GenomeCanada

FUTURE OF GENOMICS

2021–22 ANNUAL REPORT

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GENOME CANADA'S MAIN OFFICE IS LOCATED ON THE TRADITIONAL, UNCEDED TERRITORY OF THE ALGONQUIN ANISHINABEG.

JOINT MESSAGE FROM THE PRESIDENT AND BOARD CHAIR

DEAR FRIENDS,

What a pivotal year this has been for genomics and Genome Canada. We've had many achievements, including the important work of our Canadian COVID-19 Genomics Network (CanCOGeN) during the pandemic and of our All for One precision health partnership. These initiatives have demonstrated the powerful impact of our ongoing leadership in mobilizing the talent and resources of a complex genomics ecosystem to address major global challenges and benefit Canadians' everyday lives.

Building on the success of a mobilized ecosystem and our own strengths, we have evolved our approach to investment, in collaboration with the six Genome Centres. Our new challenge-driven approach to genomics research and innovation will allow us to deliver more tangible and equitable benefits for communities across Canada. We believe that developing and deploying genomics solutions to major challenges can help support the companies, intellectual property and jobs of the future in Canada. It can also help connect innovation with skills and the capacity to deliver on Canada's net zero climate action plan, and better health and food security outcomes. We recently announced Climate-Smart Agriculture and Food Systems as our next challenge-driven initiative.

Over the last year, we have met with and listened to stakeholders from across the genomics ecosystem, including researchers, government partners, industry leaders, equity-deserving groups and Indigenous communities. Their insights and ideas have helped us enormously in prioritizing, selecting and co-designing challenge-driven initiatives. An enormous thank you to everyone who participated in the Future of Genomics roundtables and other events and engagement activities. And, of course, much gratitude to Genome Canada and regional Centre staff who worked tirelessly to make these events and opportunities happen.

As Canada's national leader in genomics, and a gateway to genomics leaders around the world, we look forward to delivering challenge-driven initiatives with impact, and being a key partner in the development of the Pan-Canadian Genomics Strategy. Let's work together to harness the potential of genomics to transform the lives of Canadians—improving their health and wellbeing while also creating good jobs and economic growth.

ROB ANNAN,
PRESIDENT

ELIZABETH DOUVILLE,
BOARD CHAIR

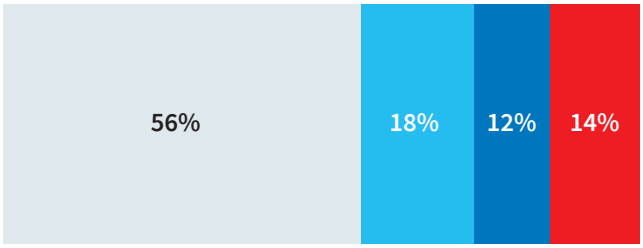
THE YEAR IN REVIEW

HIGHLIGHTS

This was a milestone year for Genome Canada as we worked with the genomics ecosystem in Canada to evolve our approach to investment. Our overall goal was to mobilize genomics for maximum impact and more equitable benefits for Canadians. Our new challenge-driven programming helps address pressing issues such as climate change through novel genomics solutions and contributes to economic growth and improved health and well-being of Canadians.

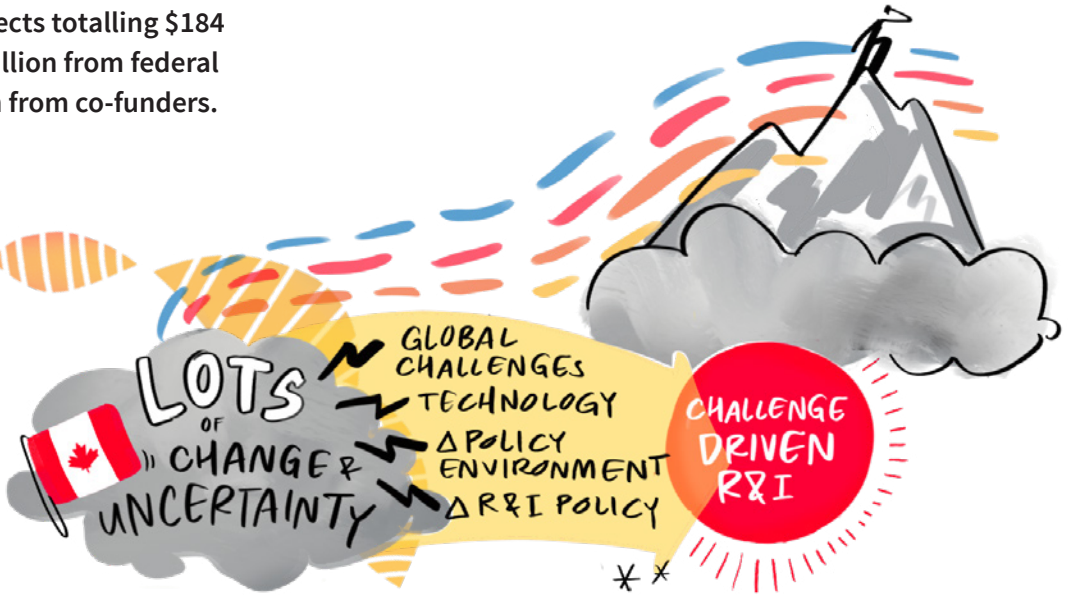
The Canadian Genomics Enterprise—a pan-Canadian ecosystem of Genome Canada and six regional Centres across Canada—invests in challenge-driven research and innovation in genomics and the associated biosciences. We bring together provincial and regional players to create national solutions that provide economic and social benefits for all Canadians. Aligning regional strengths with national priorities, the Enterprise model leverages investments by federal and provincial governments and industry, university and non-profit partners. In the last year, the Enterprise supported research projects totalling $184 million, including $81 million from federal sources and $103 million from co-funders.

2021–22 research funding supported by the Canadian Genomics Enterprise



$184M total

Federal
Provincial
Industry
Universities, Canadian not-for-profit organizations, foundations, and foreign governments and not-for-profit organizations



APRIL 19, 2021

Funding announced in Budget 2021 signalled federal commitment to advance Canadian bioscience research and innovation, accelerating ground-breaking initiatives in critical public health areas such as pandemic surveillance and precision medicine in the clinic, while delivering made-in-Canada solutions to anti-microbial resistance (AMR), food security and biomanufacturing. We welcomed the news of $400 million for a new Pan-Canadian Genomics Strategy, including $136.7 million for us to kickstart the strategy. The Budget recognized the key role genomics plays in developing cutting-edge therapeutics and in helping Canada track and fight COVID-19. Canada is a global leader in the field, and genomics can improve Canadians' health and well-being while also creating good jobs and economic growth.

APRIL 27, 2021

As part of our national pandemic response through the Canadian COVID-19 Genomics Network (CanCOGeN), we launched the Canadian VirusSeq Data Portal to track the evolving pandemic across Canada. The portal was a much-anticipated pillar in the national data infrastructure that will bolster Canada's ability to manage the current pandemic—and any future ones—by sharing and resourcing viral genome sequences. This made-in-Canada data solution was a key deliverable of the $53 million Variants of Concern Strategy that the Government of Canada announced in February 2021.

JULY 22, 2021

Genomics plays a key role in climate action and sustainable resources. The federal government announced $24.4 million in support, in addition to a $1.5 million partnership between Genome Canada and Natural Resources Canada (NRCan), for eight large-scale applied research projects in Canada's natural resources and environment sectors. These projects will harness genomics research and technologies for natural resources conservation, environmental protection and sustainability. With co-funding from collaborations with provincial and other federal partners (including NRCan), universities, industry and international partners valued at $35.4 million, this represents a total investment of nearly $60 million.

> **"Today's investment showcases two of Canada's competitive advantages that will play an essential role in our growth strategy—talented researchers and a vast wealth of natural resources. We already invested $400 million in support of a Pan-Canadian Genomics Strategy to maintain our global leadership. We recognize genomics research and technologies can lead to breakthroughs with real world applications from preserving our environment and driving sustainability, to improving the health and well-being of Canadians."**
>
> *– The Honourable François-Philippe Champagne, Minister of Innovation, Science and Industry*

AUGUST 4, 2021

We appointed our new Chief Scientific Officer, Dr. Catalina Lopez-Correa, a seasoned science leader with experience across the Canadian Genomics Enterprise, including as Executive Director of CanCOGeN. Her more than 20 years of international experience in both the academic and private sectors, and deep understanding of genomics and innovation, has inspired leaders in science and industry to collaborate towards solving some of the world's greatest challenges.

FALL 2021

Hearing from the community this year was mission critical to shaping our future. We held three national roundtables and a public townhall as part of our Future of genomics dialogue series, with meaningful participation throughout from Algonquin Anishinabe Elder Dr. Claudette Commanda to positively frame our efforts. The rich engagement with over 400 stakeholders from Canada's genomics research community, government decision makers, industry, global experts and other key partners in the genomics ecosystem helped shape Genome Canada's—and the country's—strategic directions for impact in genomics.

Roundtable #1, *The genomics research & innovation System: Strategizing the Future*, explored how national research and innovation strategies and ecosystems support innovation and impact, with a focus on how genomics can help Canada tackle some of today's biggest challenges.

Roundtable #2, *Where is the future of innovative genomics in Canada? Strengthening our future*, identified where Canada's strengths and areas of future focus should be, honing in on where Canada can double down on its international advantage to lead in the future of genomics, and how to leverage unique multi- and interdisciplinary genomics across areas of research & innovation.

Roundtable #3, *How do we support innovative genomics in Canada? Delivering our future*, focused on foundational ecosystem elements required to deliver on potential impacts for Canada and globally, including ensuring that the capacity, talent and data systems are in place to support a highly impactful ecosystem that can leverage genomics research & innovation to benefit Canadians.

Findings from the roundtables were captured in a final report, *Genome Canada's Leaders Dialogue on the Future of Genomics in Canada: Strategizing, Strengthening and Delivering Impact*.

ROUNDTABLE #1

Keynote: Anne Kjersti Fahlvik, Executive Director of Business Development and Innovation at the Research Council of Norway

QUESTIONS EXPLORED:

- How can Canada incorporate learning from other national research & innovation strategies? What are the lessons for a challenge-driven strategy around genomics? What are our strengths and where are there gaps?
- How can we ensure we both strengthen Canada's global standing and competitive advantage and deliver on societal and economic impacts for complex problems?
- How can a national research & innovation strategy ensure it meets the needs of all communities and delivers on EDI and Indigenous engagement imperatives?

ROUNDTABLE #2

Keynote: Professor Dame Sue Hill, Chief Scientific Officer for England and Senior Responsible Officer for Genomics in NHS England

QUESTIONS EXPLORED:

- What are Canada's strengths and areas of competitive advantage to leverage for delivering future genomics impacts in Canada and internationally? Where are the unique opportunities to create cross-sectoral benefits from genomics & innovation in Canada?
- How can we strengthen Canada's global standing and competitive advantage on our relative areas of strength and also support the broad future of genomics in the country? Where do we need to prioritize and make choices?
- How can Canada's future genomics research & innovation address diverse needs across society, and drive health, social and economic benefits?

ROUNDTABLE #3

Keynote: Dr. Brendan Frey, CEO of Deep Genomics

QUESTIONS EXPLORED:

- What are Canada's most vital ecosystem foundational elements for delivering future genomics impacts domestically and internationally? Where are the unique opportunities for supporting cross-sectoral (both public-private and multi-sector) benefits from genomics research & innovation?
- For data, talent and capacity, how should we manage our portfolio of supports to strengthen Canada's competitive genomics advantage?
- How can supports for Canada's future genomics research & innovation address diverse needs across society, and drive health, social and economic benefits?

SEPTEMBER 13, 2021

We **welcomed three exceptional new members to our Board**. **Dr. Savage Bear** (formerly, Dr. Tracy Bear), a Nehiyaw'iskwew (Cree woman) from Montreal Lake First Nations, is the Director for the McMaster Indigenous Research Institute and an Assistant Professor with joint appointments in the Faculties of Social Sciences and Health Sciences at McMaster University. **Dr. Ivo G. Gut** is Director of the Centro Nacional de Análisis Genómico (Barcelona), one of the largest genome sequencing centres in Europe. **Dr. Éliane Ubalijoro** is the Executive Director of Sustainability in the Digital Age and the Canada Hub of Future Earth, a Professor of Practice for Public-Private Sector Partnerships at McGill University's Institute for the Study of International Development, and a Research Professor at Concordia University in the Department of Geography, Planning and Environment.

JANUARY 14, 2022

We submitted a five-year vision in our Letter of Intent (LOI) to the **Strategic Science Fund** which aims to mobilize the expertise and resources of independent, third-party science and research organizations to enhance Canada's science, technology and innovation excellence. Our bold vision will enable Canada to fully capture and harness the power of the genomics-enabled bioeconomy by supporting Genome Canada as the strategic national organization to coordinate the ecosystem for impact and address the major economic, environmental, health and social challenges of our time through genomics. We are pleased to update that our LOI was successful, and we have been **invited to make a full application** in September 2022.

MARCH 9, 2022

We continued to mobilize genomics out of the lab for real-world benefits. The federal government announced $13.8 million in support through Genome Canada to **10 downstream research and development projects** through our industry-facing Genomics Applied Partnerships Program (GAPP). In collaboration with industry, health-care organizations, as well as provincial and other federal partners—who collectively brought $27.6 million in co-funding—this represented a total investment of $41.4 million. These public-private partnerships will apply genomics research and innovation in priority areas for Canada: sustainable resources and nature-based solutions for climate change; advancement of climate-smart agriculture and agrifood for greater export competitiveness; and precision health for better outcomes for Canadians.

MARCH 11, 2022

Following the federal government's **statement**, and in collaboration with other federal research funders, we issued our **own same-day response** that committed to exploring mechanisms to ease the burden of the conflict in Ukraine and support Ukrainian and other researchers impacted by it. On April 12, we **launched our new Ukraine Research Trainee Relief Program**.

BY THE NUMBERS

	IMPACTS IN 2021-22	CULMINATING OVER 22 YEARS
PROJECTS FUNDED AND ACTIVE	192	515
INVESTED BY GENOME CANADA	$81 MILLION	$1.8 BILLION
INVESTED BY CO-FUNDING PARTNERS	$103 MILLION	$2.5 BILLION
START-UP COMPANIES CREATED FROM GENOME CANADA FUNDED PROJECTS	15	108
RESEARCH TEAM MEMBERS SUPPORTED	3,248	13,370
TRAINEES SUPPORTED	797	6,791
PATENTS, LICENSES AND INVENTIONS	62	510

FUNDING ACROSS SECTORS

AGRICULTURE
$36.2M

ENVIRONMENT
$14.8M

ENERGY/MINING
$3.8M

FORESTRY
$3.7M

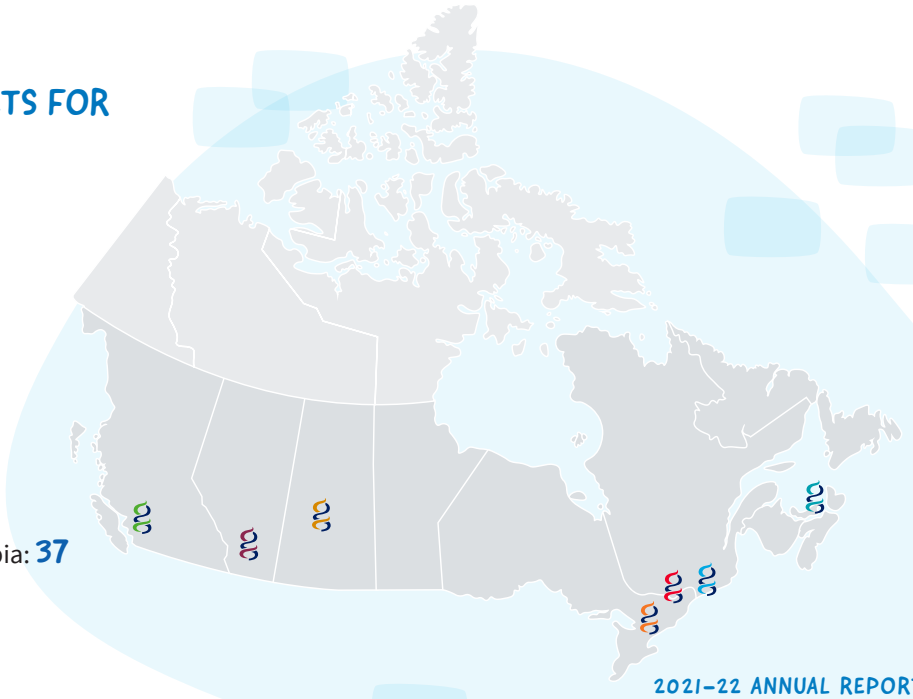
HEALTH
$98.5M

FISHERIES
$6.8M

TECHNOLOGY PLATFORMS
$20M

NUMBER OF PROJECTS FOR 2021–22 BY REGION

- Genome Atlantic: 11
- Génome Québec: 43
- Ontario Genomics: 75
- Genome Prairie: 10
- Genome Alberta: 16
- Genome British Columbia: 37



THE CANADIAN COVID-19 GENOMICS NETWORK (CANCOGEN) RISES TO THE CHALLENGE

CanCOGeN

Genome Canada has played a pivotal role in Canada's pandemic response through the development and deployment of CanCOGeN. Launched in April 2020, CanCOGeN mobilized a diverse pan-Canadian network to generate accessible and usable genomic data to inform policy and public health decisions in rapid time.

While genomic technologies enabled swift and life-saving vaccine development, the genomic data generated through CanCOGeN became one of the strongest tools for pandemic surveillance—tracking the virus' evolution and the spread of novel variants of concern in real time—as well as long-term health-care response and management. CanCOGeN's investment has also strengthened genomic sequencing capacity, skills, data sharing and collaboration across the country, bolstering capacity to tackle other major public health challenges and future pandemics.

CANCOGEN INITIATIVES

VIRUSSEQ

CanCOGeN's VirusSeq initiative has not only surpassed **but tripled** its initial mandate and sequenced **433,000** viral genomes by end of year two. Most importantly, the data generated has informed public health and policy decision making across Canada.

HOSTSEQ

As CanCOGeN HostSeq advances in its goal to sequence up to **10,000** host genomes, the data generated is enabling vital research informing our understanding of the role of human genetics in COVID-19 outcomes. The development of a population-wide dataset in the CGEn HostSeq Databank is also laying important groundwork for future genomics and health initiatives in Canada.

LOOKING AHEAD

Transition planning and implementation for the network's two lead initiatives began in late 2021, in advance of the disbursement of remaining CanCOGeN funds in April 2022.

