columbia](#), and \$734,800 each to [Genome Atlantic](#), [Genome Prairie](#) and [Genome Alberta](#). As recipients of Genome Canada funding, the Genome Centres are subject to regular external assessments.

Figure 2: Regional Genome Centres



Governance

Genome Canada is governed by a board of directors comprising up to 16 individuals drawn from the academic, private and public sectors. These individuals bring unique skills and experiences, as well as strong interests and insights, to successfully fulfil Genome Canada’s strategic plan. New directors are appointed for two-year terms renewable up to a maximum of six years. The presidents of five federal research funding agencies are non-voting, ex officio advisors to the board of directors. These federal research funding agencies are:

- Canada Foundation for Innovation,
- CIHR,
- National Research Council Canada,
- Natural Sciences and Engineering Research Council of Canada, and
- Social Sciences and Humanities Research Council of Canada.

The board of directors has overall responsibility for the stewardship of Genome Canada’s business and affairs. To help with the discharge of these duties, the board has five standing committees:

- an executive committee,
- an audit and investment committee,
- a governance, election and compensation committee,
- a programs committee, and
- a communications and outreach committee.

As well, the board of directors has established a science and industry advisory committee. It provides strategic advice and approaches and directions to help Genome Canada achieve its objectives.

NUMBER OF MEETINGS HELD BY THE BOARD AND ITS COMMITTEES IN 2017-18

Board of directors	4
Executive committee	3
Audit and investment committee	4
Governance, election and compensation committee	4
Programs committee	4
Communications and outreach committee	4
Science and industry advisory committee	5

BOARD DIRECTORS, EX OFFICIO ADVISORS, AND SCIENCE AND INDUSTRY ADVISORY COMMITTEE MEMBERS

Board of directors

Moura Quayle (chair)
Director *pro tem*, UBC School of Public Policy and Global Affairs
Professor, Sauder School of Business
University of British Columbia
Vancouver, British Columbia

Jim Farrell (vice-chair)
Forest sector consultant
Ottawa, Ontario

Fiona Brinkman
Professor of bioinformatics and genomics, Department of Molecular Biology and Biochemistry
Associate professor at School of Computing Science and at Faculty of Health Sciences
Simon Fraser University
Burnaby, British Columbia

Eric Cook
Executive director and CEO
Research and Productivity Council
Fredericton, New Brunswick

Elizabeth Douville
General partner
AmorChem Financial Inc.
Montreal, Quebec

Janice Y. Lederman
Partner, Thompson Dorfman Sweatman LLP (retired)
President, Innovate Manitoba Inc.
Winnipeg, Manitoba

Marc LePage
President and CEO
Genome Canada
Ottawa, Ontario

Kim McConnell
Founder and former CEO
Adfarm
Calgary, Alberta

Kathryn Phillips
Professor of Health Services Research and Health Economics

School of Pharmacy, Department of Clinical Pharmacy
University of California, San Francisco
San Francisco, California, U.S.A.

Ian Rae
Founder and CEO
CloudOps
Montreal, Quebec

Eddy Rubin
Chief science officer, Metabiota
San Francisco, California, U.S.A.

Jacques Simoneau
President and CEO
Gestion Univalor
Montreal, Quebec

Janet Wightman
Managing director
Kincannon & Reed
Regina, Saskatchewan

Barbara Wold
Bren Professor of Molecular Biology
California Institute of Technology
Pasadena, California, U.S.A.

Donald Ziraldo
Co-founder, Inniskillin
St. Catharines, Ontario

Ex officio advisors

Ted Hewitt
President
Social Sciences and Humanities Research Council of Canada
Ottawa, Ontario

Roderick McInnes
Acting president
Canadian Institutes of Health Research
Ottawa, Ontario

Gilles G. Patry (until July 31, 2017)
Roseann O'Reilly Runte (as of August 1, 2017)
President and CEO
Canada Foundation for Innovation

Ottawa, Ontario

B. Mario Pinto
President
Natural Sciences and Engineering Research Council of Canada
Ottawa, Ontario

Iain Stewart
President
National Research Council Canada
Ottawa, Ontario

Science and industry advisory committee

Doane Chilcoat (chair)
Director, applied technology systems
DuPont Pioneer
Johnston, Iowa, U.S.A.

Robert Beauregard
Professor, Faculty of Forestry, Geography and Geomatics
Université Laval
Quebec, Quebec

Anne-Christine Bonfils
Research program manager, vice-president's office – life sciences
National Research Council Canada
Ottawa, Ontario

Tina Hambuch (as of May 2017)
Medical director, pediatric genetics
Invitae
San Diego, California, U.S.A.

Joan Lunney
Supervisory research scientist
Beltsville Agricultural Research Center
Beltsville, Maryland, U.S.A.

Elaine R. Mardis
Professor of pediatrics, The Ohio State University College of Medicine
Co-director, The Institute for Genomic Medicine at The Research Institute, Nationwide Children's
Hospital
Columbus, Ohio, U.S.A.

Eric M. Meslin
President and CEO
Council of Canadian Academies

Ottawa, Ontario

Dan Roden

Principal investigator, National Institutes of Health (NIH), Pharmacogenomics Research Network
NIH, National Human Genome Research Institute, Electronic Medical Records and Genomics
Vanderbilt University
Nashville, Tennessee, U.S.A.

Julie Segre

Senior investigator, NIH, National Human Genome Research Institute
Chief, translational and functional genomics branch
Head, microbial genomics section
Bethesda, Maryland, U.S.A.

Wyeth Wasserman (as of July 2017)

Executive director, Research Institute, BC Children's Hospital
Senior scientist, Centre for Molecular Medicine and Therapeutics, Research Institute, BC Children's
Hospital
Professor, Department of Medical Genetics, University of British Columbia
Associate dean for research, Faculty of Medicine, University of British Columbia
Vancouver, British Columbia

Paul A. Willems

Technology vice-president, Energy Biosciences, BP Group
Associate director, Energy Biosciences Institute, University of California – Berkeley
Berkeley, California, U.S.A.

MANAGEMENT TEAM 2017-18



Genome Canada management team (left to right): Rob Annan, Karl Tibelius, Cindy Bell, Marc LePage, (Darlene Arseneau, until Oct. 31, 2017, not pictured). Photo credit: Ben Welland

Marc LePage
President and CEO

Cindy Bell
Executive vice-president

Rob Annan
Vice-president, public affairs and communications

Darlene Arseneau
Vice-president, finance and corporate services
(until October 31, 2017)

Karl Tibelius
Vice-president, genomics programs

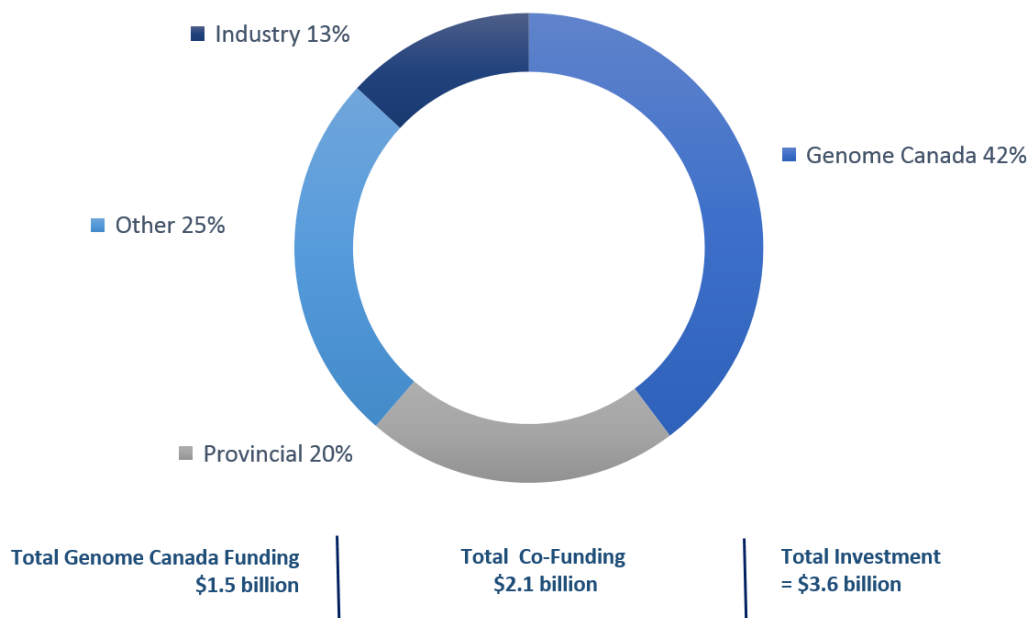
Financial management

Genome Canada has invested \$3.6 billion in genomics research since its creation in 2000. The federal government provided \$1.5 billion (including investment income earned from this funding). The remaining \$2.1 billion came from national and international partners, including provincial governments, industry, and additional private and public sector partners. Genome Canada's investments support large-scale science, access to leading-edge technology, translation, and the operations of Genome Canada and the six regional Genome Centres.

