GenomeCanada

2008–09 Annual Report

What If

Science Leads

Us

To Make Discoveries and Improve Lives

Genomics and proteomics research extends across the full spectrum of human concern—from health and the environment to food, resources and protecting the biodiversity of the planet. Regardless of his or her particular focus, every genomics researcher has the same desire at heart: to make discoveries that improve human lives.

Genome Canada is committed to providing Canadian scientists with the means, tools and opportunities to make those discoveries, here at home and in collaboration with colleagues from around the world.

The paintings in this annual report were created by elementary students in Ottawa, Ontario—offering their vision of science and scientists.

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Message from the Chair

Canada is one of the world's top-ranked countries in genomics and proteomics research. As the stories in this annual report reveal, that position is well earned. Canadian scientists continue to break ground in a vast range of research areas, from health and agriculture to technology and biodiversity.

With the support of Genome Canada, researchers in this country have access to the science and technology platforms they need to carry out their work. They have opportunities to share discoveries through fora and conferences such as the International GE^{3}LS Symposium and the Genome Canada International Conference. They have the means to participate in and lead large-scale research projects here at home and via international collaborations.

Our country is not alone in recognizing the importance of genomics and proteomics research. In recent years, others around the globe have increased their investment in these endeavours. Recently, the United States has stepped up its commitment to research—opening up new possibilities for cross-border partnerships. Nations everywhere are seeing the potential for genomics and proteomics discoveries to address many of the most urgent environmental, social and economic challenges we face as a global community.

There is no mechanism other than Genome Canada for funding large-scale genomics projects in this country, or for providing Canadian scientists with access to the technical platforms that allow them to compete internationally. To remain among the world leaders and reap the benefit of its own capacity for innovation, Canada must continue to support genomics and proteomics research—and derive the greatest possible value from the investments it has already made.

Genome Canada is dedicated to responsibly managing and allocating the public funds in its trust. We on the Board watched closely last year and were gratified by the outcomes of Genome Canada's Performance Audit and formal Evaluation. The two affirmed that the organization is succeeding in carrying out its mission to "*…develop and implement a national strategy in genomics and proteomics research for the benefit of all Canadians in key selected areas such as agriculture, environment, fisheries, forestry, health and new technology development.*"

I congratulate and thank my fellow Board Members, the management and staff of Genome Canada and our federal government colleagues for their ongoing dedication to discovery. The support we give Canada's scientific community today will help improve the lives of all Canadians in the future.

Dr. Calvin R. Stiller, C.M., O.Ont., M.D., F.R.C.P.
Chair of the Board

Message from the President and CEO

Children instinctively understand the value of discovery. Our first task in life is to explore and question, to absorb new knowledge and learn how to apply it. We all begin, in a way, as scientists.

So it is fitting that this annual report—which highlights many of the profound discoveries being made by Canada's genomics and proteomics researchers—is adorned with children's art. The paintings on these pages were created by a class of elementary students in Ottawa, and were auctioned last fall to raise money for the BC Children's Hospital Foundation.

As the paintings show, discovery takes many forms. That variety is mirrored in the activities of Genome Canada—the many ways we work to further the country's capacity for discovery.

Last year, we held an Applied Genomics Research in Bioproducts or Crops (ABC) competition—an area of priority research identified through the previous year's Position Paper process. We continued our support of International Consortium Initiatives such as the Structural Genomics Consortium (which investigates the structures of medically relevant proteins) and the *Public Population Project in Genomics*, (which seeks to harmonize the samples and data in international biobanks). We saw the conclusion of several research projects including, at the very end of the fiscal year, the *international Bovine Genome Sequencing Project*, which among other things will help inform approaches to sustainable food production.

2008–09 was also a year of evaluation. In preparing for and undergoing two major assessments—a performance audit and a formal evaluation—we had the opportunity to consider our achievements to date, how we have reached them and how we can apply lessons learned as we go forward. Both assessments affirmed our approaches and methods; both illuminated opportunities for us to refine our ways of working.

In addition to supporting genomics and proteomics research, it is also a priority of ours to make sure Canadians—and the world—learn about the good work our scientists are doing. To that end, last year, in collaboration with the Museum of Nature in Ottawa, we launched the second phase of the cross-country *GEEE! in Genome* tour—a travelling exhibition on genomics and proteomics. We also worked to foster interest in the field among the next generation of scientists by supporting the Canada-wide Science Fair and the Sanofi-Aventis BioTech Challenge.

The impact of genomics and proteomics research is not always immediate: discovery takes time and patience. As this report shows, however, its consequences can be monumental—saving lives, revitalizing industries, giving us the means to live well and live sustainably into the future.

Furthermore, each discovery enables another. The initial sequencing of the human genome took over 10 years and cost more than three billion dollars. Today we can do similar work in a matter of weeks for just thousands of dollars. The gap between question and answer is shrinking—and as it does, our capacity to make the world a better place for ourselves and our children is growing.

I thank the members of the Board of Directors, the teams at the country's Genome Centres, all the scientists funded by Genome Canada and our dedicated staff for their hard work over a demanding year. Together, we look forward to the discoveries 2009–10 will bring.

Martin Godbout, O.C., Ph.D.
President and CEO

A scientist helps doctors make sick people better.

01 | Supporting Discovery in Human Health

Genomics is saving lives by helping prevent fatal heart attacks.

How do you deal with a disease so lethal its most common first symptom is death?

That was the question Newfoundland medical practitioners struggled with for decades as apparently healthy individuals—most often men younger than 50—would die suddenly of cardiac failure. In the 1980s, the disease responsible was confirmed as arrhythmogenic right ventricular dysplasia (ARVD, later classified as ARVD5). But there was no way of diagnosing it definitely. Doctors had to rely on personal records (recurrence risk information from family pedigrees) and simple cardiac tests.

ARVD5 causes fibrous, fatty tissue to replace healthy heart cells, interfering with the heart's electrical current. In effect, the heart 'short circuits' and a potentially lethal heart rhythm is created. Men are especially susceptible, and the threat is dire: 50 percent die before the age of 40, and 80 percent before 50.

A series of recent Canadian genomics discoveries is changing those odds. In 2008, a research team led by Dr. Terry-Lynn Young at Memorial University pinned down the gene responsible for the mutation behind ARVD5. Their work was part of the Atlantic Medical Genetic and Genomics Initiative (AMGGI) funded through Genome Canada's Competition III.