- Genome Canada and the Public Health Agency of Canada's (PHAC) National Microbiology Laboratory (NML) are collaborating to create a joint initiative called the Public Health Genomics Alliance, with the NML leading coordination of future viral sequencing, and both organizations collaborating to maintain data sharing and the ongoing work of the Canadian VirusSeq Data Portal. Transitioning viral genomic sequencing to the NML will ensure a sustainable genomics viral sequencing infrastructure in Canada's public health system for future pandemic readiness.
- Host sequencing work continues, with more than 10,000 host samples now collected and close to 7,100 samples fully sequenced. Genome Canada secured a 12-month extension from Innovation, Science and Economic Development Canada to allow adequate time to finalize the original funding objectives and is working in close collaboration with CGEn to ensure future sustainability of HostSeq.
- Genome Canada will continue working to harness the vast expertise and capacity built across Canada (personnel and technical) and extensive knowledge and valuable partnerships developed over the last two years to strengthen Canada's health genomics ecosystem—including advancing genomic surveillance for future pandemic preparedness and other major public health challenges. We will do this through ongoing collaboration mechanisms, such as working groups, discussion forums, speaking engagements and events.

VirusSeq

HostSeq

STRENGTHENING CANADA'S GENOMIC DATA INFRASTRUCTURE

CanCOGeN investments enabled much-needed improvements to Canada's genomic data infrastructure, providing new and essential tools to tackle COVID-19 and future public health challenges.

CANADIAN VIRUSSEQ DATA PORTAL

Launched by Genome Canada in April 2021, the Canadian VirusSeq Data Portal is an important pillar of the national genomic data infrastructure, bolstering Canada's ability to manage the COVID-19 pandemic—and future ones—by sharing and resourcing viral genome sequences. This made-in-Canada data solution was a key deliverable of the $53 million Variants of Concern Strategy announced by the Government of Canada in February 2021 to detect and address SARS-CoV-2 variants of concern in Canada.

HOSTSEQ DATABANK

Led by CGEn, the HostSeq Databank is making host sequencing data accessible to researchers across Canada and the world. The data available is supporting current research on the genetic factors that affect COVID-19 outcomes and severity. The development of this national set of data from human genome sequencing will also support future health genomics research.

"This data portal is an important step in enacting Canada's Variants of Concern Strategy. This made-in-Canada solution to rapidly share and investigate detailed genetic information of viruses will give Canadian scientists the critical information they need to tackle COVID-19 and future infectious disease threats."

– The Honourable Patty Hajdu, Minister of Health

"Over the last two years, 'genomics' has moved out of the lab and into everyday vernacular—something unthinkable in the recent past. A great deal of this progress in Canada is due to CanCOGeN members across the country, investing time and resources in this vital undertaking, collaborating to tackle the COVID-19 challenge head on."

– Dr. Catalina Lopez-Correa, Chief Scientific Officer, Genome Canada

"Investments in sequencing, personnel and infrastructure were important, but more crucial was the development of soft infrastructure—the committees to share protocols and information, coordination of governance and policy, efforts to address data sharing. These were crucial to Canada's response and will be a proud legacy of CanCOGeN."

– Dr. Rob Annan, President and CEO, Genome Canada

CANCOGEN BY THE NUMBERS

$40M
in federal funding

24
month project

2
implementation committees

433K+
viruses sequenced through VirusSeq*

7.1K+
patient sequences through HostSeq*

67
COVID-19-related clinical studies being recruited into HostSeq

9
sub-committees and groups working on data sharing, capacity building, ethics and more

3
large HostSeq sequencing centres participating

9
provinces now sequencing in-house: B.C., Alta., Ont., Que., Sask., Man., N.S., N.L., N.B.

PEOPLE OF CANCOGEN

CanCOGeN was launched rapidly, early in the COVID-19 pandemic, thanks to grassroots efforts and strong collaboration between genomics scientists and provincial health labs across Canada and globally. Our heartfelt thanks go out to everyone across the network, for their tireless efforts, working in shared purpose and focus for the health and safety of Canadians.

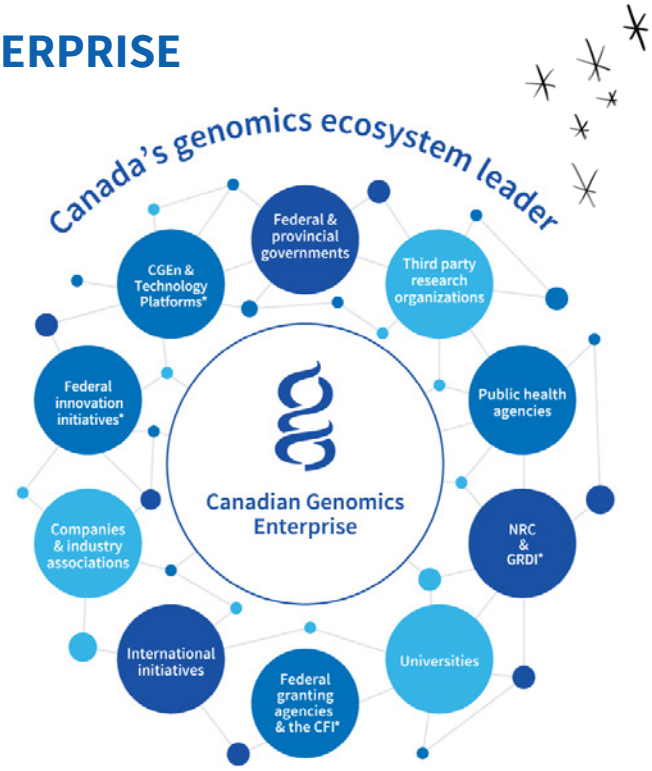
HOW WE WORK

THE CANADIAN GENOMICS ENTERPRISE

A CHALLENGE-DRIVEN MODEL FOR TRANSLATING RESEARCH INTO IMPACT

As an independent, federally funded not-for-profit organization, we are uniquely positioned to lead Canada's genomics ecosystem. We work in partnership across sectors and borders to drive investment and coordinate, connect and diversify genomics research, innovation, data and talent initiatives to meet global challenges. We work closely with the Canadian government and other federal science, technology and innovation (STI) ecosystem partners to address national priorities, connecting them to provincial and regional realities through a pan-Canadian network of six independent Genome Centres.

This pan-Canadian model is a unique power tool in the STI system: it optimizes investments by aligning regional strengths and activities with national priorities. Genome Centres are regional economic drivers, brokering successful cross-sectoral partnerships with researchers, industry and other end users through hands-on business development and partner support, knowledge mobilization and project management, and strong regional ecosystems that extend our national impact.



NRC & GRDI: National Research Council and the intramural Genomics Research and Development Initiative

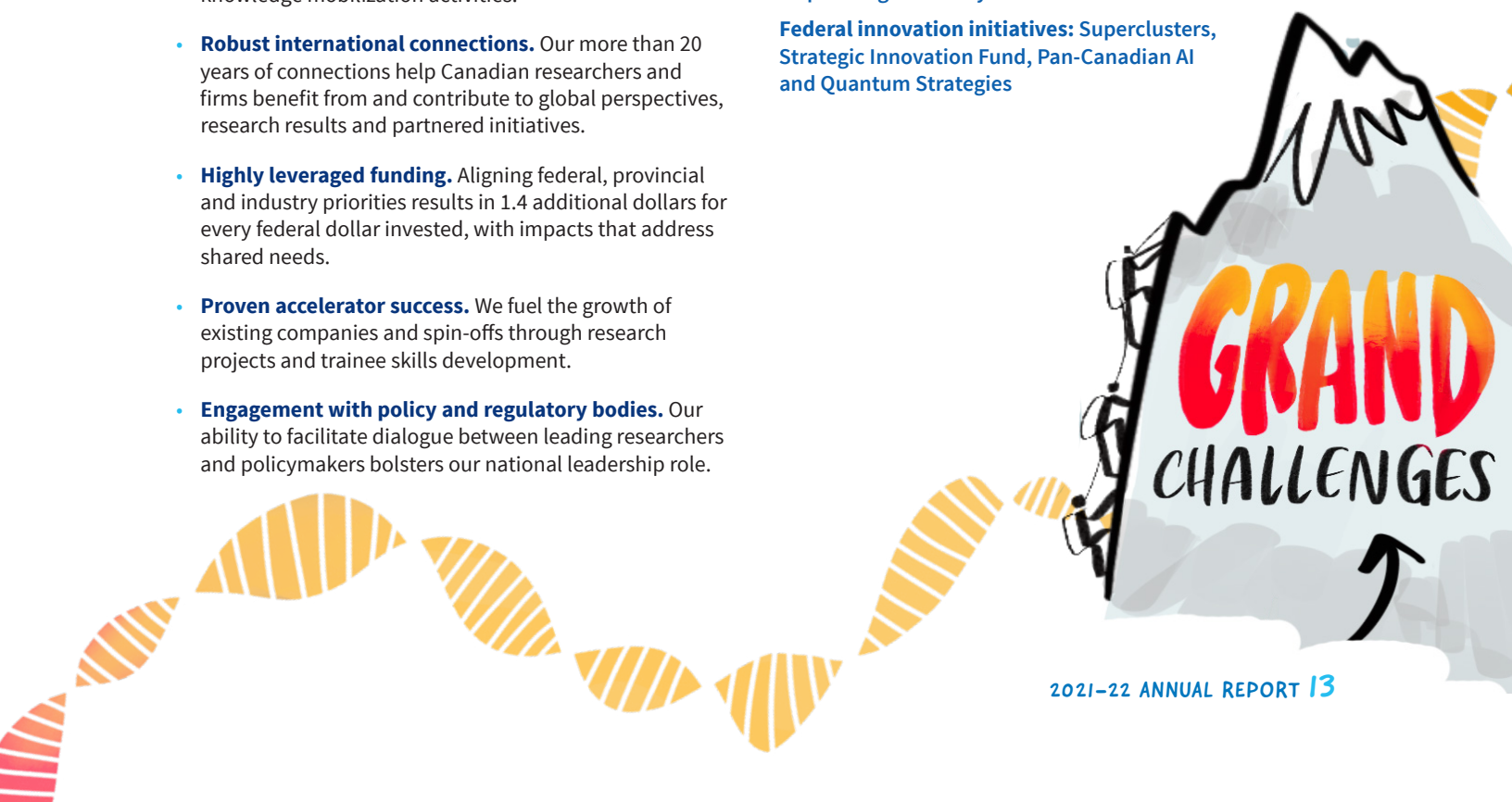
CFI: Canada Foundation for Innovation

CGEn is a federally funded national platform for genome sequencing and analysis

Federal innovation initiatives: Superclusters, Strategic Innovation Fund, Pan-Canadian AI and Quantum Strategies

OTHER VALUE-ADDED ELEMENTS OF OUR MODEL INCLUDE:

- **Convening and coordinating power.** We have deep experience convening multi-sector groups to address genomics challenges through research projects and knowledge mobilization activities.
- **Robust international connections.** Our more than 20 years of connections help Canadian researchers and firms benefit from and contribute to global perspectives, research results and partnered initiatives.
- **Highly leveraged funding.** Aligning federal, provincial and industry priorities results in 1.4 additional dollars for every federal dollar invested, with impacts that address shared needs.
- **Proven accelerator success.** We fuel the growth of existing companies and spin-offs through research projects and trainee skills development.
- **Engagement with policy and regulatory bodies.** Our ability to facilitate dialogue between leading researchers and policymakers bolsters our national leadership role.



LOOKING AHEAD

At Genome Canada, we are excited about implementing our challenge-driven approach over the next year and beyond. Building on the success of CanCOGeN and All for One, our objective is to achieve higher impact through challenge-driven genomics research and innovation. We will do so by mobilizing Canada's genomics research and innovation ecosystem to deliver made-in-Canada solutions to complex challenges—driving tangible and equitable benefits for Canadians and communities across the country.

CanCOGeN

In 2022-23 we will deliver the final sequencing results for HostSeq. Working with CGEn to make that data accessible via the HostSeq Databank, this work will lead to the development of a national set of human genome sequencing data and support future pandemic research. VirusSeq supported the sequencing of more than 433K viral genomes, surpassing threefold the original goal of 150K viral genomes. The Public Health Agency of Canada's National Microbiology Laboratory (NML) is now taking the lead as we transition this effort into national public health infrastructure. In the coming year, as part of the newly formed Canadian (Public) Health Alliance for Research in Genomics in Epidemiology and Surveillance, we will continue to coordinate with the NML to maintain data sharing and the ongoing work of the Canadian VirusSeq Data Portal.

AllforOne
Canada's Precision Health Partnership

Our All for One initiative is advancing precision health across the country, increasing equitable and timely access to accurate, genomics-enabled clinical diagnosis for Canadians with serious genetic diseases. With All for One now in place, with six (GAPP) projects funded across nine provinces and supported by a policy toolkit, our focus in the coming year will be to build out the health data ecosystem to support it. Starting in spring 2022 we will conduct a needs assessment: an important initial development phase that will shape our approach to enabling the most high-impact use cases for data sharing, including building governance and meeting technical requirements.


GenomeCanada

CLIMATE-SMART AGRICULTURE AND FOOD SYSTEMS GENOMICS INITIATIVE

Translating genomics research and innovation into solutions supporting food producers, resilient supply chains and the broader food system

Our next challenge-driven initiative will help Canada leverage its strengths to understand, respond and build resilience to global climate change, and achieve a net-zero carbon future. This initiative—a first for Canada—will focus on mitigating the impacts of climate change by investing in Climate-Smart Agriculture and Food Systems. Potential impacts could include achieving more resilient and sustainable food systems; reducing greenhouse gas emissions and carbon footprints; biological carbon sequestration; and scalable biology-based solutions.

> **"Complex challenges require strategic solutions delivered by diverse and engaged stakeholders. Coordinating the efforts of a broad range of stakeholders in Canada's genomics ecosystem around this shared challenge will create significant beneficial impacts for all Canadians."**

Genome Canada's Vice-President, Policy and Public Affairs, Pari Johnston, at an Agri-Food Innovation Council event with the Hon. Marie-Claude Bibeau, Minister of Agriculture and Agri-Food, to discuss the role of genomics research and innovation in developing climate-smart agriculture and food systems.

Our aim is to invest in a portfolio of interdisciplinary genomics research and innovation projects, designed to increase overall value and optimal delivery of knowledge mobilization, data coordination and implementation across Canada. A portfolio approach allows benefits from one solution to translate into other production systems or supply chains and cascade impact throughout the broader national food system.

We will continue to fund innovative projects through our Genomic Applications Partnership Program (GAPP) and will leverage existing projects funded trough the Large-Scale Applied Research Program (LSARP), for impact within our challenge framework. We also have strategies in place for future investments in One Health/AMR and the circular bioeconomy.

We are evolving the composition and mandate of our Science and Industry Advisory Committee to provide advice on our challenge-driven approach and genomics scientific leadership and impact. We will also put challenge-specific governance and advisory mechanisms in place, as well as thematic advisory groups, comprising key stakeholders, end users and partners, to provide guidance and input in critical areas of genomics data and knowledge mobilization.

Across our operations, workforce, programs, policies and governance structures, we will continue to actively advance our organizational commitment to IDEA (inclusion, diversity, equity and accessibility) and Indigenous truth, reconciliation and engagement with a new strategy in summer 2022. We will also welcome Wesley Oakes, our new Director, Equity and Indigenous Engagement.

To address and advance federal government priorities, drive impact within the federal science, technology and innovation ecosystem (STI) ecosystem, and inform policies that affect societal take-up of genomics, we will continue to convene genomics stakeholders, coordinate strategies and responses, and provide national genomics thought-leadership. We will work with the Canada Foundation for Innovation (CFI) to help support a sustainable national genomics infrastructure; with the National Research Council and the **Genomics R&D Initiative** across science-based departments to advance aligned initiatives; with the Social Sciences and Humanities Research Council and its **Future Challenges program** to support foresight research and knowledge mobilization on the societal implications of genomics; and with the Canadian Institute for Advanced Research (CIFAR) on the intersections of genomics and artificial intelligence. Genome Canada will continue to develop alignment with the **Digital Research Alliance of Canada** (the Alliance) to advance a national genomics data strategy, including data infrastructure, standards, bioinformatics tools and cloud computing. Moreover, synergies with Alliance will help foster a more cohesive genomics data ecosystem in Canada t hrough addressing cultural challenges related to data sharing, equitable access to genomics research and technology innovation. Through genomics, we will support federal strategies to combat climate change such as **Climate Science 2050**, the **National Adaptation Strategy** and Science Implementation Plan, and the **Blue Economy Strategy**.

A key focus over the summer will be to deliver a full proposal to the Strategic Science Fund in September 2022, based on our five-year vision outlined in the Letter of Intent stage. This vision will enable Canada to fully capture and harness the power of the genomics-enabled bioeconomy by supporting Genome Canada as the strategic national organization to coordinate the ecosystem for impact.

Genome Canada will advance five strategic objectives under the Strategic Science Fund:

- Building from the Pan-Canadian Genomics Strategy, we will play a leading role to deliver a national vision and action plan, mobilizing across sectors and borders.
- We will lead efforts to ensure national capabilities in genomics infrastructure, data and talent.
- We will deliver genomics research and innovation initiatives addressing major health, climate and food challenges.
- We will redress historic inequities and advance an inclusive genomics agenda.
- We will accelerate genomics commercialization and uptake in high growth sectors, diversifying partnerships and user engagement.

As Canada's national voice for genomics, a gateway to international genomics leaders and a key policy partner in the development of the Pan-Canadian Genomics Strategy and other federal strategies where genomics can make a tangible difference, we look forward to helping deliver world-class genomics impacts for Canada.

ACHIEVING OUR OBJECTIVES

We envision Canada as a world leader in the application of genomics-based biosciences for human health, agriculture, the environment and across the bioeconomy. To achieve this vision, we connect people and ideas across public and private sectors through challenge-driven programming that harnesses the power of genomics research, innovation and talent for the benefit of all Canadians. This section outlines our stated objectives for the last year and how we worked to meet them.

1 Drive high-impact research to benefit Canada.

2 Deliver effective, purpose-fit programs that support our mission.

3 Promote the responsible and equitable application of genomics in Canada.

At Genome Canada, we know that the interactions of the different components of research are what drive impact. This means we support research activity (building knowledge), infrastructure (building resources) and capacity (building expertise). We continued to support large-scale, interdisciplinary research with line-of-sight to application. And we funded strategic challenge-driven research addressing social challenges, while providing access to leading-edge technologies and supporting research on genomics in society.

Genome Canada research projects are selected via world-class, international peer review. Reviewers are chosen for their recognized expertise in the science, technology and/or translation arena and management of large-scale genomics projects. Drawing reviewers primarily from the international scientific community ensures that the research we fund is of the highest international standards and avoids conflict of interest. Over the past year, Genome Canada recruited 61 reviewers from 11 countries. Our Board of Directors makes the final decision on which applications to invest in, based on recommendations from the international panel of reviewers.