All research projects, with few exceptions, require co-funding from other parties, including provincial governments, universities, the private sector, and other national and international organizations. Genome Canada's funding ratio for co-funding was 1:1 prior to 2012. However, it has since increased to approximately 1:1.6.

Figure 3

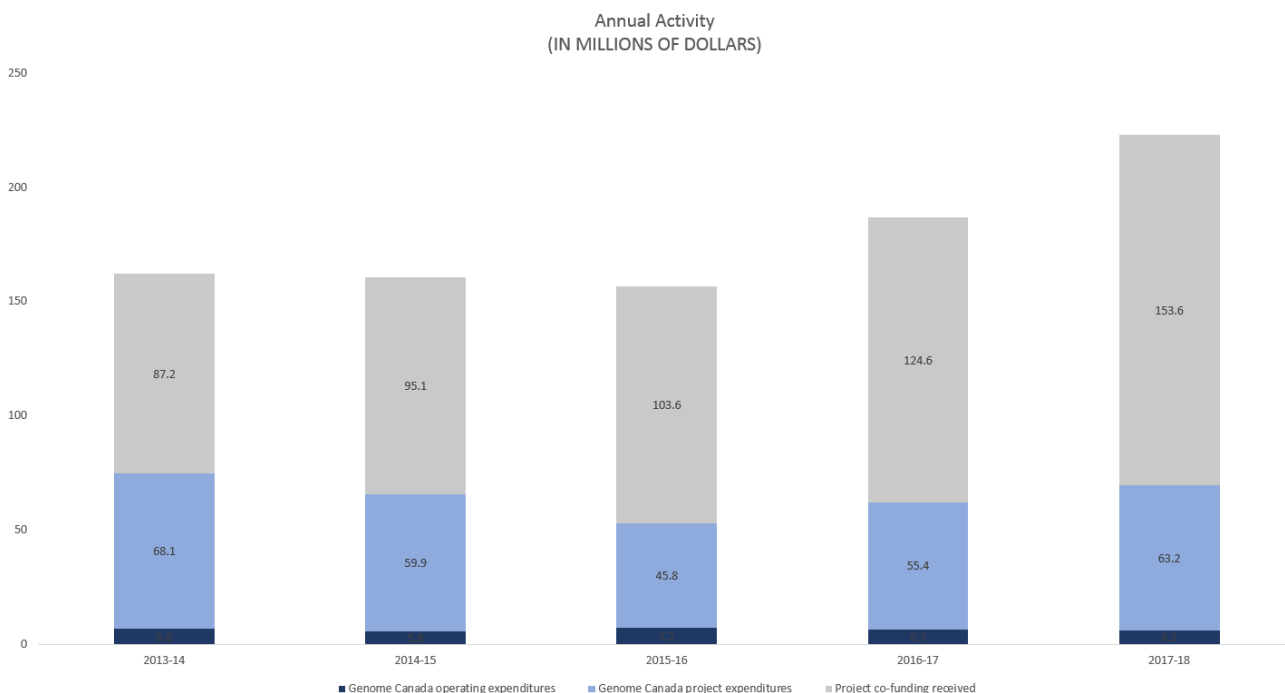
INVESTMENT BY GENOME CANADA AND PARTNERS SINCE 2000



Genome Canada receives funding each year from the federal government based on the annual requirements of supported research projects. This funding is disbursed to the six Genome Centres, which direct the funds to individual projects located in their regions. In addition, the projects, administered at institutions, receive funding directly from the required co-funders. The Centres and project leaders must report co-funding quarterly to Genome Canada.

The total annual financial investment in projects is shown in Figure 4: Annual activity. Genome Canada and the six Genome Centres monitor total project investment. Genome Canada project leaders managed \$216.8 million in total funding in 2017-18, comprised of \$63.2 million from Genome Canada and \$153.6 million from co-funding.

Figure 4



Genome Canada’s operating costs totalled approximately \$6.3 million in 2017-18. Operations include activities relating to program management, strategy, development and external relations, communications, governance, performance and evaluation, genomics in society and corporate services.

Genome Canada’s operating costs include the following statement of remuneration. The board of directors chairperson is remunerated at \$10,000 per year. Other board directors and committee members do not receive remuneration for their services. However, Genome Canada pays the expenses incurred by directors in the performance of their duties. For staff of Genome Canada, there is a compensation policy that includes job classifications and related salary ranges. Genome Canada employees are eligible for performance awards of up to 25 per cent.

For positions that exceeded \$100,000 in the year ended March 31, 2018, the following are the annual salary ranges:

- president and CEO \$275,000 to \$340,000
- vice-presidents \$160,000 to \$224,000
- directors \$100,000 to \$159,000

As of March 31, 2018, Genome Canada has \$38.3 million in investments, at market value. These investments are administered in accordance with the board of directors' approved investment policy. They are also administered in accordance with the terms and conditions of Genome Canada's three-year \$237.2-million contribution agreement with the federal government. The investment policy remained unchanged this past fiscal year.

Audited financial statements

See Appendix 2 for audited financial statements (2017-18)

Acknowledgements

We wish to thank the Government of Canada for its leadership in genomics and continued support of Genome Canada. We also wish to thank our industrious research community and our many partners within Canada and around the globe. Canada's thriving genomics enterprise depends on your dedication, investment and collaboration.

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Website: www.genomecanada.ca

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Ce rapport est aussi disponible en français.

APPENDIXES

- 1) Active projects funded
- 2) Audited financial statements

Active projects funded

LARGE-SCALE Science

Note: Project descriptions of active and past Genome Canada-funded projects are available online at: https://www.genomecanada.ca/en/project_search

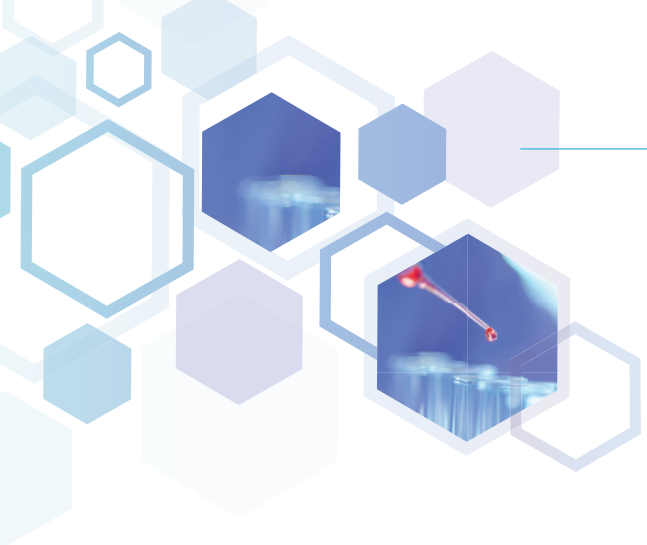
Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Large-Scale Applied Research Projects						
Genome Alberta Genome Prairie	Agriculture	Dyck, Michael Harding, John Kemp, Bob	University of Alberta	Application of Genomics to Improve Disease Resilience and Sustainability in Pork Production	\$9,801,714	\$3,799,998
Genome Alberta Ontario Genomics	Agriculture	Miglior, Filippo Stothard, Paul	University of Guelph	Increasing Feed Efficiency and Reducing Methane Emissions through Genomics: A new Promising Goal for the Canadian Dairy Industry	\$10,306,910	\$3,798,134
Genome British Columbia	Agriculture	Rieseberg, Loren Burke, John	University of British Columbia	Genomics of Abiotic Stress Resistance in Wild and Cultivated Sunflowers	\$7,879,009	\$3,054,485
Genome British Columbia Ontario Genomics	Agriculture	Foster, Leonard Zayed, Amro	University of British Columbia	Sustaining and Securing Canada's Honey Bees using 'Omic Tools	\$7,263,568	\$2,786,531
Genome Prairie	Agriculture	Bett, Kristin Vandenberg, Bert	University of Saskatchewan	Application of Genomics to Innovation in the Lentil Economy (AGILE)	\$7,892,793	\$1,463,833
Genome Prairie	Agriculture	Pozniak, Curtis Sharpe, Andrew	University of Saskatchewan	Canadian Triticum Applied Genomics (CTAG2)	\$8,809,640	\$1,707,991
Genome Prairie Genome British Columbia	Agriculture	Potter, Andrew Hancock, Robert	VIDO-InterVac University of Saskatchewan	Reverse Vaccinology Approach for the Prevention of Mycobacterial Disease in Cattle	\$7,358,606	\$2,872,310
Génome Québec	Agriculture	Belzile, François Bélanger, Richard	Université Laval	SoyaGen: Improving Yield and Disease Resistance in Short-Season Soybean	\$8,235,673	\$1,602,591
Génome Québec	Agriculture	Goodridge, Lawrence Levesque, Roger	McGill University	A Syst-OMICS approach to Ensuring Food Safety and Reducing the Economic Burden of Salmonellosis	\$9,708,401	\$3,817,861
Genome Alberta Genome Atlantic	Energy	Gieg, Lisa Wolodko, John Khan, Faisal	University of Calgary	Managing Microbial Corrosion in Canadian Offshore and Onshore Oil Production Operations	\$7,850,739	\$2,307,750
Genome Alberta	Environment	McKenzie, Debbie Wishart, David	University of Alberta	Systems Biology and Molecular Ecology of Chronic Wasting Disease	\$11,500,523	\$3,092,335
Genome Alberta Genome Prairie	Environment	Hubert, Casey Stern, Gary	University of Calgary	GENICE: Microbial Genomics for Oil Spill Preparedness in Canada's Arctic Marine Environment	\$10,612,988	\$2,999,422
Genome British Columbia	Environment	Schulte, Patricia Koop, Ben Farrell, Anthony	University of British Columbia	Sustaining Freshwater Recreational Fisheries in a Changing Environment	\$4,386,173	\$1,460,163
Génome Québec	Environment	Sauvé, Sébastien Shapiro, Jesse Dorner, Sarah	Université de Montréal	ATRAPP - Algal Blooms, Treatment, Risk Assessment, Prediction and Prevention through Genomics	\$12,304,536	\$3,166,666
Génome Québec Genome Prairie	Environment	Basu, Niladri Hecker, Markus Crump, Doug	McGill University	EcoToxChip: A Toxicogenomics Tool for Chemical Prioritization and Environmental Management	\$9,786,922	\$3,104,002