Thanks to the advances made by Canadian researchers, ARVD5 can now be diagnosed accurately. Newfoundland is taking steps to make the ARVD5 genetic test widely available. Affected individuals are offered the option of an ICD (implantable cardioverter-defibrillator), which gives the heart a life-saving jolt of electricity if it begins a potentially lethal heart rhythm.

A diagnostic tool presently under development will extend the benefits of this Newfoundland discovery to people around the world—with the potential of saving countless lives.

Closing in on cardiovascular disease

Through various funding competitions, Genome Canada has supported a broad range of human health research. The treatment of cardiovascular disease is of particular focus. Canadian scientists from the University of Montreal and Genome Québec are leading an international team of clinician-researchers and scientists to address drug response problems in the management of cardiovascular disease, which includes coronary heart disease, congestive heart failure, hypertension and stroke.

Scientists help make
the world a better place.

02 | Supporting Discovery in GE^{3}LS

(Ethical, Economic, Environmental, Legal and Social aspects of Genomics)

By sharing genomics discoveries, scientists are helping ensure all people have the opportunity to enjoy longer, healthier lives.

Genome Canada–funded researchers Peter Singer and Abdallah Daar are leading the effort to bridge what they call the *genomics divide*: the inequalities in genomics knowledge that underlie the disparities in health between the industrialized and developing worlds. While the average life expectancy in an industrialized country like Canada is about 80 years and climbing, in the developing world it is roughly half that—and sliding in the opposite direction.

Through their project, *Strengthening the Role of Genomics and Global Health* (part of the McLaughlin-Rotman Centre for Global Health at University Health Network and University of Toronto), Singer and Daar are studying the role developing-world biotechnology companies play in meeting local health needs. They are also seeking to ensure genomics advances are used appropriately to address global health challenges and to help developing countries secure their food supply over the long term.

Singer and Daar's work has fostered early collaboration between companies in Ontario and Brazil on a prostate cancer vaccine and has helped sub-Saharan countries such as Ghana and Tanzania bring together their science and business communities as a first step toward commercializing their countries' technologies. While the path from lab to village is not an easy one, Singer and Daar are convinced that building the capacity of developing countries to solve local problems with home-grown genomics solutions is the most sustainable solution for the long term.

Science/conscience

GE^{3}LS is a complex and critically important component of genomics research. GE^{3}LS research examines the ethical, environmental, economic, legal and social aspects of genomics technology and its applications. Last year Genome Canada hosted the International GE^{3}LS Symposium in Calgary, Alberta that brought together GE^{3}LS and genomics researchers to share research and consider the implications of developments in science, technology and policy. Genome Canada is also currently funding the *Building a GE^{3}LS Architecture* initiative, a study of public attitudes and decision-making processes related to genomics research and biotechnology.

A scientist helps people,
plants and animals.

03 | Supporting Discovery in Forestry

Genomics scientists are increasing the resilience of forests and the competitiveness of Canada's forest products industry.

The genomics-based tools and knowledge emerging from *Arborea II: Genomics for Molecular Breeding in Softwood Trees* will allow Canadian spruce forest managers to identify and select trees that grow faster and give higher yields.

That should be welcome news to Canada's forest products industry, which today supports more than 280,000 direct jobs—and faces ever-intensifying competition in the global market.

Funded by Genome Canada, *Arborea II* is led by Laval University forest biologists John MacKay and Jean Bousquet. Their research into molecular breeding will not only accelerate the selection and growth of spruce trees with commercially valuable characteristics but also help reduce the amount of land required to produce high-grade wood in volume.

Arborea II has longer-term potential to help the forest products industry derive and recover value from its raw material. By developing methods to select trees with the most desirable wood, it will allow mills to produce better-quality products with less waste.

Importantly, molecular breeding is an environmentally safe and socially acceptable outcome of genomics. It is not genetic engineering. Planting genetically engineered trees is not permitted in Canada except for experimentation.

Arborea II is also investigating how trees have adapted to varying temperature regimes and precipitation levels. The findings will support efforts to contend with the effects of climate change on forests and tree plantations.

Seeing the forest and the trees

As its name suggests, *Arborea II* is a sequel. The original *Arborea* project produced basic tools scientists needed to carry out worldwide research on spruce and poplar trees. The *Arboreas* are just two of many forest-related genomics and proteomics projects funded by Genome Canada. *Treenomix I* focused on forest health (pest and disease resistance) and wood formation; *Genomics of the Spruce Budworm and its Viral Pathogens* examined the molecular basis of interactions between the destructive spruce budworm, its viruses and affected trees. Today, *Conifer Forest Health Genomics (Treenomix II)* aims to identify the genetic mechanisms that make certain trees resistant to insects and insect-associated pathogens and allow certain trees to adapt to environmental stresses.

A scientist makes
green things grow.

04 | Supporting Discovery in Agriculture

Genomics is helping produce more resilient crops that will achieve better yields for farmers and enable more environmentally friendly farming practices.

In agriculture, cold can be a killer. Despite a century of efforts to breed hardier plants, Canada still loses hundreds of millions of dollars every year in potential crop productivity and marketability due to damage from low temperatures.

Funded through Genome Canada's Competition III, the *Use of Genomic Tools for Crop Improvements in Temperate Climates* project is studying the ways three economically important crops respond to low temperatures: wheat, barley and rye. Rye is the most tolerant winter cereal, making it a natural candidate for gene identification, characterization and exploitation. By understanding what makes rye so hardy, scientists and farmers may be able to breed greater resilience into other crops.

According to Dr. D. Brian Fowler, a researcher at the University of Saskatchewan and principal investigator on this project, even a one- or two-degree increase in low-temperature tolerance could raise annual agricultural returns by multiple millions of dollars in years when spring comes late or the fall frost hits early—neither of which is uncommon on the Canadian Prairies. Apart from Siberia, the Prairies have the coldest climate for crop production of any large agricultural region in the world. A short growing season and extreme winter temperatures that often fall below minus 40 degrees Celsius limit the variety of crops that can be grown successfully.

Developing more robust crops will have not only economic advantages but also potential environmental benefits—for example, by creating opportunities to establish production systems that are less reliant on herbicides and make better, more efficient use of crop moisture.