Advancing All for One, Canada's precision health partnership. All for One is advancing precision health across the country, increasing equitable and timely access to accurate, genomics-enabled clinical diagnosis for Canadians with serious genetic diseases. The initiative is improving health and wellness by building regional genomics capacity, promoting the equitable and ethical uptake of precision health tools, and addressing barriers to data sharing. As a foundational element of our precision health leadership, it is making a major contribution to the national rare disease strategy. Over the past year, we broadened access to genome-wide sequencing and led patient-community engagement. In March 2021, we announced a sixth clinical implementation project in this pan-Canadian initiative, which now serves nine provinces.

- To date, we have invested $13 million in All for One projects including the Health Data Ecosystem. With co-funding, the total is $39 million.
- Each project demonstrates the clinical utility and cost effectiveness of genome-wide sequencing as a standard of care for individuals with suspected serious genetic conditions.
- Each project is led by a clinical team but driven by the provincial ministry or regional health authority, and carried out in partnership with clinicians and diagnostic labs.
- The All for One Policy Toolkit establishes a data governance framework for informed clinical consent and genomic data sharing across other projects within the initiative.

By the numbers

The $39 million All for One initiative includes $13 million in federal investment through Genome Canada and $26 million in co-funding from industry, health-care organizations, provincial and other partners brought in through six regional Genome Centres.

$39M

All for One initiative includes

$13M in federal investment through Genome Canada

$26M in co-funding from partners through regional centres

DAIRY DRIVE TO NET-ZERO

Genomics can help dairy farmers choose cattle stocks that increase milk production while also reducing methane emissions, which present a significant greenhouse gas challenge for the industry. Around 30% of the anthropogenic methane production globally comes from dairy and beef agriculture.

Genome Canada funded a team from Alberta and Ontario that is employing genomics-based approaches to select for cattle with the genetic traits needed for more efficient feed conversion and lower methane emissions. Farmers will save money (feed is the single largest expense in milk production), and Canada's already lucrative dairy industry will become more competitive. The industry's environmental footprint will also be reduced, due to lower methane emissions and because more feed-efficient animals produce less manure waste. A consortium of industry organizations and international partners have implemented project findings so that research seamlessly integrates into farming practices.

In partnership with Genome Alberta and Ontario Genomics

Funding of demand-driven genomics collaborations in agrifood, the environment and health through the Genomics Applications Partnership Program (GAPP). To date we have funded 97 receptor-led projects for a total investment of approximately $389 million, in 21 rounds of investment in this rolling intake program. Examples of projects include integration of genomic selection into tree breeding programs to develop trees that can better adapt to climate change, development of a genomics-enabled toolbox to guide the management and intervention strategies for disease in Atlantic salmon, and development of a state-of-the-art assessment platform for antibodies. We invested $12.7 million in 2021-22.

> **"Genomics research and development plays a pivotal role in improving the lives of Canadians and advancing our post-pandemic economic recovery. Investments like the one announced today by our government allow scientists and researchers to take their work beyond the walls of the lab, and their solutions to fight climate change and keep our industries in key sectors productive, sustainable and competitive globally are bringing real-world benefits to Canadians."**
>
> *– The Honourable François-Philippe Champagne, Minister of Innovation, Science and Industry*

FUNDING OF FIVE EXISTING LARGE-SCALE APPLIED RESEARCH PROJECT (LSARP) COMPETITIONS, EACH WITH A SPECIFIC SECTOR FOCUS:

- 2020 LSARP Competition in Genomic Solutions for Natural Resources and the Environment. This $58.6 million competition, including co-funding, was launched in January 2020 in partnership with Natural Resources Canada (NRCan) to make Canada's natural resources and environment more resilient to climate change. It supports eight projects such as the impact of climate change on Canada's biodiversity and conservation of endangered species such as the North Atlantic right whale. We invested $2.4 million in 2021-22.
- 2018 LSARP Competition – Genomic Solutions for Agriculture, Agri-food, Fisheries and Aquaculture. This $78.4 million competition, including co-funding, was launched in January 2018 in partnership with Agriculture and Agri-food Canada. It supports eight projects that demonstrate how genomics research can be translated

into solutions advancing the sustainability, productive capacity and competitive position of the Canadian agriculture/agri-food and fisheries/aquaculture sectors. Projects include improving the capability and agility of a lentil breeding program and monitoring DNA from water samples to assess the health of freshwater fish. We invested $7.0 million in 2021-22.

- 2017 LSARP Competition – Genomics and Precision Health. This $163.9 million competition, including co-funding, was launched in January 2017 in partnership with the Canadian Institutes of Health Research (CIHR). It supports 15 projects that demonstrate how genomics-based research can contribute to a more evidence-based approach to health. These projects are expected to improve health outcomes and/or enhance the cost-effectiveness of the health-care system. A broad range of projects were funded, including several on diagnosis and treatment for cancers; reducing health-care disparities and improving diagnostic success for children with genetic diseases from Indigenous populations; and diagnosis of rare diseases and several chronic illnesses, including cystic fibrosis, inflammatory bowel disease and childhood arthritis. We invested $7.9 million in 2021-22.
- 2015 LSARP Competition – Natural Resources and the Environment. Genome Canada and co-funding partners are investing a total of $112.8 million in 13 projects. The scope of this competition includes genomics research in energy, mining, forestry, water stewardship, wildlife management and conservation. It also includes genomics research in bioproducts that will provide tools to help conserve natural resources and protect the environment. We invested $1.6 million in 2021-22.
- 2014 LSARP Competition – Genomics and Feeding the Future. We have continued to fund the 11 projects announced in 2015 via a $94.4 million investment, which includes co-funding. The projects use genomics approaches within the agriculture/agri-food and fisheries/aquaculture sectors to address challenges and opportunities related to global food safety, security and sustainable production. We support projects that apply genomics in multiple areas, including sustainable fisheries and honeybees; stress and disease resistance of crops and livestock; and, in partnership with the Western Grains Research Foundation, breeding for desirable traits in wheat, lentils and soybeans. We invested $125,000 in 2021-22.

Continued investment in Genomics Technology Platforms. We support 10 Technology Platforms with a total of approximately $133 million, including co-funding, over six years (2017-22). The platforms give researchers access to the latest high throughput 'omics technologies in areas such as DNA sequencing, proteomics and metabolomics, as well as development of new methods and protocols, data analysis and bioinformatics. They received $9.3 million in 2021-22.

Over the last 20 years technology platforms have been a catalyst for Canadian research, enabling our country's researchers to provide international leadership and achieve significant impacts. For example, during the COVID-19 pandemic, platforms demonstrated the nexus of expertise and technologies to respond rapidly, supporting time-sensitive, priority research essential for national emergencies.

A number of the platforms have grown into much larger entities, requiring a blend of funding from institutional, philanthropic, provincial and federal sources, in addition to Genome Canada. Therefore, Genome Canada is working with ISED and other funders such as CFI and the Digital Research Alliance of Canada (DRAC) on principles for a more strategic approach to national genomic capabilities. This could include a portfolio of coordinated genomics infrastructure that aligns genomics capacity with demand from academic research projects, commercial innovation opportunities and government programs. Moreover, this approach will foster national genomics capabilities by investing in the development of emerging technologies necessary for our future challenges.

Continued investment in the 2017 Bioinformatics and Computational Biology Competitions. This $24 million competition, launched in December 2017, supports the development of next-generation tools and methodologies under two streams: human health, and food/agriculture and natural resources/environment. Examples of projects include using machine learning to predict drug resistance in pathogenic bacteria, developing toolkits for rapid characterization of bacterial genomes, and tackling the environmental and agrifood context of AMR. The 25 funded projects received $1.9 million in investment in 2021-22.

Continued investment in Disruptive Innovation in Genomics. These competitions fund projects that develop leading-edge genomics technologies with the potential to displace existing technologies, disrupt an existing market or create a new market. Genome Canada and co-funding partners have invested $37.6 million in Disruptive Innovation projects since program inception in 2015. We invested $1.2 million in 2021-22.

Support for next-generation researchers. We partner with Mitacs through GAPP to provide placements and funding for graduate students and post-doctoral fellows working within receptor organizations. This partnership prepares Canada's next generation of innovators to advance the field of genomics by allowing candidates to apply their knowledge and skills in real-world settings while companies benefit from the high-quality research expertise. In 2021-22, this partnership supported nine Mitacs Accelerate internships in GAPP projects.

2 Deliver effective, purpose-fit programs that support our mission.

We continued our support for equitable, diverse and inclusive research programs focused on excellence and impact. We further strengthened the impact of research and innovation through collaboration and coordination within academia and industry, both nationally and internationally.

Strong commitment to action on inclusion, diversity, equity and accessibility (IDEA). We made progress on intentionally embedding IDEA policies and practices across our operations, workforce, programs, policies and governance structures. Over the last year, we took several proactive measures:

- We developed an IDEA strategy and action plan to embed IDEA policies and practices across our operations, workforce, challenge-driven initiatives, programs, governance structures and ecosystem leadership. Our new IDEA working group worked with and advised management on the strategy. The group was active in five subcommittees (Education/Training, Data Collection/Management, Human Resources/Governance, Enterprise/Stakeholder Engagement, Mission Readiness).
- We engaged a consulting firm to inform our execution/implementation of the IDEA strategy. The firm audited our policies, procedures and practices, and provided us with a final report with specific recommendations to inform our strategy and action plan in 2022-23.
- In December 2020, in a unanimous decision, our Board of Directors signed on to the 50–30 Challenge to accelerate organizational diversity actions to improve equity. In 2021, as part of Board renewal and diversification, we developed and applied a new matrix for the selection of Board members. We also advanced our plan to create a more inclusive screening, selection and hiring process; provide unconscious bias training for hiring committees; and set a baseline for diversity metrics and institutionalizing them.
- We conducted a survey of diversity across our actively funded lead investigators, to create a baseline for future IDEA activities at Genome Canada.
- An Enterprise-wide equity, diversity and inclusion (EDI) working group hosted external EDI experts and aligned activities throughout the year including data collection, sharing tools and resources, and progress towards the 50/30 Challenge goals across the Enterprise.
- IDEA staff participated in CIHR's virtual sessions on their anti-racism action plan. As part of our ongoing collaboration, we plan to engage with CIHR staff on addressing ableism and barriers to accessibility in the health research funding system.
- All documents and graphics posted to our website or included in our newsletters are now accessible, in keeping with best practices for Web Content Accessibility Guidelines 2.1 and Accessibility for Ontarians with Disabilities Act compliance.

Ongoing commitment to Indigenous truth, reconciliation and engagement. We laid the groundwork for integrating Indigenous truth, reconciliation and engagement into all aspects of our work. Over the last year, we accomplished the following:

- In summer 2021, we conducted a staff survey to create a baseline of knowledge on cultural awareness, cultural competencies, cultural safety and cultural agility related to Indigenous issues in Canada.
- With the advice of Indigenous partners and organizations, we made significant progress on developing a distinctions-based Indigenous truth, reconciliation and engagement strategy to guide our work. We are committed to launching and implementing the strategy in 2022-23.
- In spring 2022, four senior staff participated in a PPF training program, Putting Indigenous Reconciliation into Practice: Inclusion and Active Leadership. The aim is to build a community that continues to meet, share resources and best practices, and learn from each other and Indigenous mentors.

Cross-cutting IDEA/Indigenous activities. We also put in place or continued with a number of initiatives to demonstrate organizational commitment to and improve performance in both IDEA and Indigenous reconciliation.

- In June 2021 we launched our Genome Canada Playbook. One of the Playbook's values is to be "intentionally inclusive," setting out expectations for staff in integrating our IDEA framework, and our commitment to Indigenous truth, reconciliation and engagement, in everything we do. The Playbook, which puts five values into action with the support of team charters, is the output of a corporate values exercise.
- We recruited a new Director, Equity and Indigenous Engagement, Wesley Oakes, who started on July 2022.
- We are signatories of Canada's Dimensions Charter and the Declaration on Research Assessment (DORA) since 2019.

Ongoing rapid response to the COVID-19 pandemic. Since the pandemic hit in early 2020, we have consistently activated our community to engage, with rapid time to impact, on a range of national and regional efforts.

- **Year two of the Canadian COVID-19 Genomics Network (CanCOGeN).** Since the launch of CanCOGeN in April 2020, we have continued to manage this $38.4 million investment of federal money to generate accessible and usable genomics data to inform public health and policy decisions, as well as to guide treatment and vaccine development in Canada. See page 10 for more about CanCOGeN.
- **Investment in COVID-19 Regional Genomics Initiatives.** Beyond CanCOGeN, Genome Canada launched the COVID-19 Regional Genomics Initiative, to support regional genomics projects that address specific, short-term needs of industry, not-for-profit and public-sector receptors through collaborative academic-receptor research. This initiative has funded eight projects for a total investment of $1.5 million. We also established partnerships with CIHR and CIFAR to fund three additional COVID-19 related projects. We invested $0.3 million in 2021-22.
- **COVID-19 work in Emerging Issues.** In 2021-22, we continued to support COVID-19-related projects in our Emerging Issues portfolio. In partnership with CIHR, we funded the creation of tools to rapidly identify and test for the COVID-19 virus. The test was a bedside portable to patients under quarantine, helping prevent infected individuals from further transmitting the virus in hospitals and public places.

Investment in the Regional Priorities Partnership Program (RP3). This $20.4 million initiative, including co-funding, supports cross-sectoral projects that advance genomics research and translation capacity in regional areas of strategic priority. For example, in the Atlantic provinces, an RP3 project supports a collaboration between industry, federal government and a genomics start-up to deliver effective environmental monitoring of the ocean. In B.C., patients, clinicians and the health system are working together to better target depression treatments. Since RP3's inception in 2018, 21 projects have been approved across key sectors. We invested $1.4 million in 2021-22.

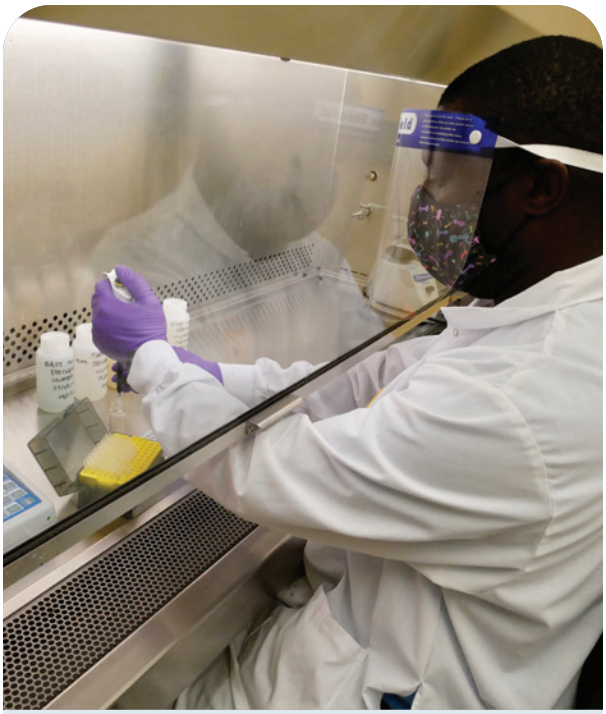


photo credit: University of Guelph

Dr. Lawrence Goodridge tests wastewater samples

SENTINEL: EARLY DETECTION OF PUBLIC HEALTH HAZARDS

Wastewater surveillance provides public health value through the rapid connection of genomics technologies and innovation. Wastewater findings are already influencing COVID-19 public health decisions, potentially saving lives and supporting the Canadian economy. Genome Canada is investing in innovative wastewater surveillance that connects 'omics technology with social media tracking of enteric illness symptoms to enable real-time tracking of outbreaks. This work is easily transferable to other illnesses and pathogens, including expanding Canada's COVID-19 wastewater screening capacity. Progress in this area, combined with federal government-facilitated development of portable detection devices for SARS-CoV-2 in wastewater, will increase the accessibility of testing locations, public health equity and the success of community responses to outbreaks.

In partnership with Génome Québec and Ontario Genomics

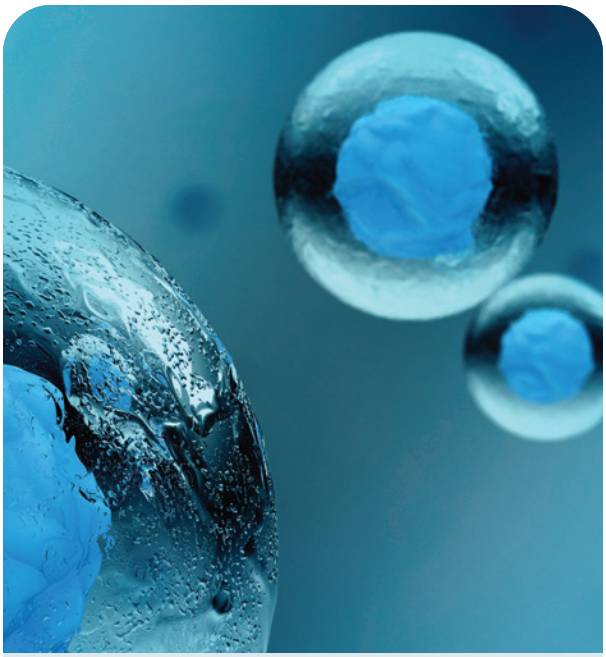
Enhancing international leadership. International cooperation and collaboration drive genomics work across health, agriculture, climate and more. We collaborate in international efforts to tackle global challenges with genomic solutions, influence the global agenda, accelerate breakthroughs in Canada and raise the profile of Canadian efforts. In 2021-22, we supported a number of international initiatives including the following:

- The**Structural Genomics Consortium (SGC)**, established in 2004, is a not-for-profit public-private partnership that supports the discovery of new medicines through open access research. We reconfirmed our investment in the SGC in March 2020, approving funding for Phase V. This phase employs innovative strategies including artificial intelligence to develop tools to better understand proteins involved in many cancers and other debilitating and rare diseases. It has a total project budget of $23.5 million and a maximum of $5 million from Genome Canada over two years. We invested $2.5 million in 2021-22.

- The **Global Alliance for Genomics and Health** (GA4GH) represents 500+ member organizations from 71 countries focused on improving human health through global genomics and clinical data sharing. As a member since 2014, we help advance the uptake of standards for harmonized data sharing to enable responsible access to genomic and health-related data on tens of millions of individuals worldwide. We provided $153,000 in 2021-22 to support the secretariat, keep the Alliance in Canada, and fund some of its driver projects, which are real-world genomic data initiatives that guide its development efforts and pilot its tools. Strategic collaboration with the GA4GH is projected to be critical for unlocking genomics innovation within Canada, both in the clinic and commercially. Moreover, Canada's strength in the development of genomic standards and policy through the GA4GH are considered growth opportunities for global leadership and a powerful model for other sectors such as agriculture.