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Large-Scale Applied Research Projects						
Ontario Genomics	Environment	Basu, Niladri Hecker, Markus Crump, Doug	Queen's University	BEARWATCH: Monitoring Impacts of Arctic Climate Change using Polar Bears, Genomics and Traditional Ecological Knowledge	\$9,219,247	\$2,708,282
Ontario Genomics	Environment	Warren, Lesley Banfield, Jillian	University of Toronto	Mine Wastewater Solutions: Next Generation Biological Treatment through Functional Genomics	\$3,682,691	\$1,181,739
Genome British Columbia Genome Québec	Fisheries	Koop, Ben Bernatchez, Louis	Simon Fraser University	Enhancing Production in Coho: Culture, Community, Catch (EPIC4)	\$9,709,592	\$3,796,910
Ontario Genomics	Fisheries	Walker, Virginia Lougheed, Stephen Schott, Stephan van Coeverden de Groot, Peter	Queen's University	Towards a Sustainable Fishery for Nunavummiut	\$5,652,792	\$2,124,674
Genome Alberta Genome British Columbia	Forestry	Thomas, Barb Erbilgin, Nadir El-Kassaby, Yousry	University of Alberta	Resilient Forests (RES-FOR): Climate, Pests & Policy - Genomic Applications	\$5,678,657	\$1,762,342
Genome British Columbia Genome Alberta Genome Québec	Forestry	Aitken, Sally Yeaman, Sam Hamelin, Richard	University of British Columbia	CoAdapTree: Healthy Trees for Future Climates	\$5,800,000	\$1,881,454
Genome British Columbia Genome Québec	Forestry	Bohlmann, Joerg Bousquet, Jean	University of British Columbia	Spruce-Up: Advanced Spruce Genomics for Productive and Resilient Forests	\$10,417,352	\$3,000,000
Genome British Columbia Genome Québec	Forestry	Hamelin, Richard Duff, Cameron Porth, Ilga	University of British Columbia	BioSurveillance of Alien Forest Enemies (BioSAFE)	\$8,730,760	\$2,763,989
Ontario Genomics Genome British Columbia	Forestry	Master, Emma Brumer, Harry	University of Toronto	SYNBIOMICS: Functional Genomics and Techno-Economic Models for Advanced Biopolymer Synthesis	\$9,989,427	\$2,830,781
Genome Alberta	Health	McCabe, Christopher Bubela, Tania	University of Alberta	PACE - 'Omics: Personalized, Accessible, Cost-Effective Applications of 'Omics Technologies	\$4,502,084	\$1,049,258
Genome Alberta	Health	Lewis, Ian Church, Deirdre	University of Calgary Calgary Laboratory Services	Reducing the global burden of infectious diseases through precision population health	\$11,030,405	\$2,103,371
Genome British Columbia Genome Alberta	Health	Penn, Andrew Borchers, Christoph Coutts, Shelagh	Vancouver Island Health Authority	Reducing Stroke Burden with Hospital-Ready Biomarker Test for Rapid TIA Triage	\$9,634,996	\$4,755,969
Genome British Columbia	Health	Connors, Joseph Marra, Marco Gascoyne, Randy	BC Cancer Agency	Personalized Treatment of Lymphoid Cancer: British Columbia as Model Province	\$10,232,799	\$2,732,796
Genome British Columbia	Health	Harrigan, Richard Montaner, Julio	British Columbia Centre for Excellence in HIV/AIDS St. Paul's Hospital	Viral and Human Genetic Predictors of Response to HIV Therapies	\$4,758,743	\$1,103,367
Genome British Columbia	Health	Sin, Don Ng, Raymond	St. Paul's Hospital University of British Columbia	Clinical Implementation and Outcomes Evaluation of Blood-Based Biomarkers for COPD Management	\$7,100,000	\$1,700,000

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Large-Scale Applied Research Projects						
Genome British Columbia	Health	Carleton, Bruce C. Ross, Colin J.	University of British Columbia	Genomic and Outcomes Databank for Pharmacogenomic and Implementation Studies (Go-PGx)	\$10,517,507	\$1,899,963
Genome British Columbia	Health	Arbour, Laura Caron, Nadine Wasserman, Wyeth	University of British Columbia	Silent Genomes: Reducing health care disparities and improving diagnostic success for children with genetic diseases from Indigenous populations	\$10,399,812	\$2,200,000
Genome British Columbia	Health	Steidl, Christian Marra, Marco Scott, David	BC Cancer Research Centre	Deciphering the genome biology of relapsed lymphoid cancers to improve patient management	\$11,926,360	\$2,100,000
Genome British Columbia Génome Québec	Health	Elliott, Alison M. Knoppers, Bartha Lynd, Larry Austin, Jehannine	BC Provincial Health Services Authority	GenCOUNSEL: Optimization of Genetic Counselling for Clinical Implementation of Genome-wide Sequencing	\$4,008,035	\$1,004,017
Genome British Columbia Génome Québec Genome Alberta	Health	Keown, Paul Sapir-Pichhadze, Ruth Caulfield, Timothy Bryan, Stirling	University of British Columbia	Precision Medicine CanPREVENT AMR: Applying Precision Medicine Technologies in Canada to Prevent Antibody Mediated Rejection and Premature Kidney Transplant Loss	\$10,834,538	\$2,036,000
Genome British Columbia Ontario Genomics	Health	Turvey, Stuart Kobor, Michael Finlay, B. Brett Subbarao, Padmaja	University of British Columbia	Childhood Asthma and the Microbiome - Precision Health for Life: The Canadian Healthy Infant Longitudinal Development (CHILD) Study	\$9,142,486	\$4,569,644
Génome Québec	Health	Cossette, Patrick Michaud, Jacques Minassian, Berge	Centre hospitalier de l'Université de Montréal	Personalized Medicine in the Treatment of Epilepsy	\$11,509,053	\$5,585,410
Génome Québec	Health	Jabado, Nada Majewski, Jacek Pastinen, Tomi	McGill University Health Centre	The ICHANGE (International Childhood Astrocytomas iNtegrated Genomics and Epigenomics) Consortium	\$5,122,390	\$1,230,661
Génome Québec	Health	Perreault, Claude Roy, Denis-Claude	Université de Montréal	Personalized Cancer Immunotherapy	\$13,486,784	\$2,409,386
Génome Québec	Health	Rioux, John Bitton, Alain	Montreal Heart Institute	IBD Genomic Medicine Consortium (iGenoMed): Translating Genetic Discoveries into a Personalized Approach to Treating the Inflammatory Bowel Diseases	\$9,966,018	\$2,460,036
Génome Québec Genome British Columbia	Health	Rousseau, François Langlois, Sylvie	Université Laval	PEGASUS: Personalized Genomics for prenatal Aneuploidy Screening Using maternal blood	\$10,525,682	\$2,475,010
Génome Québec	Health	Sauvageau, Guy Hébert, Josée	Institute for Research in Immunology and Cancer	Innovative Chemogenomic Tools to Improve Outcome in Acute Myeloid Leukemia	\$11,325,631	\$4,908,515
Génome Québec	Health	Simard, Jacques Knoppers, Bartha Maria	Université Laval	Personalized Risk Stratification for Prevention and Early Detection of Breast Cancer	\$11,761,246	\$2,732,295
Génome Québec	Health	Tardif, Jean-Claude Dubé, Marie-Pierre	Montreal Heart Institute	Personalized Medicine Strategies for Molecular Diagnostics and Targeted Therapeutics of Cardiovascular Diseases	\$9,443,002	\$4,672,882
Génome Québec	Health	Sauvageau, Guy Hébert, Josée	Institute for Research in Immunology and Cancer	Interrogating and Implementing Omics for precision medicine in Acute Myeloid Leukemia	\$12,785,000	\$5,000,000