Toward a sustainable agricultural future

Genome Canada is committed to supporting agriculture-related research, such as *Designing Oilseeds for Tomorrow's Markets*, which builds on the success of past projects and aims to develop canola crops that will support new food and feed applications. A position paper in this economically important strategic theme area "Crop genomics for a healthy Canada" as well as one in Bioproducts, "Securing Canada's future bio-based economy through genomics" were identified in 2007–2008 to be included in Genome Canada's strategic research portfolio and budget submission to Industry Canada. As a result Genome Canada held the Applied Genomics Research in Bioproducts or Crops (ABC) competition, calling for research projects focused on the application of genomics research in the area of bioproducts or crops or the GE^{3}LS issues related to these strategic areas. ABC received 48 proposals from researchers across Canada of which 12 were funded.

Scientists know where to find the REALLY big fish.

05 | Supporting Discovery in Aquaculture

Genomics is helping secure the world's food supply through aquaculture and better management of wild fish stocks.

As the global population grows so will the consumption of fish and seafood, eventually exceeding the capacity of traditional fisheries. Aquaculture is playing a major role in meeting this demand.

While humans have farmed fish and other aquatic species for thousands of years, aquaculture has only recently become a commercial enterprise in many countries, including Canada. Knowing which stocks are best suited to farming and how to raise them successfully is key.

The international *Consortium for Genomic Research on All Salmonids Project (cGRASP)* looked at ways of making farmed fish more resilient and better adapted to their environments. Led in Canada by Ben Koop, Centre for Biomedical Research, University of Victoria, and Willie Davidson, Simon Fraser University, the consortium also studied the natural diversity of wild Pacific and Atlantic fish stocks.

Building on the highly successful *Genomics Research on Atlantic Salmon Project* previously funded in part by Genome Canada, Koop and Davidson—with colleagues in Norway, Scotland and the USA—focused specifically on salmonids: economically significant species that include salmon, trout, whitefish and char.

The project compiled a comprehensive gene list, developed a microarray for monitoring gene expression and integrated the physical and linkage maps with the chromosomes—information that will yield practical benefits for salmonid aquaculture while providing a rigorous scientific base for managing wild stocks and environmental monitoring.

The analysis and conclusions from this research will help conserve and enhance wild populations, identify stocks for commercial harvesting, contribute to the sustainability of sport fisheries, answer fundamental questions about the evolution of salmonid genomes and establish ways for regulatory agencies to monitor the expression of salmonid genes and proteins in a wide variety of natural and urban-coastal environments.

Furthering Canada's aquaculture

Genome Canada has funded four fisheries-related projects, including the current *Cod Genomics and Broodstock Development*. This project will generate scientific data of benefit to aquaculture in Atlantic Canada and at the same time produce superior breeding stock, enabling the aquaculture industry to compete internationally, enhancing job prospects in coastal regions and Aboriginal communities, and creating opportunities for Canada to export its equipment, knowledge and services.

A scientist can see inside people's bodies.

06 | Supporting Discovery in Technology Development

By combining genomics knowledge with advanced technology, scientists are improving the quality of patient care and creating new opportunities for collaboration across disciplines.

It might sound like science fiction: a tool that allows doctors to literally travel through their patients' bodies, examining organs and cells on any scale. But that's exactly what Dr. Christoph Sensen and his team at the Sun Center of Excellence for Visual Genomics have built.

Sensen is a professor of Biochemistry and Molecular Biology at the University of Calgary. With funding from Genome Canada's Competition III, Sensen has fused genomics discoveries with the latest computer and graphics technologies to create the CAVE, a virtual reality environment in which researchers and clinicians can explore the human body in four dimensions. (Space has three dimensions. Time is the fourth—the measure of how things change. With the CAVE's 3D projection of the human anatomy, the CAVEman, doctors can watch months and years of aging and disease unfold in seconds).

The CAVEman is the most advanced body model in Canada—and the world. It can be customized on a case-by-case basis with specific patient information.

Cancer diagnosis and treatment provide an example of the radical impact CAVE can have on patient care. Specialists today make decisions about treatment in isolation. They draw on disparate pieces of information: MRIs, CAT scans, X-rays, blood tests, gene marker tests. But the treatment is generic and not specific to the patient. With the CAVEman, they can come together, share observations immediately, and arrive at a consensus about the best way to treat that particular individual—thereby improving the quality of care.

The CAVEman has been featured on Discovery Channel and *Good Morning America*. In addition to the full-scale CAVE unit, Sensen and his team have also developed a smaller-scale portable version.

Maintaining a platform for discovery

Genome Canada's funding of technology development contributes directly to the capacity of Canadian researchers to make genomics and proteomics discoveries. Much effort today is going into leveraging existing genomics technologies. *Production Scale Deployment of Next Generation Sequencing Instruments* is looking at how to build sequencing technologies into a critical infrastructure for understanding genetic conditions and environmental issues. The *Massively Multiparametric Flow Cytometer* project is expanding the number of biomarkers that can be analyzed simultaneously—up to 1,000 or more cells per second. And the Genome Sciences Centre of the BC Cancer Agency is, for the first time ever, applying fingerprint profiling and Illumina sequencing technologies to profile the genomes of a human cancer, follicular lymphoma.

A scientist loves nature a lot.

07 | Supporting Discovery in Biodiversity

Genomics is helping scientists understand the impact of climate change on the species of the planet.

DNA barcoding uses short, easily digitized gene sequences to identify species. The science began in Canada at the University of Guelph, and Canadian scientists like Paul Hebert, Director of the Biodiversity Institute of Ontario, continue to lead international work aimed at developing a complete catalogue of Earth's life forms.

Funded by Genome Canada, Hebert and his team are among researchers from 25 countries involved in iBOL, the *International Barcode of Life* project. Building on the prior work of the Canadian Barcode of Life Network, they are currently engaged in a five-year initiative to acquire DNA barcode records for five million specimens representing 500,000 species. Their motivation is to understand the impact of global warming and other environmental factors that today threaten species with extinction. To know what might be lost, scientists first need a comprehensive understanding of the life that exists on this planet.

DNA barcoding technology has become increasingly commoditized in recent years—and open to many applications. In a 2008 story that received wide attention—including coverage in the *New York Times*—two New York teens collected fish samples from different sushi restaurants and fish markets and sent them to the University of Guelph's DNA barcoding lab with a question: "Are these the kinds of fish the restaurants say they are?" The answer they got back was, "Not always." Seven of nine red snapper samples, for instance, weren't red snapper at all.