- The **International Rare Disease Research Consortium** unites national and international government, non-profit, for-profit, patient advocacy and scientific research organizations to promote international collaboration and advancement of rare diseases research. We bring to the table a strong foundation of investment in rare diseases, primarily in the diagnostics space, through a genomics lens. Not only have we gained valuable access to investments and best practices underway in other countries, but we have also reviewed and advised on research projects and working group initiatives within the consortium.

- The**Global Genomic Medicine Collaborative** (G2MC) was part of our international outreach, with Dr. Lopez-Correa, as co-Chair of this initiative, participating in two sessions and giving closing remarks at the G2MC International Conference in Fall 2021. This conference



THE "GOOGLE MAPS" OF THE HUMAN BODY

Think about how simple it is for us to find directions to the nearest café. Then imagine applying that simplicity to finding the causes of diseases in the human body. That is the goal of the international consortium developing the Human Cell Atlas—a reference of all the components that make different cell types in the body unique despite all sharing the same genetic code. In 2022, the **first draft of this reference** was released to the world in a number of scientific publications, mirroring the release of the first draft of the human genome sequence 21 years earlier. The atlas is already supporting diagnostic development, including approaches looking at **tracing RNA-based disease signatures** in blood, drawing back to the specific cell type that is in distress.

Genome Canada is a core member of this **international consortium** that supports more than 2,000 researchers across 83 countries. Our participation ensures that Canada is integral to the latest "big science" in biological systems and positioned to reap the benefits of research findings.

In partnership with The Wellcome Trust, UK MRC, European Commission, Klarman Family Foundation, Helmsley Charitable Trust, CZI and The British Heart Foundation.

targets an engaged international audience of leaders and stakeholders in genomic medicine, providing an ideal outreach tool to reinforce our reputation as a global leader in genomics. The event offered closed captioning in multiple languages and showcased the talent of young investigators through the Young Investigator Competition. The overall G2MC initiative is coordinating the effective implementation of genomics in clinical practice at a global level.

- DivSeek represents 100+ member organizations from various countries to help mobilize the genetic variation from the world's gene banks for crop breeding. This international collaboration aims to enhance the productivity, sustainability and resilience of crop varieties to challenges such as climate change. As a member of this community of practice, we participate in developing and sharing methodologies, open-source software tools, and best practices on generating, integrating and sharing information on plant genetic resources. A supporter of the DivSeek secretariat for the last two years, we fund a DivSeek Canada project that accelerates crop improvement by unlocking the potential of crop diversity. DivSeek also provides a clear link to our new Climate-Smart Agriculture and Food Systems challenge initiative through the climate impact of sustainable crop development.

- The Global Biodata Coalition (GBC) is a forum for research funders to better coordinate and share approaches for the efficient management and growth of biodata resources worldwide. It aims to stabilize and ensure sustainable financial support for the global biodata infrastructure, and to identify, for prioritized long-term support, a set of Global Core Data Resources crucial for sustaining this infrastructure. We became a GBC member because of the importance of these biodata resources to genomics researchers in Canada. As the Canadian member of the GBC Board of Funders, and represented by Dr. Rob Annan, we bring a broad Canadian perspective to discussions by consulting other Canadian parties interested in GBC work and informing them of GBC activities.

- Public Policy Projects, an independent policy institute in the U.K., is committed to global public policy reform, brings together policymakers, stakeholders, academics and business with an interest in the future of public policy. For two years, we have participated in its thought-leadership Global Genomics Programme roundtables and Dr. Annan contributed to its Bringing the Benefits of Genome Sequencing to the World report.

Focus on research security and cybersecurity. Research security is receiving increasing attention in Canada. Concerns include protecting Canadian intellectual property for economic competitiveness, and ensuring research, technology and data assets do not undermine Canadian values or contribute to human rights abuses abroad.

- We have put in place an internal staff committee to develop research security guidelines based on the National Security Guidelines for Research Partnerships to promote the integration of national security considerations into the development, evaluation and funding of research partnerships.

- We are working closely with the federal granting agencies, CFI and national third-party research organizations to align efforts and review and update security policies and procedures to better integrate national security considerations into activities. We participate in the TC3+ Research Security Working Group meetings to ensure that our guidelines and processes are aligned with the TC3+.

- We are developing a research security plan that will be delivered by October 31, 2022. Until then, projects must use a Genome Canada *Research Security Best Practice Checklis*t based on the federal Safeguarding Your Research portal to assess potential national security risks and outline a mitigation plan to reduce or remove the risks. We are committed to maintaining the highest levels of research excellence and integrity, academic freedom and openness, and the proper stewardship of public funds.

- Representatives from across the Enterprise have participated in a number of briefing sessions with Canadian Security Intelligence Service, Canadian Centre for Cyber Security and Public Safety Canada, including a briefing session that we organized.

- We have undertaken two independent cybersecurity exercises to identify gaps in processes, documentation, policies and defences. We enhanced Board oversight by expanding the responsibilities of the Audit and Investment Committee of the Board to include cybersecurity in 2020.

- We developed and deployed formal policies on training and awareness, incident management and password management. Our employees must now complete a mandatory awareness program and yearly refresher. In March 2022, we undertook a gap analysis against the Cyber Secure Canada certification criteria. Gap analysis is now complete, and a remedial plan is in development to achieve certification. We will have a formal cybersecurity plan in place by July 31, 2022.

3 Promote the responsible and equitable application of genomics in Canada.

We provided national leadership and mobilized the Canadian genomics ecosystem to engage in a national dialogue on genomics and policy. We worked collaboratively with stakeholders to harness the power of genomics to responsibly and ethically deliver equitable benefits for Canadians.

National dialogue on future of genomics. We designed the roundtables to help identify future opportunities and challenges for Canadian genomics overall, and to inform our strategic direction and challenge-driven approach to delivering greater impact. Across all three roundtables, a clear picture emerged of the need to build a future in which genomics can effectively address society's most challenging problems. This means:

- Supporting a coherent genomics research & innovation ecosystem that mobilizes Canada's existing scientific, human resource, infrastructure and data capacity around shared national priorities.
- Supporting coordinated efforts that drive cross-sectoral, diverse and dynamic collaborations that deliver equitable impacts and inclusive genomics.
- Recognizing Canada's diversity as its strength—from Indigenous ways of knowing, to community-partnered research, to addressing genomics' historic inequities.

> "Genomics research and development plays a pivotal role in improving the lives of Canadians and advancing our post-pandemic economic recovery. Investments like the one announced today by our government allow scientists and researchers to take their work beyond the walls of the lab, and their solutions to fight climate change and keep our industries in key sectors productive, sustainable and competitive globally are bringing real-world benefits to Canadians."
>
> *– The Honourable François-Philippe Champagne, Minister of Innovation, Science and Industry*

Supporting proposed guidance for novel food regulations. In May 2021, on behalf of the Pan-Canadian Genomics Enterprise, we submitted our recommendations for improving the safety and standard of service for plant breeding innovation. A framework that focuses on food safety rather than breeding technology will ensure the safety of Canadians while overcoming the challenges in regulating these fast-moving technologies. In May 2022, Health Canada issued new guidelines in support of gene editing in plant breeding, a globally aligned and science-based approach which will bode well research and development of new plant varieties in Canada.

Contributing to a successful Canadian oceans strategy. In June 2021, on behalf of the Pan-Canadian Genomics Enterprise, we delivered a submission to the Blue Economy Strategy Consultation. It called for positioning genomics as a cross-cutting foundational technology to drive success of any future national oceans strategy.

Inclusive storytelling. As part of our ongoing commitment to IDEA and Indigenous truth, reconciliation and engagement, our storytelling continued to focus on demonstrating real project impact across sectors and to the range of communities our work involves and affects.

- Dr. Lopez-Correa participated in a Global Alliance for Genomics and Health (GA4GH) kickoff event in November 2021. She spoke with GA4GH CEO Peter Goodhand as part of a fireside chat series with members of the genomics and health community, underscoring the importance of moving beyond diversity in data sets to advancing a global equity agenda for genomics.

BIOLOGICAL SOLUTIONS GROWING OUR CLIMATE-SMART AGRICULTURE RESPONSE

Beneficial bacteria can significantly improve the growth and yield of plants exposed to drought, as well as reduce climate-changing emissions from chemical fertilizer use. Despite having only 0.4% of the world's population, Canada has an extraordinarily high rate of fertilizer use. This use contributes to roughly 3% of global emissions from nitrogen-based fertilizers, which lead to nitrous oxide release—a greenhouse gas 265 times more potent than carbon dioxide.

A novel type of plant growth-promoting bacterium that lives in symbiosis with plants is forming the basis of biofertilizer for crop improvement and presents an outstanding opportunity for enhancing productivity while fostering sustainable and eco-friendly plant agriculture. Genome Canada's investment in an Ontario-based program of research supports an industry-academia collaboration to not only develop new scientific tools, but also implement the results, including up-scaling of the manufacturing process, legal registration of the formulation and marketing of the new product. This provides an environmental and economic win for agriculture in Canada.

In partnership with Ontario Genomics

- We launched a series of "Inclusive Genomics" learning events for staff, Centres and Board members in November. The inaugural session in November 2021 explored exclusion in higher education and research, and where we can drive meaningful change. It was moderated by Koko Agborsangaya, Program Director, CanCOGeN, and featured Dr. Malinda Smith, Vice-Provost and Associate Vice-President, Research (EDI) and Professor of Political Science at University of Calgary, and Dr. Juliet Daniel, Professor and Associate Dean of Research and External Relations, Faculty of Science, and Professor of Biology at McMaster University.
- In collaboration with CoVaRR-Net and GA4GH, we supported an event on December 6, 2021 on Indigenous peoples and genomics featuring Indigenous scholars: Dr. Jessica Kolopenuk, Assistant Professor, Faculty of Native Studies at University of Alberta; Taylor Morriseau, PhD candidate at University of Manitoba; and Leona Star, Director of Research for the First Nations Health and Social Secretariat of Manitoba. Dr. Kimberly Huyser, Associate Professor of Sociology, University of British Columbia, moderated the event, which focused on the imperative of Indigenous-led genomics governance, data sovereignty and training Indigenous genomics researchers.
- We posted seven videos from the Fall 2021 Dialogue on the Future of Genomics series, with subtitles in both English and French to improve accessibility for the francophone research community. We began offering live closed captioning at large virtual events.

COVID-19 storytelling

In the second year of the COVID-19 pandemic, we continued to engage actively in Canada's public health policy dialogue, deploying a wide range of science communications that demonstrated and explained the impact of genomics on Canadians' health and safety.

- As a key member of the Variants of Concern Leaders' Table chaired by the Deputy Minister of Health, Dr. Lopez-Correa contributed to shaping the February 2021 Government of Canada Variants of Concern Strategy.
- CanCOGeN network members across Canada have provided expert media commentary throughout the pandemic, particularly on the emergence and significance of new variants of concern in Canada.
- CanCOGeN network members demystified the genomic tools and techniques supporting Canada's COVID-19 response through infographics and blogs featured in our monthly CanCOGeN newsletter and other digital communications.

ADDRESSING THE QUIET PANDEMIC

The World Economic Forum has noted that the "quiet pandemic" of anti-microbial resistance (AMR) is leading to as many (if not more) deaths per year as COVID-19. Genomics is on the front line in combatting AMR in Canada—and globally through commitments from the WHO and G7 Health Ministers. Genome Canada's investments range from replacing anti-biotic use with genomic-identified anti-microbial proteins in veterinary practice, to understanding and managing AMR transfer between bacteria and habitats.

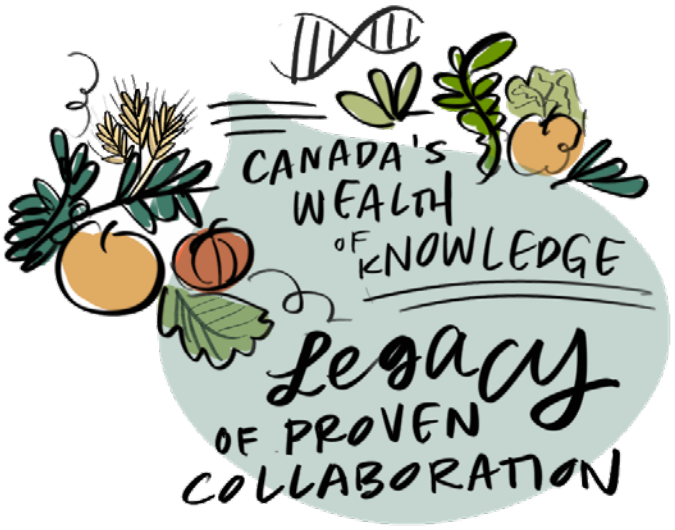
Acting on AMR is vital both in terms of lives saved and economic consequences. By 2050, the estimated cumulative costs of AMR to the Canadian healthcare system will approach $120 billion, with the economy potentially losing up to $21 billion per year. Investing in genomics now will drive the changes needed to reduce those future social and economic costs.

With collaboration across the Canadian Genomics Enterprise

- We engaged actively in Genome British Columbia's 2021 Genomics Forum (May 4 – 6), which brought together Canadian and international leaders to discuss national and international responses to the COVID-19 pandemic. Dr. Lopez-Correa spoke at the forum's session on Genomic Surveillance Around the Globe.
- In June 2021, we shared lessons learned from the COVID-19 pandemic, the ground-breaking pan-Canadian mobilization around CanCOGeN and future pandemic preparedness with Public Policy Projects.

Sequencing the Crisis: How genomics morphed from a COVID-19 research tool to a critical part of the pandemic response

- Public Policy Forum published a case study on CanCOGeN's impact and evolution in October 2021, sharing key insights from leaders across the network, tracing the impact of pan-Canadian collaboration and capacity-building enabled by the network, and outlining lessons to strengthen Canada's response to future public health challenges
- The *Chief Public Health Officer's Report on the State of Public Health in Canada 2021* highlighted CanCOGeN's progress and impact as a key contributor to Canada's COVID-19 response.
- On the international front, we sit at a number of senior global genomics policy tables, including the U.K.'s Public Policy Projects, which is leading a global conversation on issues of global reach using genomic data for research, including the importance of improving data diversity, establishment of a global dataset and the future of rare diseases.



CANCOGEN BLOG HIGHLIGHTS

The CanCOGeN blog series was a key component of our communications on the network and its impact, showcasing diverse experts from across the network, and explaining the genomics tools, techniques and issues at the heart of Canada's COVID-19 response. The blog drove our CanCOGeN newsletter subscription uptake and played a key role in maintaining our above-industry standard open/share rates.

- CanCOGeN HostSeq on a mission to understand variability in COVID-19 outcomes (May 2021)
- HostSeq: Enabling data sharing to tackle COVID-19 and future health challenges (October 2021)
- Leveraging cancer research tools to build the Canadian VirusSeq Data Portal (December 2021)
- Meet a CanCOGeN data curator (October 2021)
- Mathematical modelling in the fight against COVID-19 (December 2021)
- COVID-19 challenge drives vital expansion of Canada's genomic sequencing capacity (March 2022)

Continued outreach leveraging strategic partnerships. We engaged in a broad range of outreach activities to promote the role of genomics in Canadian public policy through high-profile platforms with significant reach into public policy, business and researcher audiences in 2021-22. We also applied a strong IDEA and next-generation talent lens to our engagement efforts:

- **Canadian Science Policy Centre (CSPC) Partnership:** This strategic partnership, which centres genomics in national science policy, science communications and next-generation science talent initiatives, generated significant impact and reach:
  - As part of CSPC's Career Campus for early career researchers, Dr. Annan spoke at a Meet the Executives event in May 2021 on Canadian science careers.
  - At the CSPC conference in November 2021, we led three panels and participated in an adMare panel on a life science strategy for Canada. Our panel topics were *Bringing the bio-revolution to Canada; The role of genomics and Big Data in re-shaping public health policy*; and *Mission possible: Using genomics missions to build back stronger post-COVID*. Ontario Genomics and Génome Québec also each led a panel and Dr. Lopez-Correa participated in two other COVID-19 related panels. We ran a virtual booth with materials from across the Enterprise and showed a video interview with Dr. Annan and CSPC President Mehrdad Hariri. We participated in a January 2022 Genomics on a mission panel event that featured Drs. Annan and Lopez-Correa in conversation with Mehrdad Hariri. This panel and our editorial on bio-innovation were a curtain-raiser for our spring launch of Canada's first Climate-Smart Agriculture and Food Systems challenge initiative.
- **Public Policy Forum (PPF).** We collaborated with PPF on a CanCOGeN case study, Sequencing the Crisis, that examines lessons learned during the pandemic that could inform new practices and policies on how we work across public services and with other sectors, with input from interviews with eight CanCOGeN leaders. Dr. Lopez-Correa presented the case study at the PPF Fall dinner (October 26), attended by over 400 federal policy influencers and leaders. The report was read more than 2,432 times on PPF's website in three days, making it the third most read page that month. Dr. Annan participated in a senior leader panel at the event discussing public trust and multisectoral collaboration, alongside keynote speaker Bob Rae, Ambassador and Permanent Representative of Canada to the UN.
- **Brookfield Institute for Innovation and Entrepreneurship and PPF.** In collaboration with the Brookfield Institute and PPF, we were a member of Canada's Moonshot: Charting a Mission-Oriented Innovation Strategy. The project was supported by an Expert Advisory Panel of which Pari Johnston, Vice-President of Policy and Public Affairs at Genome Canada is a member. In February 2022 it delivered a report called Canada's Moonshot: Solving grand challenges through transformational innovation, which examined a mission-oriented approach to innovation policy.

- **Let's Talk Science**. As part of a collaboration started in early 2021, Genome Canada and Let's Talk Science have provided outreach on genomics to high school students through five online symposia. In addition, the Royal Society of Canada, the Canadian Space Agency and Genome Alberta have partnered on sessions with us. Free and open to high schools across Canada and internationally, these sessions built curiosity/interest in genomics related to key challenge areas with next-generation scientists. Three symposia held in Fall 2021 (two in English and one in French) focused on One Health, climate change efforts on biological systems and AMR. The sessions featured a diverse panel of experts, thought leaders and researchers from across Canada. More than 4,000 young people have participated in these sessions since the inception of the partnership.