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Large-Scale Applied Research Projects						
Génome Québec Genome British Columbia	Health	Rousseau, François Langlois, Sylvie	Université Laval	PEGASUS-2 - Personalized Genomics for prenatal Abnormalities Screening Using maternal blood: Towards First Tier Screening and Beyond	\$12,241,625	\$2,198,882
Génome Québec Ontario Genomics	Health	Simard, Jacques Chiarelli, Anna Maria	Université Laval	Personalized Risk Assessment for Prevention and Early Detection of Breast Cancer: Integration and Implementation	\$15,217,975	\$100,000
Génome Québec Ontario Genomics	Health	Jabado, Nada Taylor, Michael Majewski, Jacek	Research Institute of the McGill University Health Centre	Tackling Childhood Brain Cancer at the root to improve survival and quality of life	\$12,997,397	\$2,349,822
Ontario Genomics	Health	Boycott, Kym MacKenzie, Alex	Children's Hospital of Eastern Ontario	Enhanced CARE for RARE Genetic Diseases in Canada	\$11,892,624	\$2,537,834
Ontario Genomics	Health	Scherer, Stephen Szatmari, Peter	The Hospital for Sick Children	Autism Spectrum Disorders: Genome to Outcomes	\$9,979,998	\$2,479,999
Ontario Genomics	Health	Stein, Lincoln Godfrey, Tony	Ontario Institute for Cancer Research	Early Detection of Patients at High Risk of Esophageal Adenocarcinoma	\$3,240,865	\$795,272
Ontario Genomics	Health	Stintzi, Alain Mack, David	University of Ottawa	The Microbiota at the Intestinal Mucosa-Immune Interface: A Gateway for Personalized Health	\$2,961,445	\$716,360
Ontario Genomics	Health	Stintzi, Alain Mack, David	University of Ottawa	Microbiome-Based Precision Medicine in Inflammatory Bowel Disease	\$9,111,566	\$4,555,624
Ontario Genomics	Health	Ratjen, Felix	The Hospital for Sick Children	Personalized Therapy for Individuals with Cystic Fibrosis	\$10,073,758	\$4,999,907
Ontario Genomics Genome Alberta	Health	Yeung, Rae S.M. Benseler, Susanne M.	The Hospital for Sick Children	UCAN CURE: Precision Decisions for Childhood Arthritis	\$10,000,000	\$5,000,000
Ontario Genomics Genome Alberta Genome British Columbia	Health	Boycott, Kym Brudno, Michael Bernier, Francois van Karnebeek, Clara	Children's Hospital of Eastern Ontario	Care4Rare Canada: Harnessing multi-omics to deliver innovative diagnostic care for rare genetic diseases in Canada (C4R-SOLVE)	\$10,866,640	\$2,198,898
Emerging Issues						
Genome British Columbia Genome Prairie	Agriculture	Rieseberg, Loren	University of British Columbia	DivSeek Canada: Harnessing Genomics to Accelerate Crop Improvement in Canada	\$751,552	\$242,800
Genome Prairie	Health	Karniychuk, Uladzimir	University of Saskatchewan	In vivo and Ex vivo models for Zika virus infection	\$713,062	\$237,436
National and International Initiatives						
Genome Prairie	Agriculture	Zhang, David Di	University of Saskatchewan	Creating consumer-oriented value in genetically modified foods: exploring consumer attitudes and willingness to pay	\$48,588	\$24,294
Génome Québec	Agriculture	Secko, David	Concordia University	Communicating Synthetic Biology: Deliberative Strategies for Addressing Emergent Biohype about Living Devices	\$114,938	\$55,969
Genome Alberta Génome Québec	Health	McCabe, Christopher Rousseau, François	University of Alberta	Genomics and Personalized Health GE3LS Network program	\$1,996,945	\$998,473
Ontario Genomics Genome Alberta	Health	Dirks, Peter Weiss, Samuel	The Hospital for Sick Children	Brain Cancer Stem Cell Dream Team	\$10,577,948	\$8,500,000
Genome British Columbia	Health	Sanatani, Shubhayan	BC Children's Hospital	Improving Diagnosis and Treatment of Catecholaminergic Polymorphic Ventricular Tachycardia	\$4,640,290	\$333,000

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
National and International Initiatives						
Ontario Genomics	Health	Brudno, Michael	The Hospital for Sick Children	Harmonising Phenomics Information for a Better Interoperability in the RD Field	\$4,429,833	\$333,000
Ontario Genomics	Health	Diamandis, Eleftherios	University of Toronto	Netherton Syndrome: From Mechanisms to Therapies	\$4,358,669	\$333,000
Ontario Genomics	Health	Edwards, Aled Arrowsmith, Cheryl	University of Toronto	Structural Genomics Consortium Phase IV	\$51,182,671	\$12,499,998
Ontario Genomics	Health	Stein, Lincoln	University of Toronto	Advancing Big Data Science in Genomics Research Project - The Cancer Genome Collaboratory	\$5,999,860	\$2,000,000
Ontario Genomics	Health	Gattinger, Monica	University of Ottawa	@Risk: Strengthening Canada's Ability to Manage Risk	\$195,166	\$97,583
Genome British Columbia	Health	Finlay, Brett Rossant, Janet	University of British Columbia	Humans and the Microbiome Program (CIFAR)	\$5,775,000	\$1,000,000
Genome British Columbia	Health	Hietter, Philip Boycott, Kym Rossant, Janet	University of British Columbia	Canadian "Rare Diseases: Models & Mechanisms" Network	\$2,300,000	\$200,000
Génome Québec Ontario Genomics Genome British Columbia	Health	Knoppers, Bartha Maria Brudno, Michael Friedman, Jan	McGill University	Canadian International Data Sharing Initiative (CanSHARE)	\$3,287,331	\$1,000,000
Genome British Columbia	Health	Chow-White, Peter	Simon Fraser University	Big data collaborative networks: The role of communication in the development of genomic technologies	\$179,340	\$89,670
Génome Québec	Health	Dorval, Michel	Université Laval	Societal preferences for disclosure of incidental discoveries from clinical genomics: Perspectives of cancer patients and the general population	\$64,626	\$32,313