Since performing the analysis on the sushi samples last year, the University of Guelph has been approached by corporations interested in applying DNA barcoding technology to their fish production quality control systems.

Preserving expertise, expanding knowledge

The current method of identifying organisms is to turn a specimen over to a taxonomist, a specialist in identifying members of a particular group of organisms. DNA barcoding technology makes such specialized knowledge available instantly to all manner of users, from customs officers checking imports and exports to biologists doing research in the field.


Scientists make the
world better for kids.

08 | Supporting Discovery in Child Health

Genomics is uncovering the cause of a deadly form of diabetes in children.

Type 1 diabetes has become increasingly common over the past 40 years. Canada has the third-highest rate of the disease in the world—one in 300 persons. Disturbingly, the greatest rise in new cases has been among children aged one to six. Over the next 10 years, 36,000 Canadians will be diagnosed with Type 1 diabetes and 5,800 will die from its complications. Even with insulin therapy, Type 1 diabetes complications can include heart attack, stroke, blindness and the need for limb amputation.

Dr. Jayne Danska, a senior scientist at Toronto's Hospital for Sick Children and professor in the Faculty of Medicine at the University of Toronto, leads the Genome Canada-funded project, *Genome-Environment Interactions in Type 1 Diabetes*. She and her team are working to uncover the cause of the disease's rising incidence. Because the frequency of genetic risk factors does not change as rapidly as the observed increases in Type 1 diabetes have done, Danska has concluded that the rise in Type 1 diabetes incidence is likely to be driven by an environmental component. The group's thesis is that changes in exposure to normal bacteria influence the development of the immune system and combine with genetic risk factors to promote Type 1 diabetes.

Her team studies these questions in rodent models of Type 1 diabetes and is also collaborating with a large, international study of children known to be at genetic risk of Type 1 diabetes to determine how environmental exposures to normal intestinal and skin bacteria affect the probability and timing of their progression to Type 1 diabetes. Discoveries from their research project may have implications for a number of other autoimmune disease states such as multiple sclerosis, inflammatory bowel disease and rheumatoid arthritis.

For the health of generations to come

Dr. Peter Durie, a pediatrician and senior scientist, and Dr. Julian Zielenski, a geneticist at the Hospital for Sick Children's Research Institute, have teamed up to address another childhood disease that causes suffering for thousands around the world: cystic fibrosis. Building on Canada's recognized strength in cystic fibrosis research, they are aiming to develop tests that will assess individual risk and help identify behaviour changes and preventions that might reduce the impact of the disease. In 2008–09, Genome Canada identified child health genomics as a strategic research priority through its second Strategic Research Theme Position Paper process.


I
LOVE
SCIENCE

Genomics discoveries make life better for today's generations and those of the future.

As the preceding stories have shown, the internationally respected work of Canadian genomics and proteomics researchers can have profound effects on our society today—and shape a better world for our children to inherit tomorrow.

Performance and Objectives

Audit and Evaluation

In compliance with its funding agreement and in accordance with the expectations of the Government of Canada, Genome Canada underwent two external organizational assessments in fiscal year 2008–09: a Performance Audit and an Evaluation.

Performance audit highlights

Conducted by an outside national accounting firm in accordance with audit objectives approved by the Board, the 2008–09 Performance Audit found that Genome Canada:

- has appropriate practices and processes in place to ensure that funded projects are consistent with Genome Canada's objectives, are approved in a transparent manner and are monitored for compliance with recipient funding agreements
- has mechanisms in place to monitor both the scientific and financial progress of projects
- maintains practices and processes to monitor the performance of Genome Centres with respect to their obligations under the funding agreement
- has well defined and documented processes for the funding of International Consortium Initiatives
- employs a number of practices and mechanisms to obtain ongoing support at various levels, including the federal government, the scientific community and Canadians at large
- has developed a Performance, Audit and Evaluation Strategy, with Centres playing an important role in gathering performance information on funded projects
- effectively manages risk related to its lean human resource complement

The audit identified priorities for Genome Canada going forward, including:

- complementing the Position Paper process with periodic open competitions
- further formalizing internal procedures, processes and definitions of roles and responsibilities
- clarifying the shared understanding of roles and expectations between Genome Canada and the Genome Centres
- cultivating a wider appreciation for non-ICI international partnerships throughout the genomics and proteomics communities
- establishing a national repository to collect, analyze and report on performance information for Genome Canada as a whole

Evaluation highlights

Conducted by an independent national consulting firm, and overseen by an *ad hoc* committee of the Board, a formal evaluation of Genome Canada was undertaken in fiscal year 2008–09. The evaluation found that through its provision of funding for large-scale research projects and state-of-the-art science and technology platforms, Genome Canada:

- has had tremendous impacts, and its rationale remains strong and important
- has transformed the quality and quantity of genomics research in Canada, making Canada a visible and respected world player
- successfully raised significant incremental funds through co-funding and leveraged funding
- helped attract and retain world-class scientists in Canada

- shown leadership in GE³LS (ethical, environmental, economic, legal and social aspects related to genomics research)—an emphasis that sets Canada apart from most of the world
- has explicitly considered potential socio-economic considerations in its planning and management of project funding, particularly in its most recent competitions
- employs a hybrid program model which marries the best features of centralized models with decentralized models, as well as some features of granting councils with those of private sector management

The evaluation also identified a number of important issues for Genome Canada to address going forward, including:

- Canadian genomics researchers do not appear to be as enthusiastic about Genome Canada's impact as other stakeholders including international experts
- Genome Canada must continue to provide strong and continuous support for basic, curiosity-driven research
- the role of Genome Canada vis-à-vis the Genome Centres requires further refinement
- challenges remain in integrating GE³LS topics and researchers within research projects
- the rapidly changing genomics research landscape requires the consideration of new, more flexible, more agile research and platform models
- the four-year funding timeframe may be too short for large-scale projects

Assessing our impact

A bibliometric analysis—a study of the literature and citations attributed to Canadian researchers—revealed that Canada ranked 5th in genomics behind the U.S., Switzerland, Netherlands and the U.K. between 1996 and 2007. This ranking was based on scientific impact, output per capita, number of papers and specialization in genomics/proteomics. More recently—from 2005 to 2007—Canada ranked 6th, falling slightly due to other countries' increased investments in genomics and proteomics.