- **Summer internship for Indigenous peoples in Genomics Canada (SING Canada)**. We remain committed to a long-term partnership with SING Canada and support for the initiative's growth. This fiscal year the Enterprise (Genome Canada, Genome BC, Genome Prairie and Genome Atlantic) helped procure mobile genome sequencing kits from Oxford Nanopore to support the lab component of a Summer 2022 cohort initiative, #LandBack, with nine participants. We are also supporting a three-year Emerging Opportunities grant for SING's operations and long-term growth plan. SING presents opportunities to bring Indigenous knowledge and a decolonization lens to the field of genomics and build the next generation of Indigenous genomics leadership in Canada.

- **Black Excellence in Science, Technology, Engineering, Mathematics and Medicine/Health (BE-STEMM 2022)**. We were a Platinum Sponsor of the inaugural BE-STEMM event in Jan.-Feb. 2022, a four-day virtual conference supporting the research and careers of Black Canadians across a range of sectors, with a focus on removing barriers and boosting retention of these scholars. This bilingual, accessible event featured both established and early-career Black keynotes and showcased the work of scientists, educators, applied professionals, undergraduates and high school students. Programming included a Career Fair, Leadership Summit and other initiatives to support Black Canadians in STEMM.

- **Bio International 2021**. In June 2021 we sponsored a digital booth, which showcased the Enterprise as a pan-Canadian model of six regional Centres, in the Canada pavilion on the Global Marketplace virtual tradeshow floor. We attended sessions, networked, gathered inbound opportunities and reported back on key trends in the investment and technology development space in global biotechnology and biomanufacturing industries. This was part of a broader relationship with BIOTECanada, which included a Spring 2021 **op-ed on the future of Canadian life sciences** in the *Insights* magazine, featuring Drs. Annan and Douville.

- **The Conversation Canada (TCC)**. We continue our strategic partnership with TCC to advance the common goal of building public awareness of genomics science, technology and its broad benefits across sectors as well as the societal implications of genomics. More broadly, we are both supporting innovative digital media and a healthy journalism landscape in Canada; mobilizing knowledge; creating opportunities for early career, Indigenous and researchers from equity-deserving groups to showcase their research; and creating an enabling environment for evidence-informed policymaking.

- **Mission eDNA**. This citizen science program for school-age youth involves high school students across Quebec collecting genomic data to better understand the state of biodiversity in waterways through eDNA. Partnering with Génome Québec and the Fonds de recherche du Québec, we supported a pilot underway to adapt an established high school educational initiative for two Indigenous communities with up to 10 high schools. There may be long-term potential to expand the project across Quebec and eventually replicate it in other provinces.

Continued integration of genomics in society (GIS) and GE^{3}LS. GIS aspects are integrated across our programs and initiatives—from the start of design and planning, through execution and implementation, all the way to transition and hand off. We also continue to invest in GE^{3}LS interdisciplinary research to maximize impact and benefits. This includes continuing to fund large-scale standalone GE^{3}LS research projects, which allow researchers to delve deeply into critical issues. It also involves continuing to fund GE^{3}LS research as integrated components of large-scale genomic-based projects, which deliver key insights that inform projects from a broader societal perspective.

- **Continued funding of the Genomics in Society Interdisciplinary Research Teams program**. This $5.8 million knowledge translation program, launched in February 2019, brings researchers from different disciplines together to (i) investigate factors affecting the advancement, adoption, evaluation and governance of genomics research; and (ii) address issues at the intersection of genomics and society that will ultimately contribute to Canada's leadership and social and/or economic benefits in various sectors. It is designed to support and enhance GE3LS research that addresses important and overarching challenges that affect the adoption and uptake of the outcomes from genomics research and/or accelerate the synthesis and dissemination of research pertinent to users, including policymakers, within a sector. We invested $0.3 million in 2021-22.

- **Continued funding of research on the implications of genomics in society** (GE³LS) through LSARP. All LSARP projects undertake research on the application and implications of genomics in society with the potential to inform and help implement changes in practices or policies related to use of genomics research and innovation or enhance understanding of the implications for society more broadly. Since 2014, the LSARP program has committed an investment of $66.6 million, including co-funding, in GE³LS research.

- **Continued investment in the Joint Initiative with the Social Sciences and Humanities Research Council of Canada** (SSHRC) on Societal Implications of Genomics. This $2 million initiative jointly supports social sciences and humanities research and related activities that will enrich the understanding of the societal implications of genomic research. SSHRC is the lead on peer review as principal investigators apply through its regular programs. A total of 17 projects have been approved for funding through 2021-22 and are providing insight into topics that may inform future challenge areas such as consumer attitudes towards genetically modified food and enabling the growth of Indigenous-led and cross-cultural community-based wildlife monitoring programs that lead to a more resilient Arctic. This past year, we also worked with SSHRC on a long-term, forward-thinking partnership to inform and directly shape our key priorities and challenge areas. We co-created a Knowledge Synthesis Grants competition to mobilize social sciences and humanities research to examine and synthesize existing knowledge on the shifting dynamics of privilege and marginalization. The funding opportunity will be launched in September 2022.

SUPPORTING A 360-DEGREE SUSTAINABLE ECONOMY

One industry's waste is another's treasure. Genomics is enabling biological processes to support the circular economy—from taking **plastic waste** out of the environment through enzymes and bacteria that can break the plastics down into reusable chemicals and components, to turning **paper and pulp** industry waste into high value products. The Canadian Genomics Enterprise's investments in paper and pulp waste are **impacting the industry already**, with significant commitments to uptake.

The circular bioeconomy is a USD $7.7 trillion global opportunity. In Canada, the accelerated adoption of the circular bioeconomy is integral to a net-zero economy future with a projected $240 billion market in Canada by 2031. With the federal government committed to supporting the circular economy, including its biological components, genomics can continue to valorize by-products of production.

With collaboration across the Canadian Genomics Enterprise

OPERATING CHALLENGES IN 2021-22

An ongoing operating challenge for Genome Canada has been the current model of short-term funding agreements with the Government of Canada that present issues with strategic investment planning and additional challenges in the ability of Genome Canada and the six Centres to secure co-funding through medium- to long-term partnerships.

We welcomed the opportunity to participate in the Strategic Science Fund competition to secure longer-term federal funding that would position us as a more stable and credible partner with industry and the provinces and territories. We are now invited to submit a full proposal in September 2022. If successful, we would have predictable, stable and long-term funding that would mitigate our past operating challenges and enable us to deliver on a national action plan and strategically harness Canada's genomics ecosystem to address the major economic, environmental, health and social challenges of our time.

Over the last year, the COVID-19 pandemic has continued to present unique challenges for the research sector. With the closing of academic institutions around the country, there have been delays in research projects with research labs closed, childcare centres shuttering their doors and researchers no longer able to be in close physical proximity to their teams. Economic effects heightened the risk that co-funding would be difficult to obtain, as businesses and governments adjusted their budgets to account for reduced revenues. While the situation is now improving, we welcomed the COVID relief funding in our bridge funding for 2022-24 to provide support to affected projects, allowing them to deliver on project outputs, continue research infrastructure, and the maintain partnerships with provinces, industry, and other not-for-profit funders.

OPERATIONS AND MANAGEMENT

GOVERNANCE

Genome Canada is governed by its Board of Directors, comprising up to 16 individuals drawn from the academic, private and public sectors. Directors bring unique skills and experiences, as well as strong interests and insights to successfully fulfil our strategic plan. A Director may hold office for a maximum of three two-year terms, apart from the Chair, who may hold office as Director for a maximum of four two-year terms.

The Presidents of five federal research funding agencies—the Canada Foundation for Innovation, the Canadian Institutes of Health Research, the National Research Council, the Natural Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council—are non-voting, Ex-officio Advisors to the Board.

The Board has overall responsibility for the stewardship of our business and affairs. To help with the discharge of these duties, the Board has five standing committees:

1. **Audit and Investment Committee**
2. **Communications and Outreach Committee**
3. **Executive Committee**
4. **Governance, Election and Compensation Committee**
5. **Programs Committee**

Additionally, the Science and Industry Advisory Committee provides strategic advice to help Genome Canada achieve our objectives.

NUMBER OF MEETINGS HELD BY THE BOARD AND ITS COMMITTEES IN 2021–22

Board of Directors	5
Audit and Investment Committee	4
Communications and Outreach Committee	4
Executive Committee	0
Governance, Election and Compensation Committee	4
Programs Committee	4
Science and Industry Advisory Committee	2

BOARD OF DIRECTORS, EX-OFFICIO ADVISORS, AND SCIENCE AND INDUSTRY ADVISORY COMMITTEE MEMBERS IN 2021–22

BOARD OF DIRECTORS

Elizabeth Douville (Chair)
Founder and Managing Partner
AmorChem Venture Fund
Montreal, Quebec

Jim Farrell (Vice-Chair)
Forest Sector Consultant
Ottawa, Ontario

Rob Annan
President and CEO
Genome Canada
Ottawa, Ontario

Savage Bear (formerly, Tracy Bear)
Director, McMaster Indigenous Research Institute
Assistant Professor, Faculty of Social Sciences
McMaster University
Hamilton, Ontario
(as of June 2021)

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

Jennifer Gardy
Deputy Director, Surveillance, Data & Epidemiology
Bill & Melinda Gates Foundation
Chicago, Illinois, U.S.

Ivo Gut
Director, CNAG-CRG
Barcelona, Spain
(as of June 2021)

Ian Rae
Founder and CEO
CloudOps
Montreal, Quebec

Eddy Rubin
Director
Science Corps
San Francisco, California, U.S.

Bonnie Schmidt
Founder and President
Let's Talk Science
London, Ontario

Jacques Simoneau
Corporate Director
Montreal, Quebec

Andrew Stephens
Corporate Director and retired oil and gas executive
Calgary, Alberta

Éliane Ubalijoro
Director, Future Earth Canada Hub
Executive Director, Sustainability in the Digital Age
Montreal, Quebec
(as of June 2021)

Janet Wightman
Managing Partner
Kincannon & Reed
Regina, Saskatchewan

EX-OFFICIO ADVISORS

Alejandro Adem
President
Natural Sciences and Engineering Research Council of Canada
Ottawa, Ontario

Mitch Davies
President
National Research Council of Canada
Ottawa, Ontario
(until October 2021)

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

Roseann O'Reilly Runte
President and CEO
Canada Foundation for Innovation
Ottawa, Ontario

Iain Stewart
President
National Research Council of Canada
Ottawa, Ontario
(as of October 2021)

Michael J. Strong
President
Canadian Institutes of Health Research
Ottawa, Ontario

SCIENCE AND INDUSTRY ADVISORY COMMITTEE

Doane Chilcoat (Chair)
VP, Technology and Research Operations
Design Therapeutics
Carlsbad, California, U.S.

Anne-Christine Bonfils
Research Program Manager,
Vice-President's Office – Life Sciences
National Research Council of Canada
Ottawa, Ontario

Iain Gillespie
Principal and Vice-Chancellor
University of Dundee
Dundee, Scotland

Tina Hambuch
Global Lead Laboratory Director
Invitae
San Diego, California, U.S.

John MacKay
Wood Professor of Forest Science,
Department of Plant Sciences
University of Oxford
Oxford, England

Elaine R. Mardis
Professor of Pediatrics
Ohio State University College of Medicine
Columbus, Ohio, U.S.

Cami Ryan
Social Sciences Lead
Bayer Crop Science
St. Louis, Missouri, U.S.

Julie Segre
Senior Investigator
National Institutes of Health
Bethesda, Maryland, U.S.
(until June 2021)

Jeremy Shears
Chief Scientist - Biosciences
Shell
London, England

Wyeth Wasserman
Professor, Medical Genetics, University of British Columbia
Investigator, BC Children's Hospital Research Institute
Vancouver, British Columbia

Susan M. Wood-Bohm
President and CEO
Wood-Bohm and Associates
Douro-Dummer, Ontario

Rae S.M. Yeung
Professor of Pediatrics, Immunology and Medical Science, University of Toronto
Staff Rheumatologist, The Hospital for Sick Children
Toronto, Ontario

MANAGEMENT TEAM

Rob Annan
President and CEO

Scott Davies
Vice-President, Corporate Services and CFO
(until October 2021)

Pari Johnston
Vice-President, Policy and Public Affairs

Catalina Lopez-Correa
Chief Scientific Officer
(as of August 2021)

Dalia Morcos Fraser
Vice-President, Corporate Services and
Chief Financial Officer (as of May 2022)

Karl Tibelius
Vice-President, Genomics Programs (until April 2022)

"Congratulations on a well-earned retirement to Dr. Karl Tibelius, Vice-President, Genomics Programs. Karl has provided exceptional leadership to our national and international genomics programs for more than a decade, driving excellence in our peer review systems, program evaluation, research administration and science policies. Before this, Karl was instrumental in steering Canadian genomics research from its earliest days, first at the Medical Research Council and then its successor, CIHR. The impact of his contributions to Genome Canada and the full Canadian Genomics Enterprise will be felt for years to come."

– Dr. Rob Annan, President and CEO, Genome Canada

FINANCIAL MANAGEMENT

Genome Canada has invested approximately $4.3 billion in genomics research since our creation in 2000, of which the federal government has provided $1.8 billion, including investment income from this funding. The remaining $2.5 billion has come from national and international partners, including provincial governments and private- and public-sector partners. Our 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 required funding ratio for co-funding was 1:1 prior to 2012 and has risen to 1:1.4 since that time, reflective of our commitment to growing our partnership model.

We receive funding each year from the federal government based on the annual requirements of research projects. This funding goes to the six Genome Centres, which direct the funds to the 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 the graph below. Genome Canada and the Centres monitor total project investment. Genome Canada project leaders managed $184.0 million in funding in 2021-22, of which $81.0 million was from Genome Canada and $103.0 million from co-funding.

Genome Canada's operating costs were $6.6 million in 2021-22. Operations include activities relating to genomics programs, strategy, fundraising, policy and communications, genomics in society, governance, performance and evaluation, and administration.

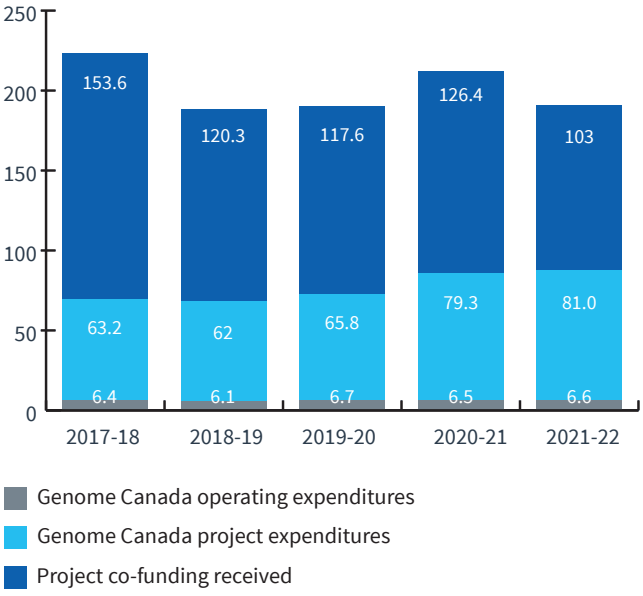
Our operating costs include the following remuneration. All Board members and Science and Industry Advisory Committee members receive remuneration from Genome Canada, and Genome Canada reimburses directors for expenses incurred in the performance of their duties. The compensation policy for our staff includes job classifications and related salary ranges. Our employees are eligible for annual performance awards ranging from 10% to 25%.

For positions that exceeded $100,000 in the year ended March 31, 2022, the following were the annual salary ranges:

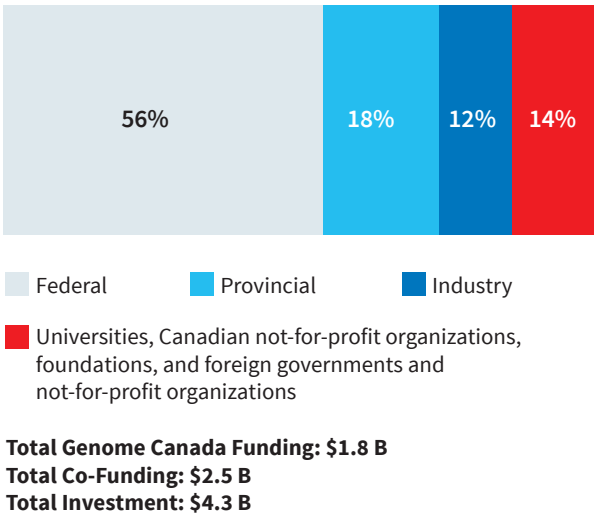
- President and CEO **$275,000 to $340,000**
- Vice-Presidents **$145,775 to $218,663**
- Directors (Band 4) **$113,281 to $169,922**
- Directors (Band 3) **$88,030 to $132,043**
- Managers (Band 2) **$68,407 to $102,611**

As of March 31, 2022, Genome Canada has $16.5 million in short-term investments recorded on the Statement of Financial Position at market value. These investments are administered in accordance with the Board's approved investment policy and the terms and conditions of the contribution agreement with the federal government. The investment policy remained unchanged this past fiscal year.

Annual activity (in millions of dollars)



Investment by Genome Canada and co-funders since 2000



Total Genome Canada Funding: $1.8 B
Total Co-Funding: $2.5 B
Total Investment: $4.3 B

ACKNOWLEDGMENTS

Genome Canada gratefully acknowledges the support of the Government of Canada, the lead investor in our challenge-driven genomics initiatives. This investment supports our focus on mobilizing Canada's genomics research, innovation, data and talent ecosystem on areas of strategic importance for Canada where genomics can make a vital difference to Canadians' prosperity and quality of life.

With funding from

Canada

We collaborate across Canada's research and innovation ecosystem in program development, delivery and policy dialogue, and wish to acknowledge a number of key organizations for their partnership last year. In addition to these, we are grateful for ongoing collaborations with universities, colleges and national higher education associations across the country.