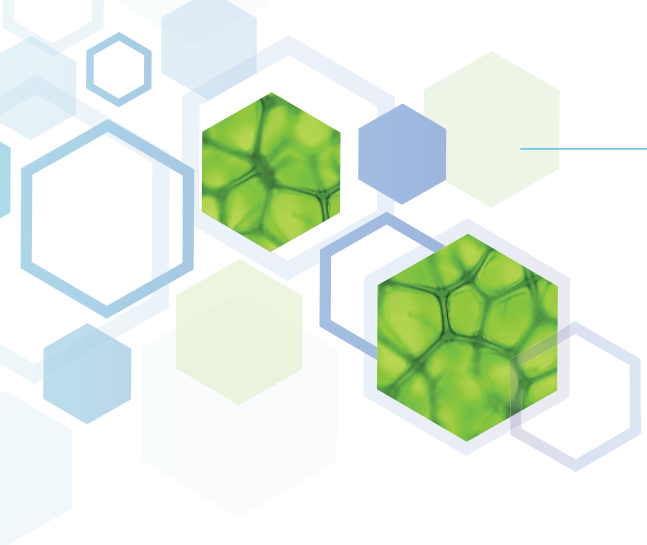


Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Core Operations Support for Technology Platforms						
Genome Alberta Genome British Columbia	All	Wishart, David Borchers, Christoph	University of Alberta University of Victoria	The Metabolomics Innovation Centre	\$5,427,207	\$5,427,207
Genome British Columbia	All	Borchers, Christoph Foster, Leonard	University of Victoria University of British Columbia	The Pan-Canadian Proteomics Centre	\$5,518,555	\$5,518,555
Genome British Columbia	All	Marra, Marco Jones, Steven Nislow, Corey Hirst, Martin	BC Cancer Agency University of British Columbia	BC Cancer Agency Genome Sciences Centre Genomics Technology Platform	\$5,472,887	\$5,472,887
Genome Québec Ontario Genomics	All	Awadalla, Philip Stein, Lincoln Ferretti, Vincent Simpson, Jared Bartlett, John	Ontario Institute for Cancer Research	Canadian Data Integration Centre	\$3,807,658	\$3,807,658
Génome Québec Ontario Genomics	All	Bourque, Guillaume Brudno, Michael	McGill University The Hospital for Sick Children	Canadian Centre for Computational Genomics	\$4,133,680	\$4,133,680
Génome Québec	All	Lathrop, Mark Pastinen, Tomi Ragoussis, Ioannis Bourque, Guillaume	McGill University	McGill University and Génome Québec Innovation Centre	\$5,505,600	\$5,505,600
Génome Québec	All	Thibault, Pierre Tyers, Michael	Université de Montréal	Centre for Advanced Proteomic and Chemogenomic Analyses	\$2,052,208	\$2,052,208
Ontario Genomics Génome Québec	All	McKerlie, Colin Vidal, Sylvia	The Hospital for Sick Children McGill University	The Centre for Phenogenomics	\$3,780,893	\$3,780,893
Ontario Genomics	All	Scherer, Stephen Strug, Lisa	The Hospital for Sick Children	The Centre for Applied Genomics	\$5,505,002	\$5,505,002
Ontario Genomics	All	Wrana, Jeff Gingras, Anne- Claude	Lunen- feld-Tanenbaum Research Institute Sinai Health System	Network Biology Collaborative Centre	\$3,016,310	\$3,016,310

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Genomics Innovation Network - Technology Development Projects						
Genome Alberta Genome British Columbia	All	Wishart, David Borchers, Christoph	University of Alberta University of Victoria	The Metabolomics Innovation Centre	\$1,856,377	\$938,790
Genome British Columbia	All	Borchers, Christoph Foster, Leonard	University of Victoria University of British Columbia	The Proteomics Centre	\$2,070,256	\$999,815
Genome British Columbia	All	Holt, Rob Marra, Marco	BC Cancer Agency	Sequencing Platform at the BC Cancer Agency Genome Sciences Centre	\$2,000,000	\$999,586
Génome Québec Ontario Genomics	All	Bourque, Guillaume Brudno, Michael	McGill University The Hospital for Sick Children	Canadian Centre for Computational Genomics	\$1,062,606	\$526,895
Génome Québec	All	Lathrop, Mark Ragoussis, Ioannis Bourque, Guillaume Pastinen, Tomi	McGill University	McGill University and Génome Québec Innovation Centre	\$3,293,977	\$761,522
Ontario Genomics	All	McKerlie, Colin	The Hospital for Sick Children	Toronto Centre for Phenogenomics	\$1,018,748	\$501,933
Ontario Genomics	All	Scherer, Stephen Strug, Lisa	The Hospital for Sick Children	The Centre for Applied Genomics	\$1,487,169	\$743,196
Ontario Genomics	All	Wrana, Jeff Gingras, Anne-Claude	Mount Sinai Hospital	Network Biology Collaborative Centre	\$905,892	\$452,360
Genomics Innovation Network - Collaborative Project						
Genome British Columbia	Health	Hirst, Martin	University of British Columbia	Canadian Epigenetics, Environment and Health Research Consortium Network	\$2,000,000	\$1,000,000
Bioinformatics and Computational Biology						
Ontario Genomics	Agriculture	Provart, Nicholas	University of Toronto	ePlants pipeline and navigator for accessing and integrating multi-level 'omics data for 15 agronomically important species for hypothesis generation	\$250,000	\$250,000
Genome Atlantic Ontario Genomics	Health	Beiko, Rob McArthur, Andrew	Dalhousie University	Rapid Prediction of Antimicrobial Resistance from Metagenomics Samples: Data, Models and Methods	\$249,985	\$116,661
Genome British Columbia	Health	Biol, Inanc	BC Cancer Agency	New Bioinformatics for New Sequencing Technologies: Genome Characterization and Varia- tion Detection using Long Reads	\$250,000	\$116,668
Genome British Columbia	Health	Brinkman, Ryan Chauve, Cedric Mostafavi, Sara	BC Cancer Agency	Automated Analysis of Big Flow Cytometry Data	\$249,994	\$118,762
Genome British Columbia	Health	Chindelevitch, Leonid Hsiao, William Chauve, Cedric	Simon Fraser University	PathOGiST: Calibrated Multi-Criterion Genomic Analysis for Public Health Microbiology	\$250,000	\$116,668
Genome British Columbia Ontario Genomics	Health	Hsiao, William McArthur, Andrew Brinkman, Fiona	University of British Columbia	Genomic Epidemiology Application Ontology (GenEpiO)	\$250,000	\$116,668

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Bioinformatics and Computational Biology						
Genome British Columbia	Health	Wasserman, Wyeth	University of British Columbia	OnTarget: Big Data Informed Software for the Design of cis-Regulatory Regions Controlling Human Gene Expression	\$250,000	\$116,709
Génome Québec	Health	Major, François Duchaine, Thomas	Université de Montréal	Computation of Cell-Specific MicroRNA: Mrna Regulatory Networks Enable the Design of Efficient RNAi-based Therapeutics	\$250,000	\$116,668
Génome Québec	Health	Shapiro, Jesse Barreiro, Luis	Université de Montréal	A Toolkit for Genome-Wide Association Studies in Bacteria	\$250,000	\$116,668
Génome Québec	Health	Waldispuhl, Jerome Moitessier, Nicolas	McGill University	Computational Methods and Databases to Identify Small RNA-binding Molecules Regulating Gene Expression	\$249,999	\$116,868
Génome Québec Genome Prairie	Health	Waldispuhl, Jerome Tremblay-Savard, Olivier	McGill University	Crowdsourcing Genomic Databases	\$250,000	\$116,668
Ontario Genomics	Health	Boutros, Paul	Ontario Institute for Cancer Research	Enhanced and Automated Visualization of Complex Data	\$250,000	\$116,668
Ontario Genomics	Health	Brudno, Michael Weksberg, Rosanna	The Hospital for Sick Children	EpigenCentral: Consolidated epigenetic landscape for congenital, developmental and childhood disorders	\$249,900	\$117,577
Ontario Genomics	Health	Ferretti, Vincent Stein, Lincoln	Ontario Institute for Cancer Research	Dockstore: A Platform for Sharing Cloud-Agnostic Tools with the Research Community	\$250,000	\$116,668
Ontario Genomics	Health	Poon, Art	Western University	Kamphir: A Versatile Framework to Fit Models to Phylogenetic Tree Shapes	\$205,365	\$91,033
Ontario Genomics	Health	Simpson, Jared	Ontario Institute for Cancer Research	Rapid, Accessible Genome Assembly Using Long Read Sequencing	\$250,000	\$116,668
Disruptive Innovation In Genomics						
Genome British Columbia	All	Hof, Fraser	University of Victoria	A Chemo-Affinity Toolkit for Methylation Proteomics	\$238,800	\$238,800
Genome British Columbia	All	Shah, Sohrab Nielsen, Cydney	University of British Columbia	Reimagining Genome Browsing for the Era of Single Cell Genomics	\$250,000	\$250,000
Genome British Columbia	All	Wasserman, Wyeth	University of British Columbia	GNomics: Graphs 'N' Omics	\$250,000	\$250,000
Genome British Columbia	All	Borchers, Christoph Sickmann, Albert	University of Victoria	Replacing Immunoassays with MS-based Technology: Quantitative Proteomics Kits Enabling Deep Molecular Phenotyping of the Mouse	\$3,865,231	\$999,695
Genome British Columbia	All	Hansen, Carl	University of British Columbia	Next Generation Immune Profiling Technology based on Microfluidic Single Cell Analysis	\$2,993,509	\$991,185
Genome British Columbia	All	Marra, Marco Coope, Robin	BC Cancer Agency	Automated Tumour Pathology	\$409,858	\$101,559
Génome Québec	All	Costantino, Santiago Kleinman, Claudia	McGill University	Laser Assisted Single-Cell Genomics	\$250,000	\$250,000
Génome Québec	All	Juncker, David	McGill University	Single Exosome Multi-Omic Analysis	\$249,999	\$249,999
Génome Québec	All	Lécuyer, Eric Blanchette, Mathieu Waldispuhl, Jérôme	Institut de recherches cliniques de Montréal	The RNA Zipcode Discovery Pipeline: Emerging Tools for Targeting Therapeutic Molecules at Subcellular Resolution	\$250,000	\$250,000