	Canada
Scientific impact, both observed and expected	5th
Output per capita	5th
Number of papers	6th
Specialization in genomics	10th
Specialization in GE³LS	4th (overall ranking)

The data show that Canada is an important producer of scientific knowledge in genomics at the international level, and that it has been a solid producer of first-rate science in the last decade. Genome Canada-funded research papers had significantly higher actual and expected impacts than other Canadian genomics papers or world papers.

In addition, Canada compares well internationally with respect to patenting genomics. Canada owned 3.3% of genomics patents issued by the U.S. Patent and Trademark Office in 2007, compared to 2.2% in 1993. Canada ranked third for its number of patents per capita and second for its average of relative citations. In multi-criteria benchmarking, Canada placed second behind the United States, and its performance has been strongest in the most recent period, from 2005 to 2007.

Pursuing Our Objectives

Throughout 2008–09, Genome Canada continued its pursuit of its five objectives. The following is a summary of key activities in each area.

01 National strategy

The development and establishment of a coordinated strategy for genomics research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry and fisheries.

- Completed a second cycle of the Position Paper process designed to identify areas of strategic importance for Canada
- Participated actively and took a lead role in international collaborations including the International Funders' Forum and the International Knockout Mouse Consortium
- Supported the participation of Canadian researchers in a workshop in Rome as part of a Canada-Italy research partnership
- Co-founded the Cancer Stem Cell Consortium and formed a partnership with the California Institute for Regenerative Medicine to support leading Canadian and Californian cancer stem cell researchers
- Held a GE^{3}LS Symposium and Genome Canada's International Conference (GCIC)

02 Genome Centres and Science and Technology Platforms

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

- Continued to support Genome Canada's six Genome Centres
- Announced the results of the New Technology Development competition, allocating $9.37 million to 13 technology development projects for a duration of two years

03 Research support

The support of large-scale projects of strategic importance to Canada by bringing together industry, governments, universities, research hospitals and the public.

On the national level:

- Receipt of final reports of large-scale projects funded through the Applied Genomics and Proteomics Research in Human Health competition
- Managed the strategic competition on Applied Genomics Research in Bioproducts or Crops

Internationally:

- Receipt of final reports for three large-scale projects funded through Genome Canada's first international bilateral competition, Genome Canada – Genoma España Joint Projects in Human Health, Plants and Aquaculture
- Managed three International Consortium Initiatives (large-scale international genomics projects led by Canadian researchers): the Structural Genomics Consortium, the Public Population Project in Genomics, and the International Barcode of Life

04 GE^{3}LS Leadership and communications

The assumption of leadership in the areas of ethical, environmental, economic, legal, social and other issues related to genomics research (GE^{3}LS), and the communication of the relative risks, rewards and successes of genomics to the Canadian public.

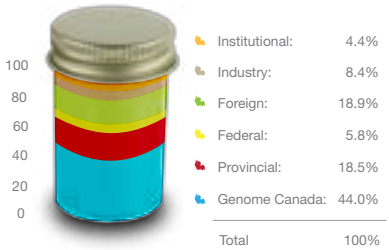
- Hosted the International GE³LS Symposium (Calgary, April 2008) on the theme, *Navigating the Changing Landscape*
- Recruited a Chief GE³LS Officer
- Developed and initiated implementation of a national GE³LS strategy
- Developed a GE³LS microsite within Genome Canada's website. Oversight of communications and public outreach activities and tools targeted at the public, media, parliamentarians, government policy and decision makers, researchers, partners and other key stakeholders
- Partnered with the Canadian Museum of Nature for the second three-year cross-Canada tour of *The GEEE! in Genome*, a bilingual travelling exhibition
- Partnered with the Canada-wide Science Fair and Sanofi-Aventis BioTech Challenge
- Participated in or otherwise supported international genomics and proteomics conferences

05 Co-funding

The encouragement of investment by others in the field of genomics research.

- Attracted co-funding to genomics and proteomics research projects and further developed collaborative relationships with the private, public and philanthropic sectors

Funding sources for Genome Canada-approved projects as of May, 2009:



Co-funding includes funds received and commitments secured.
Genome Canada funding includes funding received from Industry Canada.

Current projects with Genome Canada funding 2008–2009

Centre	Sector	Project Leader(s)	Project Title
Large-Scale Projects			
Genome British Columbia	Development of New Technologies	Borchers, Christoph	MS-Based Structural Proteomics for Drug Development and Design
Genome British Columbia	Development of New Technologies	Marra, Marco	Production-Scale Deployment of Next-Generation Sequencing Instruments
Genome British Columbia	Development of New Technologies	Hansen, Carl Marra, Marco	Towards Single Cell Genomics
Genome British Columbia	Fisheries	Koop, Ben Davidson, William	Consortium for Genomic Research on All Salmonids Project (cGRASP)

Centre	Sector	Project Leader(s)	Project Title
Genome British Columbia	Forestry	Bohlmann, Jorg	Conifer Forest Health Genomics
Genome British Columbia	GE^{3}LS	Burgess, Michael Danielson, Peter	Building a GE^{3}LS Architecture (GE^{3}LS Arc)
Genome British Columbia	Health	Goldberg, Paul	Innovative Genomic Applications to Develop Clinical Biomarkers and Novel Therapies for Common Iron Metabolism Disorders
Genome British Columbia	Health	Hayden, Michael Carleton, Bruce	Genotype-Specific Approaches to Therapy in Childhood (GATC)
Genome British Columbia	Health	Horsman, Douglas	Development and Validation of Comparative Genomic Hybridization Arrays for Clinical Use in Cancer
Genome British Columbia	Health	Lam, Stephen Ling, Victor	Application of Pharmacogenomics for Rational Chemotherapy of Lung Cancer
Genome British Columbia	Health	Keown, Paul McManus, Bruce McMaster, Robert	Better Biomarkers of Acute and Chronic Allograft Rejection
Genome British Columbia	Health	Finlay, Brett Brunham, Robert Reiner, Neil	Functional Genomics for Emerging Infectious Diseases (Proteomics for Emerging Pathogen Response – PREPARE)
Genome British Columbia	Health	Hancock, Robert Babiuk, Lorne	The Pathogenomics of Innate Immunity (PI2)
Genome British Columbia	Health	Marra, Marco Connors, Joseph Gascoyne, Randy	High Resolution Analysis of Follicular Lymphoma Genomes
Genome British Columbia	Health	Marra, Marco Hoodless, Pamela	Dissecting Gene Expression Networks in Mammalian Organogenesis (MORGEN)
Genome British Columbia	Health	Moerman, Donald	Efficient Identification and Cloning of Single Gene Deletions in the Nematode Caenorhabditis Elegans
Genome British Columbia	Health	Simpson, Elizabeth	Pleiades Promoter Project: Genetic Resource for CNS Regional and Cell Specific Molecular Delivery
Genome Alberta	Agriculture	Weselake, Randall Selvaraj, Gopalan	Designing Oilseeds for Tomorrow's Market
Genome Alberta	Development of New Technologies	Sensen, Christoph	Four-Dimensional Modelling of Genetic Disease Patterns