- adMare
- Agriculture and Agri-Food Canada
- Agri-Food Innovation Council
- BIOTECanada
- Brookfield Institute for Innovation and Entrepreneurship
- Canadian Black Scientists Network
- Canadian Cancer Research Alliance
- Canadian Food Innovation Network
- Canadian Organization for Rare Disorders
- Canada Foundation for Innovation
- Canadian Institutes of Health Research
- Canadian Public Health Laboratory Network
- Canadian Science Policy Centre
- CGEn
- CIFAR
- Council of Canadian Academies
- CoVaRR-Net
- Digital Research Alliance of Canada
- Digital Technology Supercluster
- DNAstack and COVID Cloud
- Environment and Climate Change Canada
- Fisheries and Oceans Canada
- Global Alliance for Genomics and Health
- Genomics Research and Development Initiative
- Health Canada
- Indigenous Works
- Indspire
- Let's Talk Science
- McGill University Centre for Computational Genomics
- Mitacs
- Natural Resources Canada
- National Microbiology Laboratory
- National Research Council
- Natural Sciences and Engineering Research Council
- Office of the Chief Science Advisor
- Parliamentary Internship Programme
- Protein Industries Canada
- Public Health Agency of Canada
- Public Policy Forum
- Public Policy Projects
- Social Sciences and Humanities Research Council
- SING Canada
- Stem Cell Network
- Terry Fox Research Institute
- The Conversation Canada

APPENDICES

ACTIVE PROJECTS FUNDED 2020-21

LARGE-SCALE SCIENCE

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
LARGE-SCALE APPLIED RESEARCH PROJECTS (LSARP)						
Genome Alberta	Forestry	Cooke, Janice Cullingham, Catherine	University of Alberta Carleton University	TRIA-FoR: Transformative Risk Assessment and Forest Resilience Using Genomic Tools for the Mountain Pine Beetle Outbreak	$6,431,135	$2,999,994
Genome Alberta	Environment	Muench, Douglas Martineau, Christine	University of Calgary Natural Resources Canada	Application of Genomics to Enhance Wetland Treatment Systems for Remediation of Processed Water in Northern Environments	$6,379,093	$2,983,534
Genome British Columbia	Environment	Helbing, Caren Langlois, Valerie Dupras, Jérôme Bernatchez, Louis	University of Victoria Institut national de la recherche scientifique Université du Québec en Outaouais Université Laval	iTrackDNA: Non-Destructive Precision Genomics for Environmental Impact Tracking in a Global Climate Change Era	$11,979,761	$3,000,000
Genome British Columbia	Environment	Jones, Steven Murray, Maribeth	BC Cancer, Michael Smith Genome Sciences Centre University of Calgary	The Canadian BioGenome Project	$6,294,530	$2,999,963
Genome Alberta	Environment	Frasier, Timothy Hamilton, Philip	Saint Mary's University New England Aquarium	Conservation Genomics of the Endangered North Atlantic Right Whale	$6,020,874	$2,119,435
Genome Prairie	Environment	Stern, Gary Collins, Eric	University of Manitoba	GENICE II: Reimagining Monitored Natural Attenuation as an Oil Spill Response Strategy in the Arctic	$6,570,702	$2,998,477
Ontario Genomics	Environment	Yang, Laurence Zechel, David DiCenzo, George McLellan, P. James	Queen's University	Optimizing a Microbial Platform to Break Down and Valorize Waste Plastic	$7,675,843	$3,000,000
Ontario Genomics	Environment	Hebert, Paul	University of Guelph	BIOSCAN–Canada	$6,999,588	$3,000,000
Genome Alberta Ontario Genomics Genome British Columbia Génome Québec	Agriculture	Baes, Christine Stothard, Paul Cerri, Ronaldo Sirard, Marc-André	University of Guelph University of Alberta The University of British Columbia Université Laval	Integrating Genomic Approaches to Improve Dairy Cattle Resilience: A Vomprehensive Goal to Enhance Canadian Dairy Industry Sustainability	$12,541,132	$3,997,769
Genome British Columbia	Agriculture	Birol, Inanc	The University of British Columbia	PeptAid – Antimicrobial Peptides to Replace Antibiotics in Farm Veterinary Practice	$6,887,638	$3,441,747
Genome Prairie	Agriculture	Bett, Kirstin Vandenberg, Albert	University of Saskatchewan	Enhancing the Value of Lentil Variation for Ecosystem Survival (EVOLVES)	$7,432,398	$3,519,023
Genome Prairie Genome Alberta	Agriculture	Waldner, Cheryl Otto, Simon	University of Saskatchewan University of Alberta	Genomic ASSETS (Antimicrobial Stewardship Systems from Evidence-based Treatment Strategies) for Livestock	$5,678,154	$2,540,323
Genome Prairie Ontario Genomics	Agriculture	Pozniak, Curtis Cloutier, Sylvie	University of Saskatchewan Agriculture and Agri-Food Canada	4DWheat: Diversity, Discovery, Design and Delivery	$11,166,747	$3,999,856

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Génome Québec Ontario Genomics	Fisheries	Bernatchez, Louis Moore, Jean-Sebastian Fraser, Dylan J. Schott, Stephan	Université Laval Concordia University Carleton University	FISHES: Fostering Indigenous Small-Scale fisheries for Health, Economy, and Food Security	$14,404,554	$4,000,000
Ontario Genomics Genome British Columbia	Agriculture	Zayed, Amro Foster, Leonard	York University The University of British Columbia	BeeCSI: 'Omic Tools for Assessing Bee Health	$9,922,052	$3,849,471
Ontario Genomics Genome Prairie	Fisheries	Heath, Daniel Docker, Margaret Cooke, Steven J.	University of Windsor University of Manitoba Carleton University	GEN-FISH: Genomic Network for Fish Identification, Stress and Health	$9,072,963	$3,999,815
Genome Alberta	Health	Lewis, Ian Benediktsson, Hallgrimur	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	Health	Arbour, Laura Caron, Nadine Wasserman, Wyeth W.	The University of British Columbia BC Children's Hospital Research Institute	Silent Genomes: Reducing Health-Care Disparities and Improving Diagnostic Success for Indigenous Children with Genetic Disease	$9,673,479	$2,200,000
Genome British Columbia	Health	Carleton, Bruce C. Ross, Colin J.	The University of British Columbia	Genomic and Outcomes Database for Pharmacogenomics and Implementation Studies (Go-PGx)	$10,517,507	$1,899,963
Genome British Columbia	Health	Steidl, Christian Marra, Marco Scott, David	BC Cancer Research Centre The University of British Columbia	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 McGill University The University of British Columbia	GenCOUNSEL: Optimization of Genetic Counselling for Clinical Implementation of Genome-wide Sequencing	$3,943,809	$1,004,017
Genome British Columbia Génome Québec Genome Alberta	Health	Keown, Paul Sapir-Pichhadze, Ruth Caulfield, Timothy Bryan, Stirling	The University of British Columbia McGill University University of Alberta	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, Brett Subbarao, Padmaja	The University of British Columbia The Hospital for Sick Children	Childhood Asthma and the Microbiome - Precision Health for Life: The Canadian Healthy Infant Longitudinal Development (CHILD) Study	$8,580,968	$4,569,644
Génome Québec	Health	Sauvageau, Guy Hébert, Josée	Institute for Research in Immunology and Cancer Hôpital Maisonneuve-Rosemont	Interrogating and Implementing Omics for Precision Medicine in Acute Myeloid Leukemia	$12,785,000	$5,000,000
Génome Québec Genome British Columbia	Health	Rousseau, François Langlois, Sylvie	Université Laval The University of British Columbia	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	Jabado, Nada Taylor, Michael Majewski, Jacek	Research Institute of the McGill University Health Centre The Hospital for Sick Children	Tackling Childhood Brain Cancer at the Root to Improve Survival and Quality of Life	$12,997,397	$2,349,822
Génome Québec Ontario Genomics	Health	Simard, Jacques Chiarelli, Anna Maria	Université Laval Cancer Care Ontario	Personalized Risk Assessment for Prevention and Early Detection of Breast Cancer: Integration and Implementation	$15,217,975	$100,000

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Ontario Genomics	Health	Ratjen, Felix	The Hospital for Sick Children	Personalized Therapy for Individuals with Cystic Fibrosis	$9,488,508	$4,999,907
Ontario Genomics	Health	Stintzi, Alain Mack, David	University of Ottawa Children's Hospital of Eastern Ontario	Microbiome-Based Precision Medicine in Inflammatory Bowel Disease	$9,266,995	$4,555,624
Ontario Genomics Genome Alberta	Health	Yeung, Rae S.M. Benseler, Susanne M.	The Hospital for Sick Children University of Calgary	UCAN CURE: Precision Decisions for Childhood Arthritis	$9,298,208	$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 Research Institute The Hospital for Sick Children University of Calgary The University of British Columbia	Care4Rare Canada: Harnessing Multi-Omics to Deliver Innovative Diagnostic Care for Rare Genetic Diseases in Canada (C4R-SOLVE)	$10,096,606	$2,198,898
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 Atlantic	Energy	Gieg, Lisa Wolodko, John Khan, Faisal	University of Calgary University of Alberta Memorial University	Managing Microbial Corrosion in Canadian Offshore and Onshore Oil Production	$7,850,739	$2,307,750
Genome Alberta Genome Prairie	Environment	Hubert, Casey Stern, Gary	University of Calgary University of Manitoba	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 M. Koop, Ben Farrell, Anthony	The University of British Columbia University of Victoria	Sustaining Freshwater Recreational Fisheries in a Changing Environment	$4,386,173	$1,460,163
Genome British Columbia Génome Québec	Forestry	Bohlmann, Joerg Bousquet, Jean	The University of British Columbia Université Laval	Spruce-Up: Advanced Spruce Genomics for Productive and Resilient Forests	$10,417,352	$3,000,000
Genome British Columbia Génome Québec	Forestry	Hamelin, Richard Duff, Cameron Porth, Ilga	The University of British Columbia Canadian Food Inspection Agency Université Laval	BioSurveillance of Alien Forest Enemies (BioSAFE)	$8,730,760	$2,763,989
Génome Québec	Environment	Sauvé, Sébastian Shapiro, Jesse Dorner, Sarah	Université de Montréal Polytechnique 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 University of Saskatchewan Environment and Climate Change Canada	EcoToxChip: A Toxicogenomics Tool for Chemical Prioritization and Environmental Management	$9,786,922	$3,104,002
Ontario Genomics	Environment	Lougheed, Stephen C. van Coeverden de Groot, Peter Whitelaw, Graham Dyck, Markus	Queen's University Government of Nunuvut	BEARWATCH: Monitoring Impacts of Arctic Climate Change using Polar Bears, Genomics and Traditional Ecological Knowledge	$9,219,247	$2,708,282
Ontario Genomics	Mining	Warren, Lesley A. Banfield, Jillian	The University of Toronto	Mine Wastewater Solutions: Next Generation Biological Treatment through Functional Genomics	$3,682,691	$1,181,739
Ontario Genomics Genome British Columbia	Forestry	Master, Emma Brumer, Harry	The University of Toronto The University of British Columbia	SYNBIOMICS: Functional Genomics and Techno-Economic Models for Advanced Biopolymer Synthesis	$10,725,222	$2,830,771

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Genome British Columbia	Agriculture	Rieseberg, Loren H. Burke, John M.	The 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	The University of British Columbia York University	Sustaining and Securing Canada's Honey Bees Using 'Omic Tools	$7,263,568	$2,786,531
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 C.	McGill University Université Laval	A SystOMICS Approach to Ensuring Food Safety and Reducing the Economic Burden of Salmonellosis	$9,708,401	$3,787,861
Ontario Genomics	Fisheries	Walker, Virginia K. Lougheed, Stephen C. Schott, Stephan van Coeverden de Groot, Peter	Queen's University Carleton University	Towards a Sustainable Fishery for Nunavummiut	$5,652,792	$2,124,674
Genome Québec	Health	Perreault, Claude Roy, Denis-Claude		Personalized Cancer Immunotherapy	$13,486,784	$2,409,386
EMERGING ISSUES						
Genome Prairie	Agriculture	Murphy, Lee Anne Navabi, Katayoon	University of Manitoba	DivSEEK International Network	$742,073	$242,073
Genome Alberta	Health	Pillai, Dylan R.	University of Calgary	Development and Implementation of Rapid Metagenomic Sequencing Coupled with Isothermal Amplification Point of Care Testing for Viral Diagnostics	$957,700	$244,715
Genome Atlantic	Health	Hatchette, Todd Ogden, Nicholas Lindsay, Robbin	Dalhousie University Public Health Agency of Canada	Lyme Disease in NS: The Influence of Strain Variation on Clinical Disease	$780,801	$242,800
Genome British Columbia	Health	Hieter, Philip	The University of British Columbia	Research Network: Expanding Collaboration between Basic and Clinician Scientists in Functional Studies of Novel Rare Diseases	$1,679,500	$560,000
Genome British Columbia	Health	Pimstone, Simon Krajden, Mel Penninger, Josef Bubela, Tania	The University of British Columbia British Columbia Center for Disease Control Simon Fraser University	SARS□CoV□2 Study for Eased Restrictions in British Columbia (SAfER BC)	$1,215,596	$237,500
Ontario Genomics	Health	Goodridge, Lawrence Delatolla, Robert	University of Guelph Univesrity of Ottawa	Ontario SARS-CoV-2 Variants of Concern Surveillance in Wastewater Pilot Program	$338,446	$237,500
CANADIAN COVID-19 GENOMICS NETWORK (CANCOGEN)						
All	Health	CGen - Canada's platform for genome sequencing and analysis	The Hospital for Sick Children	HostSeq: Sequencing of Genomes of Canadian Human Hosts of SARS-CoV-2 Viral Samples	$19,250,000	$19,250,000
All	Health	VirusSeq Implementation Committee	Canadian Public Health Laboratory Network (CPHLN)	VirusSeq: Capacity Building for Large-Scale SARS-CoV-2 Genomic Surveillance in Canada	$7,468,072	$7,468,072
All	Health	VirusSeq Implementation Committee	Canadian Public Health Laboratory Network (CPHLN)	VirusSeq: Sequencing of Genomes of Canadian SARS-CoV-2 Viral Samples	$8,102,092	$8,102,092

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Genome British Columbia	Health	William Hsiao	Simon Fraser University	VirusSeq: Metadata Specifications Development, Sharing and Curation	$932,500	$932,500
Genome British Columbia	Health	Terrance Snutch	The University of British Columbia	VirusSeq: ARTIC Protocol Development and Modification	$188,968	$188,968
Genome British Columbia	Health	Fiona Brinkman	Simon Fraser University	VirusSeq: IRIDA Support and Dissemination	$80,000	$80,000
Génome Québec	Health	Yann Joly	McGill University	VirusSeq: Ethics & Governance	$428,740	$428,740
Ontario Genomics	Health	Jared Simpson	Ontario Institute for Cancer Research (OICR)	VirusSeq: Development of Quality Control Criteria and Standards	$200,000	$200,000
Génome Québec	Health	Guillaume Bourque	McGill University	VirusSeq: National Data Portal	$1,100,000	$1,100,000
NATIONAL AND INTERNATIONAL INITIATIVES						
Ontario Genomics Genome Alberta	Health	Dirks, Peter Weiss, Samuel	The Hospital for Sick Children University of Calgary	Brain Cancer Stem Cell Dream Team	$10,577,948	$8,500,000
Génome Québec	Health	Knoppers, Bartha Maria	McGill University	Can-SHARE Connect (2019-2020): Supporting the Regulatory and Ethics Work Stream	$500,000	$166,667
Génome Québec	Health	Knoppers, Bartha Maria	McGill University	Canadian Genomics Partnership for Rare Disease - The Regulatory and Ethics Toolbox	$329,715	$244,715
Ontario Genomics	Health	Goodhand, Peter	Ontario Institute for Cancer Research	Canadian Genomics Partnership for Rare Disease	$488,000	$244,000
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	Health	Stein, Lincoln	The University of Toronto	Advancing Big Data Science in Genomics Research Project - The Cancer Genome Collaboratory	$5,999,860	$2,000,000
Genome Alberta	Health	Zovoilis, Athanasios	University of Lethbridge	BioNet Alberta	$2,950,000	$950,000
Genome Atlantic	Health	Alda, Martin Uher, Rudolf	Nova Scotia Health Authority Dalhousie University	Early Detection of Bipolar Disorder and Optimized Selection of Long Term Treatment	$974,996	$199,996
Genome Atlantic	Fisheries	Hori, Tiago	PEI Department of Agriculture and Fisheries	Breeding Better Blue Mussels (Mytilus edulis): Developing Genomic Tools for the Implementation of a Modern and Sustainable Mussel Breeding Program	$779,339	$200,000
Genome Atlantic	Health	Joly, David Filion, Martin	Université de Moncton	TRICHUM: Translating Research into Innovation for Cannabis Health at Université de Moncton	$1,227,800	$200,000
Genome British Columbia	Health	Bryan, Stirling Austin, Jehannine	The University of British Columbia	Towards Clinical Implementation of Pharmacogenomics to Improve the Treatment of People with Depression in BC	$1,449,460	$483,154
Genome British Columbia	Health	Hoang, Linda Eloranta, Katie	The University of British Columbia BC Centre for Disease Control Canadian Food Inspection Agency	Unified Pathogen Control Onehealth Approach Specifically Targeting Vibrio (UPCOAST-V)	$498,010	$166,003
Genome British Columbia	Agriculture	Lu, Xiaonan Hsiao, William	The University of British Columbia BC Centre for Disease Control	One Health Syst-Omics Approach to Reduce Campylobacter in Agri-Food Chain	$500,000	$166,667

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Genome British Columbia	Environment	Prystajecky, Natalie Levett, Paul	The University of British Columbia BC Centre for Disease Control	Unified Pathogen Control One Health Approach Specifically Targeting Norovirus (UPCOAST-N)	$499,990	$166,663
Genome Prairie	Agriculture	Pozniak, Curtis	University of Saskatchewan	An Integrated Approach for Enhancing Fusarium Head Blight Resistance in Durum	$1,475,000	$475,000
Genome Prairie		Spriggs, Beth Wilcox, Ayn Banerji, Shantanu	SharedHealth Inc. CancerCare Manitoba SharedHealth Inc.	Genome360 Phase II: Manitoba`s Provincial Applied Genomics Enterprise Platform	$2,027,496	$475,000
Génome Québec		Lettre, Guillaume Gravel, Simon	Montréal Heart Institute McGill University	Whole-Genome Sequence Reference-Québec (GenoRef-Q) Initiative	$3,402,974	$1,000,000
Ontario Genomics	Agriculture	Baes, Christine Lohuis, Michael	University of Guelph Semex Alliance	Precision Fertility and Resiliency Phenotyping in Dairy Cattle	$499,899	$166,633
Ontario Genomics	Agriculture	Barta, John Brisbin, Jennifer	University of Guelph Ceva Animal Health Inc.	A Genomics-Derived Assay for Rapid Determination of Eimeria spp. Oocyst Viability: Improving Coccidiosis Management in the Poultry Industry	$366,628	$122,210
Ontario Genomics	Agriculture	Emery, Neil Tanaka, Kelly	Trent University NutriAg Ltd.	Metabolomic-Based Strain Selection of Microbial Bioinoculants which Alleviate Impacts of Drought Stress in Crop Production	$358,250	$119,417
Ontario Genomics	Agriculture	Eskandari, Milad Reid, Jeff	University of Guelph SeCan	Using New Emerging Genomic Tools to Improve Soybean Yield and Seed Compositions in Ontario	$180,000	$60,000
Ontario Genomics	Agriculture	Lee, Elizabeth Cowan, Josh	University of Guelph Grain Farmers of Ontario	Application of Genomic-Based Technologies to Improve the Rate of Genetic Gain in Ontario Winter Wheat Breeding	$400,000	$133,333
Ontario Genomics	Agriculture	Lu, Ray Vanderbroek, Dave	University of Guelph Alliance Genetics Canada	Genomics Tools to Reduce Sow Stress and Improve Piglet Survival and Overall Performance	$480,000	$160,000
Ontario Genomics	Agriculture	Saxena, Praveen Yates, Barbara	University of Guelph Ferrero Canada	Introducing Cold Tolerance in Hazelnut	$274,058	$91,352
Ontario Genomics	Agriculture	van der Merwe, George Preiss, Richard	University of Guelph Escarpment Laboratories	Development of an Omics-Driven Beer Yeast Performance Database to Support the Ontario Craft Brewing Industry	$366,165	$122,055
Ontario Genomics	Health	Duggan, Ana	McMaster University	Jenner's Legacy: Uncovering the Origins and Dissemination of Smallpox Vaccines in the 19th-20th Centuries	$48,030	$24,015
Ontario Genomics	Health	Gattinger, Monica	University of Ottawa	@Risk: Strengthening Canada's Ability to Manage Risk	$195,166	$97,583
Génome Québec	Health	Clausius, Katharina	Université de Montréal	Participatory Democracy and the Canadian Genetic Non-Discrimination Act	$61,295	$30,648
Génome Québec	Health	Whitley, Rob	McGill University	So My Dad is Not My Dad: Investigating the Psychosocial Experience of Adults Learning 'Not Parent Expected' News from an Ancestry DNA Test	$73,948	$36,974
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