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Disruptive Innovation In Genomics						
Génome Québec	All	Trifiro, Mark Kirk, Andrew	McGill University	Plasmonic PCR: Rapid Diagnostics through Plasmonics	\$249,976	\$249,976
Génome Québec Ontario Genomics	All	Tyers, Michael Wright, Gerard	Université de Montréal	A Cell Microfactory Platform for in vivo Biosynthesis and Delivery of Genetically Encoded Natural Products and Synthetic Antibodies	\$249,358	\$249,358
Ontario Genomics	All	Boone, Charles Moffat, Jason	University of Toronto	AbSyn Technology for Identification of Synergistic Cancer Therapeutics	\$249,389	\$249,389
Ontario Genomics	All	Dowling, James Brudno, Michael	The Hospital for Sick Children	RNA-seq in Patient-Derived ex-vivo Models: Genetic Diagnostics beyond Whole Exomes	\$250,000	\$250,000
Ontario Genomics	All	Emili, Andrew	University of Toronto	Massively Parallel Single Molecule Protein Sequencing in Situ	\$250,000	\$250,000
Ontario Genomics	All	Figeys, Daniel Stintzi, Alain	University of Ottawa	RapidAIM: a High-Throughput Assay of Individual Microbiome	\$250,000	\$250,000
Ontario Genomics	All	Finan, Turlough	McMaster University	Development of Advanced Genetic Toolbox for Sinorhizobium Meliloti to Enable Genome Scale Engineering	\$250,000	\$250,000
Ontario Genomics	All	Krell, Peter Doucet, Daniel	University of Guelph	Cell Biosensors for Rapid Screening of Insect Attractants	\$233,901	\$233,901
Ontario Genomics	All	Scherer, Stephen Lok, Si	The Hospital for Sick Children	Economical High Throughput de novo Whole Genome Assembly	\$241,467	\$241,467
Ontario Genomics	All	Stagljar, Igor	University of Toronto	Development of SIMPL, a Novel Protein-Protein Interaction Assay based on Split Intein for Biomedical Research	\$250,000	\$250,000
Ontario Genomics	All	Tabard-Cossa, Vincent	University of Ottawa	Solid-State Nanopore-based Quantification of Low-Abundance Biomarkers	\$250,000	\$250,000
Ontario Genomics	All	Taylor, Michael Khokha, Rama	The Hospital for Sick Children	Functional Genomics in Human Cells for Drivers of Lethal Metastatic Human Cancers	\$250,000	\$250,000
Ontario Genomics	All	Wheeler, Aaron Kolomietz, Elena	University of Toronto	Development of a Digital Microfluidic Platform to Identify and Target Single Cells from a Heterogeneous Cell Population for Lyses in an Ultra-Low Volume	\$250,000	\$250,000
Ontario Genomics	All	Wilson, Michael Shlien, Adam	University of Toronto	SANGRE (Systematic Analysis of Blood Gene Regulation by Sequencing) – Bringing RNA-seq to Clinical Diagnostics	\$249,934	\$249,934
Ontario Genomics	All	Sidhu, Sachdev	University of Toronto	Synthetic Inhibitors of Ubiquitin-Binding Cancer Targets	\$3,009,018	\$1,000,000
Ontario Genomics	All	Stagljar, Igor	University of Toronto	The Mammalian Membrane Two-Hybrid (MaMTH) Assay - an Advanced Proteomics Technology for Biomedical Research	\$3,000,000	\$1,000,000



Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Genomic Applications Partnership Program						
Genome Alberta	Agriculture	Plastow, Graham Kemp, Robert	University of Alberta Genesis Inc.	Development of Genomic Crossbred Estimate Breeding Values to maximize profitability for Canadian pork producers	\$3,389,222	\$1,129,647
Genome Prairie	Agriculture	Chen, Guanqun (Gavin) Tahir, M	University of Alberta Dow AgroSciences Canada Inc.	Enhancement of Commercial Utilization of Canola Oil and Meal by Manipulation of Cellular and Sub-Cellular Metabolism Involving Fats and Carbohydrates	\$961,392	\$320,000
Genome Prairie	Agriculture	Yost, Christopher Whiting, Mike	University of Regina Lallemand Inc.	Improving on-seed survival and performance of legume inoculants using genome shuffling	\$427,491	\$142,491
Génome Québec	Agriculture	Labrie, Steve Duquenne, Manon	Université Laval Agropur Cooperative	A Metagenomic Approach to Evaluate the Impact of Cheesemaking Technologies and Ripening Conditions on the Microbial Ecosystem of Premium Washed Rind Cheeses	\$742,679	\$247,472
Génome Québec	Agriculture	Tsang, Adrian Matzat, Paul	Concordia University Elanco Animal Health	Development and Commercialization of Next Generation Enzyme Supplement for Swine and Poultry	\$6,000,000	\$2,000,000
Génome Québec	Agriculture	Robert, Claude Sullivan, Brian	Université Laval Canadian Centre for Swine Improvement	Chips for Better Chops: Commercial Application of Genomics for Accelerated Swine Genetic Improvement	\$6,550,103	\$1,996,186
Génome Québec	Agriculture	Tsang, Adrian Matzat, Paul	Concordia University Elanco Animal Health Eli Lilly and Company	Lysozyme feed additives to improve gut health and productivity of food animals	\$6,000,000	\$2,000,000
Ontario Genomics	Agriculture	Yoshioka, Keiko Somers, Daryl	University of Toronto Vineland Research and Innovation Centre	Genomics for a Competitive Greenhouse Vegetable Industry	\$2,416,624	\$802,648
Ontario Genomics	Agriculture	Baes, Christine Wood, Ben	University of Guelph Hybrid Turkeys, a Hendrix Genetics Company	Application of Genomic Selection in Turkeys for Health, Welfare, Efficiency and Production Traits	\$6,039,988	\$1,999,422
Ontario Genomics	Agriculture	Pauls, Peter Crisp, Matthew Gray, Benjamin	University of Guelph Benson Hill Biosystems	Increasing yield in Canola Using Genomic Solutions	\$3,682,897	\$1,147,374

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Genomic Applications Partnership Program						
Genome British Columbia	Forestry	Bohlmann, Joerg Russell, John H.	University of British Columbia British Columbia Ministry of Forests, Lands and Natural Resource Operations	Cedar Enhanced Durability and Resistance (CEDaR): Sustainability of Canada's Western Redcedar Forestry Sector	\$2,150,779	\$716,811
Genome British Columbia Genome Québec	Forestry	Hamelin, Richard Duff, Cameron	University of British Columbia Canadian Food Inspection Agency	Protecting Canada's Forests against Invasive Alien Species by Next Generation Biosurveillance	\$2,430,000	\$810,000
Génome Québec	Forestry	Bousquet, Jean Smith, Guy	Université Laval FP Innovations	Fact Tests for Rating and Amelioration of Conifers (FastTRAC)	\$3,364,420	\$1,122,043
Genome Alberta	Health	Lewis, Ian Church, Deidre	University of Calgary Calgary Lab Services	Device for the rapid detection of seven common bloodstream infections and assessment of antibiotic susceptibility	\$6,024,695	\$1,999,812
Genome British Columbia	Health	Carleton, Bruce Coté, Yvan	University of British Columbia Dynacare	Integrating Pediatric Pharmacogenomic Testing into the Canadian System	\$2,809,934	\$936,512
Genome British Columbia	Health	Rossi, Fabio Underhill, T. Michael	University of British Columbia AbCellera Biologics	Antibody Therapeutics for Duchenne Muscular Dystrophy	\$6,506,824	\$1,998,726
Génome Québec	Health	Bergeron, Michel Allibert, Patrice	Université Laval GenePOC Inc.	Expanding the Molecular Point-Of-Care Test Menu with Two Gram-Positive Cocci	\$5,711,781	\$1,740,577
Génome Québec	Health	Thibault, Pierre Dunyach, Jean-Jacques	Université de Montréal Thermo Fisher Scientific	Bridging the ProteoGenomics Gap for Personalized Medicine Using Transformative Mass Spectrometry Technologies	\$1,737,722	\$522,730
Génome Québec	Health	Goodyer, Paul Huertas, Pedro	McGill University Health Centre Eloxx Pharmaceuticals	Novel Aminoglycoside Readthrough Reaction for Nonsense Mutations	\$2,051,396	\$671,720
Génome Québec Genome British Columbia	Health	Borchers, Christoph Batist, Gerald Elvin, Paul	McGill University University of Victoria AstraZeneca	Second Generation Diagnostics: iMALDI-based Assays for Protein Activity to Improve Patient Selection for Therapeutic Akt Inhibitors in Cancer Treatment	\$3,340,335	\$806,285
Ontario Genomics	Health	Kelley, Shana Graham, Jack	University of Toronto Xagenic	Development of Low Cost Diagnostic Platform for Infectious Disease Testing	\$5,976,619	\$1,979,494
Ontario Genomics	Health	Kennedy, James Altar, Anthony	Centre for Addiction and Mental Health Assurex Health Inc.	Clinical Utility and Enhancements of a Pharmacogenomic Decision Support Tool for Mental Health Patients	\$5,994,758	\$1,981,184
Ontario Genomics	Health	Liu, Peter Bucklar- Suchankova, Gabriela	University of Ottawa Heart Institute Roche Diagnostics International	Cardiovascular Biomarker Translation (CBT) Program	\$5,904,662	\$1,953,663