Centre	Sector	Project Leader(s)	Project Title
Genome Alberta	GE^{3}LS	Caulfield, Timothy Einsiedel, Edna	Translating Science: Genomics and Health Systems
Genome Alberta	Health	Halloran, Philip	The Transplant Transcriptome Project
Genome Prairie	Agriculture	Fowler, Brian	Crop Adaptation Genomics – Use of Genomic Tools for Crop Improvements in Temperate Climates
Genome Prairie	Development of New Technologies	Hicks, Geoff	Enabling Technologies for Embryonic Stem Cell Functional Genomics
Genome Prairie	Health	Hicks, Geoff Rossant, Janet	North American Conditional Mouse Mutagenesis Project: High Throughput Mammalian Functional Analysis for the Discovery of Novel Determinants of Human Disease
Ontario Genomics Institute	Development of New Technologies	Kain, Kevin Greenberg, Michael Chan, Warren	Quantum Dot Diagnostics: Simultaneous Genomic and Proteomic Profiling of Multiple Pathogens at Point-of-Care
Ontario Genomics Institute	Development of New Technologies	Henkelman, Mark	Automated Three-dimensional Phenotyping of Mouse Embryos
Ontario Genomics Institute	Development of New Technologies	Hebert, Paul	Environmental Barcoding through Massively Parallelized Sequencing
Ontario Genomics Institute	Development of New Technologies	Tanner, Scott	Massively Multiparametric Flow Cytometer Analyzer
Ontario Genomics Institute	Development of New Technologies	Kelley, Shana Sargent, Ted	Multiplexed MicroRNA Detection on an Electronic Chip
Ontario Genomics Institute	Development of New Technologies	Figeys, Daniel	Proteomic Technologies for the Study of Rare Cells
Ontario Genomics Institute	Development of New Technologies	Morris, Quaid Bader, Gary	Software Tools to Simplify Gene Function Prediction
Ontario Genomics Institute	Development of New Technologies	Petronis, Art	Technologies for Methylome Studies
Ontario Genomics Institute	Environment	Hebert, Paul	Canadian Barcode of Life Network
Ontario Genomics Institute	GE^{3}LS	Singer, Peter Daar, Abdallah	Strengthening the Role of Genomics and Global Health
Ontario Genomics Institute	Health	Andrews, Brenda	Integrative Biology
Ontario Genomics Institute	Health	Danska, Jayne Macpherson, Andrew	Genome-Environment Interactions in Type 1 Diabetes

Centre	Sector	Project Leader(s)	Project Title
Ontario Genomics Institute	Health	Durie, Peter Zielenski, Julian	The Contribution of Genetic Modulators of Disease Severity in Cystic Fibrosis to Other Diseases with Similarities of Clinical Phenotype
Ontario Genomics Institute	Health	Guidos, Cynthia	Identification of Genetic Pathways that Regulate the Survival and Development of Cancer and Cancer Stem Cells
Ontario Genomics Institute	Health	Hegele, Rob	Structural and Functional Annotation of the Human Genome for Disease Study
Ontario Genomics Institute	Health	Pawson, Tony Wrana, Jeff Li, Shawn	The Dynactome: Mapping Spatio-Temporal Dynamic Systems in Humans
Ontario Genomics Institute	Health	Scherer, Stephen	Autism Genome Project
Genome Québec	Development of New Technologies	Sekaly, Raffick Brinkman, Ryan	High-Throughput, High-Dimensional, Multi-Parametric Analysis of the Immune System
Genome Québec	Development of New Technologies	Tabrizian, Maryam	Integrated Proteomics Platforms for High-throughput Biomarker Discovery and Validation
Genome Québec	Forestry	MacKay, John	Arborea II: Genomics for Molecular Breeding in Softwood Trees
Genome Québec	GE^{3}LS	Knoppers, Bartha Maria	Genomics and Public Health (GPH): Building Public “Goods”?
Genome Québec	Health	Bergeron, Michel	Novel Rapid Molecular Theranostic Technologies for Nucleic Acid Detection
Genome Québec	Health	Sladek, Robert	Genetics of Type 2 Diabetes Melitus
Genome Québec	Health	Xu, Deming Roemer, Terry	Chemogenomics-Driven Drug Discovery in the Human Fungal Pathogen, Candida Albicans
Genome Québec	Health	Abou-Elela, Sherif	Functional Annotation of Essential Alternatively Spliced Isoforms
Genome Québec	Health	Dewar, Ken	An Integrated Genetic/Physical Genome Map for the Old World Monkey, Cercopithecus Aethiops
Genome Québec	Health	Pastinen, Tomi Peterson, Alan Sinnett, Daniel	The GRID Project (Gene Regulators In Disease)