LEADING-EDGE TECHNOLOGY

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
CORE OPERATIONS SUPPORT FOR TECHNOLOGY PLATFORMS						
Genome Alberta Genome British Columbia Génome Québec	All	Wishart, David Borchers, Christoph Li, Liang	University of Alberta McGill University	The Metabolomics Innovation Centre	$8,088,844	$8,088,844
Genome British Columbia	All	Marra, Marco Jones, Steven Hirst, Martin	BC Cancer The University of British Columbia	BC Cancer Agency Genome Sciences Centre Genomics Technology Platform	$8,101,750	$8,101,750
Genome British Columbia Génome Québec	All	Goodlett, David Borchers, Christoph Foster, Leonard	University of Victoria McGill University The University of British Columbia	The Pan-Canadian Proteomics Centre	$8,115,330	$8,115,330
Génome Québec	All	Lathrop, Mark Ragoussis, Ioannis Bourque, Guillaume Pastinen, Tomi	McGill University	McGill Applied Genomics Innovation Core	$8,111,584	$8,111,584
Génome Québec	All	Thibault, Pierre Tyers, Michael	Université de Montréal	Centre for Advanced Proteomic and Chemogenomic Analyses	$3,014,780	$3,014,780
Génome Québec Ontario Genomics	All	Bourque, Guillaume Brudno, Michael	McGill University The Hospital for Sick Children	Canadian Centre for Computational Genomics	$6,206,097	$6,206,097
Ontario Genomics	All	Awadalla, Philip Bartlett, John Pugh, Trevor Simpson, Jared Stein, Lincoln	Ontario Institute for Cancer Research	Canadian Data Integration Centre	$5,665,792	$5,665,792
Ontario Genomics	All	Scherer, Stephen Strug, Lisa	The Hospital for Sick Children	The Centre for Applied Genomics	$8,110,420	$8,110,420
Ontario Genomics	All	Wrana, Jeff Gingras, Anne-Claude	Lunenfeld-Tanenbaum Research Institute Sinai Health System	Network Biology Collaborative Centre	$4,457,958	$4,457,958
Ontario Genomics Génome Québec	All	Justice, Monica Vidal, Sylvia	The Hospital for Sick Children McGill University	The Centre for Phenogenomics	$5,346,369	$5,346,369
BIOINFORMATICS AND COMPUTATIONAL BIOLOGY						
Genome Alberta	Agriculture	Stothard, Paul Van Domselaar, Gary	University of Alberta Public Health Agency of Canada	A Comprehensive Analytical Toolkit and High-Performance Genome Browser for Rapid, Reliable and In-Depth Characterization of Bacterial Genomes	$940,977	$458,368
Genome Atlantic Ontario Genomics	Agriculture	Beiko, Rob McArthur, Andrew	Dalhousie University	Rapid Prediction of Antimicrobial Resistance from Metagenomics Samples: Data, Models, and Methods	$1,398,943	$499,051
Genome British Columbia	Environment	Birol, Inanc	BC Cancer Agency	AnnoVis: Annotation and Visualization of De Novo Genome and Transcriptome Assemblies	$1,000,000	$500,000

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Genome British Columbia	Health	Borchers, Christoph Mohammed, Yassene	University of Victoria	Proteogenomics-Improved and-Guided Quantification Pipeline (PIGQpipe): Targeted Proteomics with Internal Proteogeno-typic Peptide Standards to Quantify Variants Identified by Proteogenomic Experiments	$556,472	$273,860
Genome British Columbia	Health	Foster, Leonard Wishart, David	The University of British Columbia University of Alberta	Illuminating the Dark Matter of the Metabolome with Convolutional Neural Networks	$500,000	$250,000
Genome British Columbia	Environment	Hallam, Steven	The University of British Columbia	Global Scale Metabolic Pathway Reconstruction from Environmental Genomes	$1,028,699	$499,962
Genome British Columbia	Agriculture	Hsiao, William Van Domselaar, Gary	The University of British Columbia Public Health Agency of Canada	Bioinformatics Tools to Enable Federated, Real Time Genomic Epidemiology Data Sharing and Analysis in a One Health Framework	$1,164,488	$500,000
Genome British Columbia	Health	Joy, Jeffrey B. Montaner, Julio S.G.	The University of British Columbia	Development and Implementation of Bioinformatics Tools for HIV and HCV Phylogenetic Monitoring Platforms	$1,249,397	$499,992
Genome British Columbia	Health	Libbrecht, Maxwell Chindelevitch, Leonid Shapiro, Jesse	Simon Fraser University McGill University	Machine Learning Methods to Predict Drug Resistance in Pathogenic Bacteria	$1,000,000	$499,886
Génome Québec	Health	Blanchette, Mathieu Majewski, Jacek Waldispühl, Jérôme	McGill University	Bioinformatics Tools for Integrative 3D Epigenomics	$1,122,405	$500,000
Génome Québec	Health	Bourque, Guillaume Joly, Yann	McGill University	Epigenomics Secure Data Sharing Platform for Integrative Analyses (EpiShare)	$1,000,000	$500,000
Génome Québec	Agriculture	Butler, Gregory	Concordia University	TooT Suite: Predication and Classification of Membrane Transport Proteins	$600,000	$300,000
Génome Québec	Agriculture	Diallo, Abdoulaye Baniré Sirard, Marc-André	Université du Québec à Montréal Université Laval	Bioinformatics and Artificial Intelligence to Leverage Predictive Models of Dairy Production	$1,004,258	$499,070
Génome Québec	Health	Greenwood, Celia Oualkacha, Karim	Lady Davis Institute for Medical Research Université du Québec à Montréal	Precision Medicine in Cellular Epigenomics	$660,512	$317,220
Génome Québec	Health	Najmanovich, Rafael	Université de Montréal	Next-Generation Molecular Docking Leveraging Artificial Intelligence Techniques to Understand Large-Scale Ligand Binding Data Sets	$500,000	$250,000
Génome Québec	Environment	Xia, Jianguo Basu, Niladri	McGill University	Development and Validation of a Web-Based Platform for Environmental Omics and Toxicology	$1,047,507	$500,000
Génome Québec	Health	Xia, Jianguo Bourque, Guillaume Jacques, Pierre-Etienne	McGill University Université de Sherbrooke	An Integrative Platform for Metabolomics and Systems Biology	$1,094,607	$500,000
Ontario Genomics	Environment	Adamowicz, Sarah Hebert, Paul	University of Guelph	Extracting Signal from Noise: Big Biodiversity Analysis from High-Throughput Sequence Data	$482,070	$250,000
Ontario Genomics	Health	Boone, Charles Myers, Chad L.	The University of Toronto University of Minnesota	BridGE-SGA: A Novel Computational Platform to Discover Genetic Interactions Underlying Human Disease	$990,910	$494,552

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Ontario Genomics	Health	Gingras, Anne-Claude Rost, Hannes	Lunenfeld-Tanenbaum Research Institute The University of Toronto	Computational Tools for Data-Independent Acquisition (DIA) for Quantitative Proteomics and Metabolomics	$1,000,000	$500,000
Ontario Genomics	Health	Haibe-Kains, Benjamin	University Health Network	SYNERGx: A Computational Framework for Drug Combination Synergy Prediction	$972,700	$486,336
Ontario Genomics	Health	Ma, Bin Moran, Michael	University of Waterloo Hospital for Sick Children	Software for Peptide Identification and Quantification from Large Mass Spectrometry Data using Data Independent Acquisition	$925,987	$462,998
Ontario Genomics	Forestry	Provart, Nicholas Bohlmann, Joerg	The University of Toronto The University of British Columbia	From ePlants to eEcosystems: New Frameworks and Tools for Sharing, Accessing, Exploring and Integrating 'Omic Data from Plants	$999,999	$499,999
Ontario Genomics	Health	Pugh, Trevor Brudno, Michael	Princess Margaret Cancer Centre Hospital for Sick Children	CReSCENT: CanceR Single Cell ExpressioN Toolkit	$917,861	$499,900
Ontario Genomics	Health	Stein, Lincoln Fiume, Mark	Ontario Institute for Cancer Research DNAstack	Dockstore 2.0: Enhancing a Community Platform for Sharing Cloud-Agnostic Research Tools	$809,249	$437,610
Génome Québec	Health	Juncker, David	McGill University	Digital Omics of Single Exosomes	$2,001,438	$667,157
Génome Québec	Health	Lécuyer, Eric Blanchette, Mathieu Waldispühl, Jérôme	Institut de recherche clinique de Montréal McGill University	The RNA Zipcode Discovery Pipeline: Emerging Tools for Therapeutic Targeting at Subcellular Resolution	$3,164,100	$999,997
Ontario Genomics	Health	Boone, Charles Moffat, Jason	The University of Toronto	AbSyn Technology for Identification of Synergistic Cancer Therapeutics	$2,468,009	$896,331
Ontario Genomics	Health	Figeys, Daniel Stinzi, Alain	University of Ottawa	RapidAIM: A Technology to Rapidly Assess the Effects of Compounds on Individual Microbiomes	$2,888,563	$757,358
Ontario Genomics	Health	Shlien, Adam Dowling, James	Hospital for Sick Children	Beyond the Genome: Transcriptome Based Diagnostics for Rare Diseases and Cancer	$2,999,944	$999,419
Ontario Genomics	Health	Stagljar, Igor	The University of Toronto	Interactome Mapping of Disease-Related Proteins Using Split Intein-Mediated Protein Ligation (SIMPL)	$2,223,117	$741,039
Ontario Genomics	Health	Wheeler, Aaron Kolomietz, Elena Chitayat, David	The University of Toronto Sinai Health Systems	Development of a Digital Microfluidic Platform to Identify and Target Single Cells from a Heterogeneous Cell Population for Lysis in an Ultra-Low Volume for Non-Invasive Prenatal Diagnosis	$3,002,970	$1,000,000
Ontario Genomics	Health	Stagljar, Igor	The University of Toronto	The Mammalian Membrane Two-Hybrid (MaMTH) Assay - an Advanced Proteomics Technology for Biomedical Research	$3,034,211	$1,000,000
Ontario Genomics	Health	Emili, Andrew	The University of Toronto	Massively Parallel Single Molecule Protein Sequencing in Situ	$250,000	$250,000

TRANSLATION

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
GENOMIC APPLICATIONS PARTNERSHIP PROGRAM						
Genome Alberta	Fisheries	Fast, Mark Frisch, Kathleen Hewison, Tim	University of Prince Edward Island Cermaq Canada Grieg Seafood	Complex Gill Disease Initiative (CGDI)	$4,690,770	$1,537,846
Genome Prairie	Health	Rockman-Greenberg, Cheryl Topp, Adam	University of Manitoba Shared Health	Canadian Prairie Metabolic Network	$6,068,618	$1,996,716
Génome Québec	Agriculture	Belzile, Francois Cowan, Josh	Université Laval Canadian Field Crop Research Alliance and Grain Farmers of Ontario	Development and Implementation of a Toolkit for Genomics-Assisted Breeding in Soybean	$7,001,050	$2,000,000
Genome Québec	Agriculture	Robert, Claude Dion, Nicole	Université Laval Olymel	ALPHAgenomics: Integrating Genomics and Phenomics for the Swine Industry	$1,998,527	$649,649
Génome Québec	Agriculture	Tsang, Adrian Escobar, Jeffery	Concordia University Elanco Animal Health Eli Lilly and Company	Lysozyme Feed Additives to Improve Gut Health and Productivity of Food Animals for Swine and Poultry	$6,147,400	$2,000,000
Ontario Genomics	Health	Bartlett, John Sadis, Seth	Ontario Institute for Cancer Research Thermo Fisher Scientific	Development of an Epigenomic Profiling Tool to Facilitate Precision Medicine in Early Breast Cancer	$2,400,000	$800,001
Ontario Genomics	Environment	Ensminger, Ingo Isabel, Nathalie	The University of Toronto Natural Resources Canada	Fast Track Diagnosis of Stress, Disease, Phenology and Growth - Drone-based High-Throughput Field Phenotyping for Genome Assisted Tree Breeding and Selection (FastPheno)	$4,744,502	$1,581,501
Ontario Genomics	Health	McPherson, Peter Raina, Chetan	McGill University YCharOS Inc.	Antibody Characterization for Open Science – Towards Characterized Antibodies for the Human Proteome	$3,979,175	$959,982
Genome British Columbia	Agriculture	Poojari, Sudarsana Zhang, Xuekui Rott, Mike Schenck, Bill	Brock University University of Victoria Canadian Food Inspection Agency Canadian Grapevine Certification Network	CLEan plAnt extractioN SEquencing Diagnostics (CLEANSED) for Clean Grapevines in Canada	$6,228,081	$2,000,000
Genome British Columbia	Agriculture	Rieseberg, Lorne Baute, Greg	The University of British Columbia	Fast-Track Breeding of Powdery Mildew-Resistant Cannabis	$4,265,446	$1,421,673
Genome Québec	Agriculture	Bélanger, Richard Vivancos, Julien	Université Laval Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec	Development and Validation of a Genomic-Based Diagnostic Tool of the Virulence Profile of Phytophthora Sojae, a Major Pathogen of Soybean	$3,259,878	$956,081
Genome Québec	Environment	Sunday, Jennifer Rubidge, Emily Stanley, Ryan	McGill University Fisheries and Oceans Canada Fisheries and Oceans Canada	Optimizing the eDNA Approach to Monitor Biodiversity in Canada's Marine Protected Areas	$757,409	$242,100
Genome Alberta	Agriculture	Dyck, Michael Kemp, Bob	University of Alberta PigGenCanada	Application of Genomics-based Tools to Select for Pig Disease Resilience	$1,026,200	$340,200
Genome Atlantic	Health	Bedard, Karen Vandersteen, Anthony Brock, Jo Ann Dyack, Sarah	Dalhousie University IWK Health Centre	Implementation of Clinical Exomes in a Pre- and Peri-Natal Setting	$4,758,489	$1,580,695

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Génome Québec	Agriculture	Martin, Vincent Pouliot, Michel	Concordia University Agropur Cooperative	Bioprocess Development for Lactose Valorisation	$1,950,000	$650,000
Ontario Genomics	Environment	Wilson, Paul Roberts, Mary Jane	Trent University Environment and Climate Change Canada	Caribou Genomics: A National Non-Invasive Monitoring Approach for an Iconic Model Species-At-Risk	$4,631,620	$1,354,800
Ontario Genomics Génome Québec	Health	Goodridge, Lawrence Levesque, Roger Landgraff, Chrystal	University of Guelph Université Laval Public Health Agency of Canada	Stopping Enteric Illnesses Early (Sentinel)	$6,490,662	$1,907,690
Genome Alberta	Health	Bernier, Francois O'Hara, Carolyn	University of Calgary Alberta Precision Laboratories	TIGeR: Translational Implementation of Genomics for Rare diseases	$6,089,492	$2,000,000
Génome Québec	Health	Gilbert, Lucy Rouleau, Guy	McGill University OPTILAB - McGill University Health Centre	Detecting Ovarian and Endometrial Cancer Early Using Genomics (DOvEEgene)	$6,241,573	$2,000,000
Ontario Genomics	Energy	Rehmann, Lars Paik, Nak	University of Western Ontario World Energy Hamilton	Strain Development for Butanol Process Addition to Existing Biodiesel Plants	$796,745	$265,499
Genome British Columbia	Health	Lehman, Anna Ivany, Craig	The University of British Columbia Provincial Health Services Authority	Implementation of Diagnostic Whole Genome Sequencing for Rare Diseases in British Columbia	$8,124,794	$1,999,086
Ontario Genomics	Health	Sadikovic, Bekim Kadour, Mike	Lawson Health Research Institute/ Western University London Health Sciences Centre	Beyond Genomics: Assessing the Improvement in Diagnosis of Rare Diseases using Clinical Epigenomics in Canada (EpiSign-CAN)	$4,787,447	$1,588,260
Génome Québec	Health	Michaud, Jacques Ouellet, Denis	CHU Sainte-Justine Ministère de la Santé et des Service sociaux	Rapid Whole-Genome Sequencing in Acute Care Neonates and Infants	$6,165,469	$2,000,000
Ontario Genomics	Health	Cowen, Leah Jaikaran, Dominic	The University of Toronto Bright Angel Therapeutics	Targeting Fungal Stress Responses to Provide First-in-Class Treatment for Drug Resistant Fungal Pathogens	$5,516,034	$1,986,029
Génome Québec	Health	Waldispühl, Jérôme Szantner, Attila	McGill University Massively Multiplayer Online Science	Crowdsourcing Sequence Alignments in a AAA Game for Microbiome Research	$2,953,319	$803,250
Ontario Genomics	Health	Boycott, Kym Somerville, Martin Sarta, Neeta	Children's Hospital of Eastern Ontario Research Institute The Hospital for Sick Children Ontario Ministry of Health	Optimization and Implementation of a Clinical Genome-Wide Sequencing Service for Rare Disease Diagnosis in Ontario	$6,000,000	$2,000,000
Ontario Genomics	Health	McQuibban, Angus Li, Zheng	The University of Toronto Cyclica Inc.	Validating and Improvement of in Silico Proteome Screening and Drug Design Technologies by Experimental Drug Discovery for Neurodegenerative Diseases	$2,303,527	$609,776
Genome Atlantic Genome Alberta	Energy	Hubert, Casey Ventura, Todd MacDonald, Adam	University of Calgary Saint Mary's University Nova Scotia Department of Energy	Validation and Integration of Genomics Solutions for Offshore Oil Exploration in Nova Scotia and Beyond	$6,479,444	$1,999,864
Genome Prairie Génome Québec	Environment	Palace, Vince Smyth, Patrick	IISD - Experimental Lakes Area Canadian Association of Petroleum Producers	Floating Wetland Treatments to Enhance Remediation (FLOWTER)	$3,905,267	$1,119,560