Translation

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Genomic Applications Partnership Program						
Ontario Genomics	Agriculture	LaPointe, Gisele Pepe, Maria	University of Guelph Parmalat Canada	Translating OMICS for competitive dairy products	\$1,339,129	\$446,077
Ontario Genomics	Agriculture	Guttman, David Paulter, Nicholas	University of Toronto Vineland Research and Innovation Centre	Broad-Range Disease Resistance in Greenhouse Vegetables	\$2,008,200	\$668,291
Ontario Genomics	Agriculture	Mubareka, Samira Qadir, Mohammad	University of Toronto Fusion Genomics	Pre-emergence surveillance for reportable influenza viruses at the human-animal interface	\$790,753	\$250,000
Ontario Genomics Génome Québec	Agriculture	Goulet, Charles Liscombe, David	Université Laval Vineland Research and Innovation Centre	A Genetic Toolbox for Tomato Flavour Differentiation	\$1,804,643	\$601,533
Genome Atlantic Genome Alberta	Energy	Hubert, Casey MacDonald, Adam	University of Calgary Nova Scotia Department of Energy	Microbial Genomics for De-Risking Offshore Oil and Gas Exploration in Nova Scotia	\$4,886,764	\$1,597,843
Genome Prairie	Environment	Levin, David Ducharme, Shawna	University of Manitoba Composites Innovation Centre	Fibre Composite and Biomatrix Genomics (FiCoGEN) - Application to the Ground Transportation Industry	\$3,315,000	\$1,105,000
Génome Québec	Environment	Robert, Claude Rioux, Rejean	Université Laval Direction générale de la protection de la faune (Québec)	Use of genomics to manage and protect caribou populations	\$3,043,190	\$1,011,323
Ontario Genomics	Environment	Edwards, Elizabeth Dworatzek, Sandra	University of Toronto SiREM	Scale-up of Bioaugmentation Cultures and Development of Delivery Strategies and Monitoring Tools for Anaerobic Benzene and Alkylbenzene Bioremediation	\$952,497	\$317,422
Ontario Genomics	Environment	Mahadevan, Radhakrishnan Lau, Kit	University of Toronto BioAmber	Genomics Driven Engineering of Hosts for Bio-Nylon	\$5,700,000	\$1,900,000
Genome Atlantic	Fisheries	Rise, Matthew Taylor, Richard	Memorial University Cargill Aqua Nutrition	Biomarker Platform for Commercial Aquaculture Feed Development	\$3,804,456	\$1,093,988
Genome Atlantic	Fisheries	Rise, Matthew Taylor, Richard	Memorial University EWOS Innovation	Integrated Pathogen Management of Co-Infection in Atlantic Salmon	\$4,533,102	\$1,509,113
Genome Atlantic Ontario Genomics	Fisheries	Boulding, Elizabeth Ang, Keng Pee	University of Guelph Cooke Aquaculture Inc.	SALMON and CHIPS - Commercial Application of Genomics to Maximize Genetic Improvement of Farmed Atlantic Salmon on the East Coast of Canada	\$3,797,739	\$1,265,930

Translation

Centre(s)	Sector	Leader(s)	Lead Organization	Title	Total Funding	Genome Canada Contribution
Genomic Applications Partnership Program						
Ontario Genomics	Health	Wang, Jean Uger, Robert	University Health Network Trillium Therapeutics Inc.	SIRPaFc: Translating Genomics Research Into a Novel Cancer Immunotherapy	\$3,428,274	\$1,106,079
Ontario Genomics	Health	Kamel-Reid, Suzanne Sumner, Jeff	Princess Margaret Cancer Centre Lifelabs Medical Laboratory Services	Towards a National Framework for Cancer Genome Profiling in Canadian Hospitals	\$6,000,000	\$1,999,999
Ontario Genomics	Health	Keshavjee, Shaf Hartnett, Thomas	University Health Network United Therapeutics	Novel Rapid Diagnostic Tools for Lung Transplantation: Bringing Omics to the Bedside	\$6,000,000	\$2,000,000
Ontario Genomics	Health	Wen, Xiao-Yen MacDonald, R. Loch	St. Michael's Hospital Edge Therapeutics	Preclinical Development of Drugs for Intracerebral Hemorrhage (ICH)	\$5,948,000	\$1,982,667
Ontario Genomics	Health	Hawkins, Cynthia Saunders, Barney	The Hospital for Sick Children Nanostring Technologies	Clinical Development and Translation of Genomics-Driven Pediatric Cancer Diagnostics using NanoString Technology	\$1,865,739	\$600,000
Ontario Genomics	Health	Stewart, David Ivany, Craig	Ottawa Hospital and the University of Ottawa Eastern Ontario Regional Laboratory Association	Standardization of Molecular Diagnostic Testing for Non-small cell Lung Cancer	\$2,054,798	\$595,197
Ontario Genomics	Health	Lye, Steve Liu, Xin	Lunenfeld-Tanenbaum Research Institute BGI-Research	Leveraging Leukocytes as Endogeneous Biosensors to Create Novel Diagnostics for Preterm Birth	\$4,565,893	\$1,503,307
Ontario Genomics	Health	Bramson, Jonathan Fiorino, Tony	McMaster University Triumvira Immunologics Inc.	Validation of TAC receptors for use against liquid and solid tumors	\$2,256,179	\$723,883
Ontario Genomics	Health	Surette, Michael Magarvey, Nathan Haigh, Andrew	McMaster University Adapsyn Bioscience	Applying the Adapsyn Genomics Platform to the Identification, Isolation, and Characterization of Immune Modulators from the Human Microbiome	\$6,034,102	\$1,990,459

Financial statements of Genome Canada

March 31, 2018

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Independent Auditor's Report

To the Directors of
Genome Canada

We have audited the accompanying financial statements of Genome Canada, which comprise the statement of financial position as at March 31, 2018, and the statements of operations and changes in net assets and of cash flows for the year then ended, and 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.

Auditor's 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 the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers 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 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 Canada as at March 31, 2018, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.



Chartered Professional Accountants
Licensed Public Accountants
June 21, 2018

Genome Canada**Statement of financial position**

As at March 31, 2018


(In thousands of dollars)

	Notes	2018	2017
		\$	\$
Assets			
Current assets			
Cash and cash equivalents	3	27,861	21,637
Interest receivable		82	125
Other receivables		218	93
Prepaid expenses		170	154
		28,331	22,009
Investments	4	11,648	27,808
Capital assets	5	46	100
		40,025	49,917
Liabilities			
Current liabilities			
Accounts payable and accrued liabilities		824	707
Deferred contributions	6	39,155	49,110
Deferred contributions related to capital assets	7	46	100
		40,025	49,917
Commitments and contingencies	9 and 10		
Net assets			
		—	—
		40,025	49,917

The accompanying notes are an integral part of the financial statements.

On behalf of the Board

 _____, Director

 _____, Director

Genome Canada

Statement of operations and changes in net assets

Year ended March 31, 2018

(In thousands of dollars)

	Notes	2018	2017
		\$	\$
Revenue			
Amortization of deferred contributions	6	69,558	62,162
Amortization of deferred contributions related to capital assets	7	54	53
		69,612	62,215
Expenses			
Projects and Genome Centres		63,247	55,419
Program management		2,184	2,001
Strategy, development and external relations		1,547	2,444
Corporate services		2,580	2,298
Amortization of capital assets		54	53
		69,612	62,215
Excess of revenue over expenses, being net assets, end of year		—	—

The accompanying notes are an integral part of the financial statements.