Centre	Sector	Project Leader(s)	Project Title
Genome Québec	Health	Rouleau, Guy Drapeau, Pierre	Identification and Characterization of Genes Involved in Common Developmental Brain Diseases
Genome Québec	Health	Phillips, Michael Tardif, Jean-Claude	Pharmacogenomics of Drug Efficacy and Toxicity in the Treatment of Cardiovascular Disease
Genome Québec	Health	Dewar, Ken	Sequencing of the Bacterium Clostridium Difficile (C. difficile)
Genome Atlantic	Fisheries	Bowman, Sharen Trippel, Edward	Atlantic Cod Genomics and Broodstock Development
Genome Atlantic	Health	Samuels, Mark Young, Terry-Lynn	Atlantic Medical Genetic and Genomics Initiative (AMGGI)
Science & Technology Platforms			
Genome British Columbia	Science and Technology	Nelson, Colleen	The Prostate Centre – Gene Array Facility (TPC-GAF)
Genome British Columbia	Science and Technology	Marra, Marco	Genome Sciences Centre (GSC)
Genome British Columbia	Science and Technology	Borchers, Christoph	University of Victoria – Genome BC Proteomics Core Facility (UVic-GBC PCF)
Genome Alberta	Science and Technology	Sensen, Christoph	An Integrated and Distributed Bioinformatics Platform for Genome Canada
Ontario Genomics Institute	Science and Technology	Scherer, Stephen	The Centre for Applied Genomics (TCAG)
Genome Québec	Science and Technology	Dewar, Ken	McGill University and Genome Quebec Innovation Centre
International Consortium Initiatives			
Ontario Genomics Institute	Health	Edwards, Aled	Structural Genomics Consortium (SGC phase II)
Ontario Genomics Institute	Health	Rudnicki, Michael	International Regulome Consortium (IRC phase II)
Genome Québec	Health	Knoppers, Bartha Maria	Public Population Project in Genomics (P3G phase II)
Ontario Genomics Institute	Health	Hebert, Paul	International Barcode of Life project (iBOL)

Notes on Governance

Genome Canada is governed by a Board comprised of up to 16 directors drawn from the academic, private and public sectors. The Board also includes five non-voting, ex officio advisors—the presidents of the following major federal research agencies: Canada Foundation for Innovation (CFI), Canadian Institutes of Health Research (CIHR), National Research Council (NRC), Natural Sciences and Engineering Research Council (NSERC), and Social Sciences and Humanities Research Council (SSHRC).

The Board oversees the direction and management of the property, business and affairs of Genome Canada. Its governance framework is defined by the corporation's letters patent, general bylaws, funding agreements with Industry Canada, corporate policies, and strategic plans.

Key Board activities in 2008–09

Strategy and planning

- Approved four-year funding support for 12 peer-reviewed projects from the Competition in Applied Genomics Research in Agriculture or Bioproducts
- Endorsed a Genome Canada GE^{3}LS strategy
- Approved Genome Canada's membership in the Cancer Stem Cell Consortium
- Approved for development, the following genomics research initiatives which were deemed as significant strategic priorities with potential for national and international scientific and socio-economic impact:
  - » Aquatic and Terrestrial Animal Genomics Competition
  - » Child Health Genomics Competition
  - » New Genomics Frontiers Competition
  - » Joint Competition between Genome Canada and the Italian National Research Council
  - » International Cancer Genomics Consortium
- Approved funding support for the International Barcode of Life Consortium
- Approved no further funding support for the International Regulome Consortium

Finance

- Approved audited financial statements for year ending March 31, 2008
- Approved 2009–10 operational budget

Performance, evaluation and audit

- Received the performance audit report
- Received the Genome Canada evaluation report
- Received an evaluation report of the Board of Directors

Reporting, monitoring and compliance

- Approved 2007–08 annual report
- Approved 2009–10 corporate plan
- Received the panel report and approved recommendations for the interim review of the Public Population Project in Genomics
- Received site-visit panel reports and approved recommendations for the interim review of Competition III projects

Bylaws and corporate policies

- Adopted bylaw 30 for the amendment of the provisions of the corporation's letters patent and issuance of supplementary letters patent

- Adopted a whistle-blowing policy, and a candidates at a federal election policy
- Adopted revised policies on: travel, data and resource sharing, and access to research publications

Succession planning

- Supported the appointment of an Executive Vice President, Corporate Development and a Chief GE^{3}LS Officer
- Reappointed the President and CEO for a three-year term
- Appointed three new directors

Committees of the Board

The Board has a number of permanent committees, each with a specific mandate:

Audit Committee

The Audit Committee is mandated by the Board of Directors to provide direction, oversight and advice with respect to the accounting, auditing, financial reporting, internal controls, corporate risk assessment, and financially related legal compliance functions of Genome Canada.

Compensation Committee

The Compensation Committee is mandated by the Board of Directors to provide advice and recommendations with respect to compensation practices, policies and procedures for Genome Canada employees, including compensation and bonus guidelines.

Corporate Governance Committee

The Corporate Governance Committee is mandated by the Board of Directors to provide direction, oversight and advice with respect to matters of corporate governance, including development of corporate governance principles and guidelines, review of bylaws, corporate policy, Committee terms of reference, and development of a Board and Committee assessment process.

Election Committee

The Election Committee is mandated by the Board of Directors to provide advice and recommendations with respect to Board and Committee succession planning including the selection process and selection criteria, as well as Board and Committee size, composition and profile.

Investment Committee

The Investment Committee is mandated by the Board of Directors to provide direction, oversight and advice with respect to matters involving the investment management of any funds at the disposal of Genome Canada, including the formulating of investment policies and implementation strategies with respect to Genome Canada's investments.

Science and Industry Advisory Committee

The mandate of the Science and Industry Advisory Committee is to provide strategic advice to the Board of Directors of Genome Canada that will contribute to the corporation's achievement of its long-term objectives of excellence and leadership in genomics and proteomics research and in ethical, environmental, economic, legal and social issues (GE^{3}LS) relating to this research in Canada.

Executive Committee

The Executive Committee shall, while the Board of Directors is not in session, be competent to exercise all or any of the powers vested in the Board of Directors, save and except any powers to adopt, amend or repeal bylaws of Genome Canada and do such acts as must be performed by the directors themselves under the law.