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Génome Québec	Agriculture	Labrie, Steve Fraud, Sebastian	Université Laval General Mills	Genomic-Based Approach to Optimize the Development of Texturizing Bacterial Strains in Yogurt	$1,170,675	$390,225
Ontario Genomics	Health	Moffat, Jason Singh, Sheila	The University of Toronto Century Therapeutics	Systematic Evaluation and Optimization of Immune-Targeting Modalities for GBM and Brain Metastases	$4,581,669	$1,375,100
Genome Atlantic	Fisheries	Bernatchez, Lewis Mallet, André	Université Laval L'Étang Ruisseau Bar Ltd	Genomics for Developing the First Canadian Production Ready Strain of Selectively Bred Eastern Oyster	$3,806,291	$1,249,924
Génome Québec	Health	Borchers, Christoph Spatz, Alan Leduc, Claude	Lady Davis Institute Jewish General Hospital MRM Proteomics Inc.	Developing the Next Generation PD-L1 Assays Using Precision Mass Spectrometry	$1,449,026	$478,138
Ontario Genomics	Environment	Edwards, Elizabeth A. Dworatzek, Sandra	The University of Toronto SiREM	Field Validation of Technologies for Anaerobic Benzene and Alkylbenzene Bioremediation	$2,752,161	$926,160
Ontario Genomics	Health	Bartlett, John Sadis, Seth	Ontario Institute for Cancer Research Thermo Fisher Scientific	Targeted Next Generation Sequencing Panels for Clinical Disease Management	$6,000,000	$2,000,000
Ontario Genomics	Health	Hawkins, Cynthia Ferree, Sean	The Hospital for Sick Children Nanostring Technologies	NanoString nCounter Vantage 3D Platform-Based Complementary Diagnostic Tests for Precision Medicine in Pediatric Cancers	$4,045,291	$1,300,000
Ontario Genomics	Environment	Hajibabaei, Mehrdad Hendriks, Elizabeth	University of Guelph World Wildlife Fund Canada	Assessing Freshwater Health Through Community Based Environmental DNA Metabarcoding	$2,608,784	$866,852
Ontario Genomics	Health	Kelley, Shana Ambler, Natalie	The University of Toronto Charlotte Products Ltd.	Devices for Detection and Identification of Surface Microbial Contamination in High-Risk Facilities	$4,469,365	$1,485,636
Ontario Genomics	Agriculture	Mallard, Bonnie Lohuis, Michael	University of Guelph The Semex Alliance	Translating High Immune Response (HIRTM) Genomics to Improve Beef Cattle Health and Welfare	$1,617,164	$538,601
Genome British Columbia	Health	Rossi, Fabio Heyries, Kevin	The University of British Columbia AbCellera Biologics	Antibody Therapeutics for Duchenne Muscular Dystrophy	$6,288,178	$1,998,726
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	Environment	Robert, Claude Rioux, Réjean	Université Laval Protection de la faune du Québec	Use of Genomics to Manage and Protect Caribou Populations	$3,043,190	$1,011,323
Ontario Genomics	Agriculture	Guttman, David Paulter, Michael	The University of Toronto Vineland Research and Innovation Centre	Broad-Range Disease Resistance in Greenhouse Vegetables	$2,008,200	$668,291
Ontario Genomics	Health	Surette, Michael Magarvey, Nathan Haigh, Andrew	McMaster University Adapsyn Bioscience Inc.	Applying the Adapsyn Genomics Platform to the Identification, Isolation, and Characterization of Immune Modulators from the Human Microbiome	$6,034,102	$1,990,459
Génome Québec	Agriculture	Tsang, Adrian Matzat, Paul	Concordia University Elanco Animal Health	Lysozyme feed additives to improve gut health and productivity of food animals	$6,000,000	$2,000,000
Ontario Genomics	Health	Bramson, Jonathan Helsen, Christopher	McMaster University Triumvira Immunologics Inc.	Validation of TAC Receptors for Use Against Liquid and Solid Tumors	$2,256,179	$723,883

CENTRE(S)	SECTOR	LEADER(S)	ORGANIZATION(S)	TITLE	TOTAL FUNDING	GENOME CANADA CONTRIBUTION
Ontario Genomics	Health	Lye, Stephen Liu, Xin	Lenenfeld-Tanenbaum Research Institute BGI-Research	Leveraging Leukocytes as Endogenous Biosensors to Create Novel Diagnostics for Preterm Birth	$4,565,893	$1,503,307
Ontario Genomics	Environment	Mahadevan, Radhakrishnan Dugar, Deepak	The University of Toronto Visolis Inc.	Genomics Driven Engineering of Hosts for Bio-Nylon	$5,700,000	$1,900,000
Genome British Columbia	Health	Carleton, Bruce Coté, Yvan	The University of British Columbia Dynacare	Integrating Pediatric Pharmacogenomic Testing into the Canadian Health Care System	$2,809,934	$936,512
Ontario Genomics	Agriculture	Baes, Christine Wood, Ben	University of Guelph Hybrid Turkeys	Application of Genomic Selection in Turkeys for Health, Welfare, Efficiency and Production Traits	$6,039,988	$1,999,422
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	Pauls, Peter Oufattole, Mohammed	University of Guelph Benson Hill Biosystems	Increasing Yield in Canola Using Genomic Solutions	$3,682,897	$1,147,374
Genome British Columbia	Forestry	Bohlmann, Joerg Russell, John H.	The 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
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
Ontario Genomics	Health	Stewart, David Sekhon, Harmon	Ottawa Hospital University of Ottawa Eastern Ontario Regional Laboratory Association	Standardization of Molecular Diagnostic Testing for Non-Small Lung Cancer	$2,054,798	$595,197
GENOMICS IN SOCIETY INTERDISCIPLINARY RESEARCH TEAMS						
Genome British Columbia Ontario Genomics	Agriculture	Regier, Dean A. Bubela, Tania Hanna, Timothy	BC Cancer Research Simon Fraser University Queen's University	Canadian Network for Learning Healthcare Systems and Cost Effective 'Omics Innovation	$2,628,837	$1,000,000
Ontario Genomics Genome British Columbia	Agriculture	von Massow, Michael Weary, Dan	University of Guelph The University of British Columbia	Barriers and Opportunities for Commercialization of Gene-Edited Beef and Dairy Products	$1,424,374	$711,354
Genome Alberta Ontario Genomics	Health	Murray, Maribeth S. Pulsifer, Peter	University of Calgary Carleton University	The Role of Genomics in Fostering and Supporting Arctic Biodiversity: Implications for Wildlife Management, Policy and Indigenous Food Security	$1,879,203	$932,330

AUDITOR'S REPORT & AUDITED FINANCIAL STATEMENTS

GENOME CANADA

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Year ended March 31, 2022

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INDEPENDENT AUDITORS' REPORT

To the Directors of Genome Canada

Opinion

We have audited the financial statements of Genome Canada (the "Entity"), which comprise:

- the statements of financial position as at March 31, 2022
- the statements of operations and changes in net assets for the year then ended
- the statements of cash flows for the year then ended
- and notes to the financial statements, including a summary of significant accounting policies

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

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

Basis for Opinion

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

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

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

Other Information

Management is responsible for the other information. Other information comprises:

- the information, other than the financial statements and the auditors' report thereon, included in the Annual Report document.

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

In connection with our audit of the financial statements, our responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit and remain alert for indications that the other information appears to be materially misstated.

We obtained the information, other than the financial statements and the auditors' report thereon, included in the Annual Report document as at the date of this auditors' report. If, based on the work we have performed on this other information, we conclude that there is a material misstatement of this other information, we are required to report that fact in the auditors' report.

We have nothing to report in this regard.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

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

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

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

Auditors' Responsibilities for the Audit of the Financial Statements

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

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

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

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

We also:

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

  The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Entity's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Entity's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditors' report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditors' report. However, future events or conditions may cause the Entity to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

- Communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

KPMG LLP

Chartered Professional Accountants, Licensed Public Accountants

Ottawa, Canada

July 13, 2022

GENOME CANADA

Statement of Financial Position

March 31, 2022, with comparative information for 2021
(in thousands of dollars)

		2022		2021
Assets				
Current assets:				
Cash	$	10,842	$	5,388
Short-term investments (note 3)		16,530		46,445
Interest receivable		–		50
Other receivables		138		218
Prepaid expenses		275		226
		27,785		52,327
Capital assets (note 4)		19		25
	$	27,804	$	52,352
Liabilities and Net Assets				
Current liabilities:				
Accounts payable and accrued liabilities (note 5)	$	2,789	$	1,127
Deferred contributions - research projects (note 6(a)i)		19,199		37,110
Deferred contributions - CanCOGeN (note 6(a)ii)		4,432		12,722
		26,420		50,959
Deferred lease inducements (note 7)		165		168
Deferred contributions (note 6)				
Deferred contributions - internally restricted		1,200		1,200
Deferred contributions related to capital assets		19		25
		1,219		1,225
Commitments (note 10)				
	$	27,804	$	52,352

See accompanying notes to financial statements.

On behalf of the Board:

Director
ROB ANNAN, PRÉSIDENT ET
CHEF DE LA DIRECTION

Director
ELIZABETH DOUVILLE,
PRÉSIDENTE DU CONSEIL
D'ADMINISTRATION

GENOME CANADA

Statement of Operations and Changes in Net Assets

Year ended March 31, 2022, with comparative information for 2021
(in thousands of dollars)

	2022	2021
Revenue:		
Research projects (note 6(a)i)	$ 65,980	$ 72,534
Research projects - CanCOGeN (note 6(a)ii)	21,700	13,218
Amortization of deferred contributions related to capital assets (note 6(b))	6	6
	87,686	85,758
Expenses:		
Projects and Genome Centres	59,985	66,619
Projects and Genome Centres – CanCOGeN	21,076	12,671
Corporate services	2,482	2,302
Strategy, development and external relations	2,362	1,970
Program management	1,151	1,643
Program management - CanCOGeN	624	547
Amortization of capital assets	6	6
	87,686	85,758
Excess of revenue over expenses, being net assets, end of year	$ –	$ –

See accompanying notes to financial statements.

GENOME CANADA

Statement of Cash Flows

Year ended March 31, 2022, with comparative information for 2021
(in thousands of dollars)

	2022	2021
Cash provided by (used in):		
Operating activities:		
Excess of revenue over expenses	$ –	$ –
Items not affecting cash:		
Amortization of capital assets	6	6
Amortization of deferred lease inducement	(3)	(5)
Deferred contributions – research projects	(65,980)	(72,534)
Deferred contributions – CanCOGeN	(21,700)	(13,218)
Amortization of deferred contributions related to capital assets	(6)	(6)
Excluded from the increase in deferred contributions (note 9)	(27)	(155)
	(87,710)	(85,912)
Grants received from Government of Canada (note 6)	48,000	69,500
Grants received from Government of Canada – CanCOGeN (note 6)	13,410	25,940
Changes in non-cash operating working capital items:		
Decrease (increase) in other receivables	80	(128)
Decrease (increase) in prepaid expenses	(49)	17
Increase in accounts payable and accrued liabilities	1,662	296
	(24,607)	9,713
Investing activities:		
Decrease (increase) in short-term investments	29,915	(12,165)
Interest received on investments	170	377
Portfolio investment management	(24)	(52)
	30,061	(11,840)
Net change in cash	5,454	(2,127)
Cash, beginning of year	5,388	7,515
Cash, end of year	$ 10,842	$ 5,388

See accompanying notes to financial statements.

GENOME CANADA

Notes to Financial Statements

Year ended March 31, 2022
(in thousands of dollars)

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1. Description of the organization:

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 by management in accordance with Canadian accounting standards for not-for-profit organizations and include the following significant accounting policies:

(a) Revenue recognition:

The Corporation follows the deferral method of accounting for contribution for not-for-profit organizations 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.

(b) 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. Short-term investments can be easily converted to cash during the period. Transaction costs related to the acquisition of investments are expensed.

2. Significant accounting policies (continued):

(c) 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:

Asset	Rate
Furniture, fixtures and office equipment	20%

(d) 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.

(e) 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 and the amount of certain accrued liabilities. 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.

(f) Lease inducements

Lease inducements, consisting of free rent and improvement allowances granted to the Corporation for the leased offices, are amortized on a straight-line basis over the term of the lease or over the useful life of the purchased asset.

(in thousands of dollars)

3. Short-term investments:

	2022 Cost	2022 Fair market value	2021 Cost	2021 Fair market value
Government of Canada Treasury bills	$ –	$ –	$ 1,710	$ 1,710
Bank deposits/Bankers' Acceptance	8,103	8,105	17,720	17,728
Commercial paper	–	–	999	1,000
Provincial/Municipal Short-term bills and notes	5,528	5,531	5,014	5,016
Federal government bonds	2,002	1,994	12,096	12,071
Provincial government bonds	899	900	7,906	7,915
Corporate bonds	–	–	1,019	1,005
	$ 16,532	$ 16,530	$ 46,464	$ 46,445

The interest rates at the end of the year range from 0% to 0.743% (2021 - 0% to 2.873%) and mature at varying dates in 2022 (2020 - varying dates in 2021).

4. Capital assets:

	Cost	Accumulated amortization	2022 Net book value	2021 Net book value
Furniture, fixtures and office equipment	$ 442	$ 423	$ 19	$ 25

Cost and accumulated amortization at March 31, 2021, amounted to $442 and $417, respectively.

5. Accounts payable and accrued liabilities:

Included in accounts payable and accrued liabilities are $Nil (2021 - $Nil) for goods and services tax/harmonized sales tax and payroll-related taxes due to government entities.

(in thousands of dollars)

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.

(a) Deferred contributions - research projects:

The Corporation operates under three active Funding Agreements with the Government of Canada. As at March 31, 2022, Innovation, Science and Economic Development Canada had committed $376,100 in grants to the Corporation under these agreements, of which $251,640 has been received as at March 31, 2022. 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, 2022, the Corporation received $189,700 under the agreement dated May 19, 2017, $36,000 under the agreement dated April 1, 2020 and $25,940 under the agreement dated July 8, 2020.

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

i. Deferred contributions – research projects:

		2022		2021
Balance, beginning of year	$	37,110	$	40,249
Add: grants received		48,000		69,500
Add: investment income		69		145
Less: amounts reflected in revenue		(65,980)		(72,534)
Less: amount internally allocated to wind-down costs (note 6(c))		–		(250)
Balance, end of year	$	19,199	$	37,110

ii. Deferred contributions – CanCOGeN:

		2022		2021
Balance, beginning of year	$	12,722	$	–
Add: grants received		13,410		25,940
Less: amounts reflected in revenue		(21,700)		(13,218)
Balance, end of year	$	4,432	$	12,722

(in thousands of dollars)

6. Deferred contributions (continued):

(a) Deferred contributions - research projects (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.

(b) 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:

	2022	2021
Balance, beginning of year	$ 25	$ 31
Less: amounts amortized to revenue	(6)	(6)
Balance, end of year	$ 19	$ 25

(c) Deferred contributions - internally restricted:

On March 21, 2019, the Board of Directors approved an internally restricted reserve from previously received deferred contributions of $950. On March 31, 2021 the reserve was increased by $250 to $1,200 to take into account the increase in the payroll component of the reserve. The amount will be held to cover costs of a potential wind-down of the organization. Interest and investment income earned from these restricted amounts is recognized as income during the year it is earned and redistributed to the deferred contributions for future research project distribution.

(in thousands of dollars)

7. Lease inducements:

The lease inducements include the following amounts:

		2022		2021
Leasehold improvement allowances	$	136	$	136
Free rent		29		32
Total lease inducements	$	165	$	168

The leasehold improvement allowance remained unspent during the 2022 period and was therefore not amortized. The amortization of leasehold improvement allowances and free rent are $Nil and $5, respectively (2021 - $Nil and $5, respectively).

8. Employee pension plan:

The Corporation maintains, for the benefit of most 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 $268 (2021 - $246).

9. Supplemental cash flow information:

		2022		2021
Loss on disposal of investments	$	(44)	$	(53)
Fair value adjustment		17		(102)
	$	(27)	$	(155)

(in thousands of dollars)

10. 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, 2022, the payments committed are approximately $49,104 in 2023 and $43,451 for other future years.

Operating leases:

The Corporation leases its premises and equipment under long-term operating leases, which expire at various dates between 2022 and 2028. The minimum aggregate lease payments are approximately as follows:

2023	$	107
2024		102
2025		107
2026		107
2027		107
Thereafter		137
	$	667

11. Financial risk management:

The Corporation is subject to the following risks due to its financial instruments:

(a) Market risk:

Market risk is the risk that fair value of future cash flows of a financial instrument will fluctuate because of changes in market prices. Market risk comprises three types of risk, namely currency risk, interest rate risk and other price risk:

i. Foreign currency risk:

Foreign currency risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in foreign exchange rates. The Corporation holds $12 (2021 - $6) in foreign currency.

ii. Interest rate risk:

Interest rate risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in interest rates. The Corporation is exposed to interest rate risk with respect to its interest-bearing investments as disclosed in note 3 to the financial statements.

11. Financial risk management (continued):

(a) Market risk (continued):

iii. Other price risk:

Other price risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate because of changes in market prices. The fair value of investments is disclosed in note 3 to the financial statements.

(b) Liquidity risk:

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

(c) Credit risk:

Credit risk refers to the risk that a counterparty may default on its contractual obligations resulting in a financial loss. The Corporation is exposed to credit risks with respect to its interest-bearing investments. The Corporation invests in government bonds to reduce the credit risk to an acceptable level.

(d) Impact of COVID-19:

In March 2020, the COVID-19 outbreak was declared a pandemic by the World Health Organization and has had a financial, market and social dislocating impact.

As at March 31, 2022, the impact of the pandemic on the Corporation from a financial risks perspective has been minimal. The Corporation has seen significant new research projects funding to support genomic research in the fight against COVID-19. The situation remains fluid and the ultimate duration and magnitude of the impact on the economy and on all aspects of operations are unknown.

There has been no significant change in the risk exposures of the Corporation compared to the fiscal year 2021.

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