Genome Canada

Statement of cash flows

Year ended March 31, 2018

(In thousands of dollars)

Notes	2018	2017
	\$	\$
Operating activities		
Excess of revenue over expenses	—	—
Items not affecting cash		
Amortization of capital assets	54	53
Change in fair value of investments	(35)	58
Amortization of deferred contributions	(69,558)	(62,162)
Amortization of deferred contributions related to capital assets	(54)	(53)
Excluded from the increase in deferred contributions	(135)	(177)
	(69,728)	(62,281)
Interest received on investments	746	509
Portfolio investment management	(65)	(69)
Grants received from Government of Canada	59,100	66,900
Deferred contributions related to capital assets	—	35
Changes in non-cash operating working capital items		
(Increase) decrease in other receivables	(125)	42
(Increase) decrease in prepaid expenses	(16)	4
Increase (decrease) in accounts payable and accrued liabilities	117	(201)
	(9,971)	4,939
Investing activities		
Purchase of investments	(18,803)	(45,970)
Proceeds on disposal of investments	34,998	29,967
Purchase of capital assets	—	(35)
	16,195	(16,038)
Net cash and cash equivalent inflow (outflow)	6,224	(11,099)
Cash and cash equivalents, beginning of year	21,637	32,736
Cash and cash equivalents, end of year	27,861	21,637

The accompanying notes are an integral part of the financial statements.

Genome Canada

Notes to the financial statements

March 31, 2018

(In thousands of dollars)

1. Description of the business

Genome Canada (the "Corporation") was incorporated on February 8, 2000, under the Canada Corporations Act and continued on December 11, 2012. The Corporation is a not-for-profit organization and has the following objectives:

- a) The development and establishment of a co-ordinated strategy for genomics research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry, fisheries, mining and energy;
- b) The provision of leading-edge technology to researchers in all genomics-related fields through regional Genome Centres across Canada, of which there are currently six, one each in British Columbia, Alberta, the Prairies, Ontario, Quebec and the Atlantic;
- c) The support of large-scale projects of strategic importance to Canada by bringing together industry, government, universities, research hospitals and the public;
- d) The assumption of leadership in the area of ethical, environmental, economic, legal, social and other issues related to genomics research, and the communication of the relative risks, rewards and successes of genomics to the Canadian public; and
- e) The encouragement of investment by others in the field of genomics research.

2. Significant accounting policies

The financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations and include the following significant accounting policies:

Revenue recognition

The Corporation follows the deferral method of accounting for contributions received from the Government of Canada.

Externally restricted contributions and related investment income are recognized as revenue in the year in which the underlying expenses are incurred. A receivable is recognized if the amount to be received can be reasonably estimated and collection is reasonably assured.

Externally restricted contributions for the purchase of capital assets are deferred and amortized to revenue on a declining balance basis at a rate corresponding to the amortization rate for the related capital assets.

Cash and cash equivalents

Cash and cash equivalents consist of cash as well as highly liquid short-term investments that can be converted into cash immediately. The Corporation considers highly liquid short-term investments as those having a maturity of less than three months from the date of acquisition. Cash and cash equivalents are recorded at fair value.

Investments

Investments are recorded at fair value. Fair value is determined at quoted market prices. Sales and purchases of investments are recorded at the settlement date. Transaction costs related to the acquisition of investments are expensed.

Financial instruments

The Corporation records interest receivable, other receivables and accounts payable and accrued liabilities at amortized cost using the effective interest method of amortization.

Genome Canada
Notes to the financial statements

March 31, 2018
(In thousands of dollars)

2. Significant accounting policies (continued)

Capital assets

Capital assets are stated at their net book value. Amortization is provided for using the declining balance method at the following annual rates or term:

Furniture, fixtures and office equipment	20%
Computers and software	50%
Telecommunication equipment	30%
Leasehold improvements	Term of lease

Pension plan

The Corporation maintains, for the benefit of almost all of its employees, a defined contribution pension plan. The cost of the plan is recorded in the statement of operations and changes in net assets as it is incurred. The charge for the year totals \$195 (\$216 in 2017).

Use of estimates

The preparation of financial statements in conformity with Canadian accounting standards for not-for-profit organizations requires the use of estimates and assumptions that affect the reported amounts of assets and liabilities, disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting periods. Accordingly, actual results could differ from these estimates. The most significant estimates used in the preparation of the financial statements include the fair value of investments, the amount of certain accrued liabilities and the estimated useful lives of capital assets. These estimates are reviewed annually and as adjustments become necessary, they are recorded in the financial statements in the year in which they become known.

3. Cash and cash equivalents

	2018	2017
	\$	\$
Cash	1,234	986
Short-term investments	26,627	20,651
	27,861	21,637

4. Investments

	2018		2017	
	Fair value	Cost	Fair value	Cost
	\$	\$	\$	\$
Federal government bonds	1,502	1,510	8,030	8,048
Provincial government bonds	2,580	2,597	12,745	12,818
Corporate bonds	7,566	7,613	7,033	7,049
	11,648	11,720	27,808	27,915

Genome Canada
Notes to the financial statements

March 31, 2018
(In thousands of dollars)

4. Investments (continued)

The interest rates at the end of the year range from 1.600% to 6.020% (0.987% to 6.145% in 2017) and mature at varying dates in 2018 and 2019 (varying dates in 2017 and 2018, in 2017).

5. Capital assets

	2018			2017
	Cost	Accumulated amortization	Net book value	Net book value
	\$	\$	\$	\$
Furniture, fixtures and office equipment	224	186	38	48
Lease improvements	152	144	8	52
	376	330	46	100

Cost and accumulated amortization at March 31, 2017, amounted to \$553 and \$453, respectively.

6. Deferred contributions

The Corporation receives contributions from the Government of Canada to be held, invested, administered and disbursed in accordance with the related funding agreement between the Corporation and the Government of Canada.

The Corporation operates under two active Funding Agreements with the Government of Canada. As at March 31, 2018, Innovation, Science and Economic Development Canada had committed \$402,200 in grants to the Corporation under these agreements, of which \$168,700 had been received. Additionally, expired agreements provided \$1,040,000 in funding to the Corporation which has all been received. The terms and conditions of these agreements call for remaining grants to be paid to the Corporation annually, subject to the appropriation by the Parliament, based on the estimated cash requirements for the year. During the year ended March 31, 2018, the Corporation received \$1,700 under the agreement dated March 31, 2008, \$22,000 under the agreement dated March 10, 2014, and \$35,400 under the agreement dated May 19, 2017.

The changes in the deferred contributions balance for the year are as follows:

	2018	2017
	\$	\$
Balance, beginning of year	49,110	44,067
Add: grants received	59,100	66,900
Add: investment income	503	340
Less: amounts amortized to revenue	(69,558)	(62,162)
Less: amounts invested in capital assets	—	(35)
Balance, end of year	39,155	49,110

Genome Canada
Notes to the financial statements

March 31, 2018
(In thousands of dollars)

6. Deferred contributions (continued)

Expenses of future years

Deferred contributions related to expenses of future years represent unspent externally restricted funding received to date, together with investment revenue earned, for the purpose of providing funds to eligible recipients and paying for operating and capital expenditures in future years.

7. Deferred contributions related to capital assets

Deferred contributions related to capital assets represent restricted contributions with which capital assets were originally purchased.

The changes in the deferred contributions balance for the year are as follows:

	2018	2017
	\$	\$
Balance, beginning of year	100	118
Add: acquisition of capital assets	—	35
Less: amounts amortized to revenue	(54)	(53)
Balance, end of year	46	100

8. Supplemental cash flow information

	2018	2017
	\$	\$
Loss on disposal of investments	(184)	(81)
Amount transferred to capital assets	—	(35)
Fair value adjustment	49	(61)
	(135)	(177)

Genome Canada
Notes to the financial statements

March 31, 2018
(In thousands of dollars)

9. Commitments

Committed funding

The Corporation is committed to finance approved research projects, science and technology platforms and Genome Centre operations in accordance with established agreements. As at March 31, 2018, the payments committed are approximately \$68,380 in 2019 and \$78,783 for other future years.

Operating leases

The Corporation leases its premises and equipment under long-term operating leases, which expire at various dates between 2019 and 2028. The minimum aggregate lease payments are approximately as follows:

	\$
2019	64
2020	99
2021	99
2022	96
2023 and thereafter	337

10. Contingencies

In the normal course of business, the Corporation has entered into a lease agreement for premises. It is common in such commercial lease transactions for the Corporation as the lessee to agree to indemnify the lessor for liabilities that may arise from the use of the leased assets. The maximum amount potentially payable under the foregoing indemnities cannot be reasonably estimated. The Corporation has liability insurance that relates to the indemnifications described above.

11. Fair value of financial instruments

The carrying value of interest receivable, other receivables, and accounts payable and accrued liabilities approximates their fair value because of the relatively short period to maturity of the instruments.

The fair value of investments is disclosed in Note 4 to the financial statements.

The Corporation is not subject to significant currency risk arising from its financial instruments. The Corporation is exposed to credit and interest rate risks with respect to its interest-bearing investments. The Corporation invests in government bonds to reduce the credit risk to an acceptable level.