Number of meetings held by the Board and its Committees in 2008–09

Board of Directors	6
Executive Committee	7
Audit Committee	4
Investment Committee	4
Election Committee	4
Corporate Governance Committee	4
Compensation Committee	4
Science and Industry Advisory Committee	3

GENOME CANADA'S TEAM

Board of Directors

Executive Committee •
Audit Committee •
Investment Committee •
Election Committee •
Corporate Governance Committee •
Compensation Committee •

Board of Directors
(as of March 31, 2009)

Calvin R. Stiller, Chair
Chair and CEO
Stilco Corporation
London, Ontario

C. Thomas Caskey, Vice-Chair
Executive Vice-President
Department of Molecular Medicine and Genetics
University of Texas
Houston, Texas

Prabhat D. (Pete) Desai
President
Desai & Desai Inc
Calgary, Alberta

Natalie E. Dakers
CEO
Centre for Drug Research and Development
Vancouver, British Columbia

Sylvie Dillard
Manager, Special Projects
Office of the Deputy Minister
Quebec Ministry of Economic Development,
Innovation and Export Trade
Québec, Québec

Connie J. Eaves
Professor
Medical Genetics, Faculty of Medicine
University of British Columbia
Vancouver, British Columbia

William Gelbart
Professor
Molecular and Cellular Biology
Harvard University
Boston, Massachusetts

Martin Godbout
President and CEO
Genome Canada
Ottawa, Ontario

K. Kellie Leitch
Chair
Paediatric Surgery
Children's Hospital of Western Ontario
Assistant Dean
Schulich School of Medicine and Dentistry
Co-director, Health Sector, MBA Program,
Ivey School of Business
London, Ontario

André Marcheterre
Past President
Merck Frosst Canada
Lorraine, Quebec

Eric M. Meslin
Director, Center for Bioethics
Associate Dean for Bioethics and Professor of Medicine,
and Medical and Molecular Genetics,
Indiana University School of Medicine
Indianapolis, Indiana

Kelvin K. Ogilvie
Professor of Chemistry
Acadia University
Wolfville, Nova Scotia

Stephen W. Scherer
Senior Scientist, Genetics and Genomic Biology
Director, Centre for Applied Genomics
Associate Chief, Research Institute
Hospital for Sick Children
Toronto, Ontario

Jacques Simard
Professor
Canada Research Chair in Oncogenetics
Faculty of Medicine
Université Laval
Québec City, Quebec

Ex Officio Advisors

Alain Beaudet
President
Canadian Institutes of Health Research
Ottawa, Ontario

Pierre Coulombe
President
National Research Council Canada
Ottawa, Ontario

Suzanne Fortier
President
Natural Sciences and Engineering Research
Council of Canada
Ottawa, Ontario

Chad Gaffield
President
Social Sciences and Humanities Research
Council of Canada
Ottawa, Ontario

Eliot A. Phillipson
President and CEO
Canada Foundation for Innovation
Ottawa, Ontario

Officers
(as of March 31, 2009)

Calvin R. Stiller
Chair, Board of Directors

C. Thomas Caskey
Vice-Chair, Board of Directors

Jean Brunet
Stein Monast L.L.P.
Corporate Secretary

Martin Godbout
President and CEO

Cindy Bell
Executive Vice-President, Corporate Development

Guy D'Aloisio
Vice-President, Finance

Carol Anne Esnard
Chief Administrative Officer

Michael Morgan
Chief Scientific Officer

Science and Industry Advisory Committee (as of March 31, 2009)

William A. Bridger, Chair
President
R.M. Spencer & Associates
Edmonton, Alberta

Brenda Andrews, Vice-Chair
Director, Terence Donnelly Centre for Cellular and Biomolecular Research
Professor and Chair, Banting and Best Department of Medical Research, University of Toronto
Toronto, Ontario

Laura Brown
Manager
Marine Ecosystems and Aquaculture Division
Fisheries and Oceans Canada
Nanaimo, British Columbia

David R. Cox
Chief Scientific Officer and Co-Founder
Perlegen Sciences, Inc.
Mountain View, California

William L. Crosby
Professor, Department of Biological Sciences
University of Windsor
Windsor, Ontario

Edna F. Einsiedel
University Professor, and Professor of Communication Studies
Faculty of Communication and Culture
University of Calgary
Calgary, Alberta

Simon J. Gaskell
Vice President Research
Manchester Interdisciplinary Biocentre
University of Manchester
Manchester, United Kingdom

Richard A. Gibbs
Director, BCM-Human Genome Sequencing Center
Wofford Cain Professor, Department of Molecular and Human Genetics, Baylor College of Medicine
Houston, Texas

Maud Hinchee
Chief Technology Officer
ArborGen, LLC
Summerville, South Carolina

Kathy Hudson
Director
The Genetics and Public Policy Center
Johns Hopkins University
Washington, District of Columbia

Benoit S. Landry
President
Percival Consultants
St-Jean-sur-Richelieu, Quebec

Si Lok
Scientific Director
Professor and Chair of Genomic Medicine
Genome Research Centre
Li Ka Shing Faculty of Medicine, University of Hong Kong
Hong Kong, China

Dale E. Patterson
President
The Bourton Group
Toronto, Ontario

Eddy Rubin
Director, Joint Genome Institute, U.S. Department of Energy, and Director, Genomics Division
Lawrence Berkeley National Laboratory
University of California at Berkeley
Berkeley, California

John Yates
Professor, Chemical Physiology
The Scripps Research Institute
La Jolla, California

Genome Canada Staff
(as of March 31, 2009)

Martin Godbout
President and CEO

Cindy Bell
Executive Vice-President, Corporate Development

Julie Bernier
Administrative Assistant / Receptionist

Genny Cardin
Analyst

Kim Corbett
Program Manager

Guy D'Aloisio
Vice-President, Finance

Marc Desmarais
Vice-President, Government Relations

Karen Dewar
Director, National Genomics Programs

Carol Anne Esnard
Chief Administrative Officer

Shannon Fisher
Program Administrator/Data Manager

Barbara Francis
Program Manager

Chuck Hasel
Consultant, Science and Technology Platforms

Karen Kennedy (up to January 16, 2009)
Director, International Genomics Programs

Patricia Kosseim
Chief GE^{3}LS Officer

Hélène Meilleur
Director of Operations

Michael Morgan
Chief Scientific Officer

Robert Moreau
Comptroller

Claudine Renauld
Vice-President, Communications and Public Affairs

Kate Swan
Program Manager

Normand Therrien
Finance Officer

Brigitte Vaillant
Administrative Officer

Compensation

Directors

(1) Directors are not compensated for regular Board and Committee duties. However, during the year ended March 31, 2009, the following directors provided additional services to Genome Canada and were remunerated as follows:

William A. Bridger	$3,498
Kelvin Ogilvie	$5,200

(2) Genome Canada has entered into a management agreement with Hodran Consultants Inc., which, as of March 31, 2009, provided for the services of Dr. Martin Godbout as President and Chief Executive Officer. Compensation for these services fell within the range of $384,000 to $537,600.

Officers

The following individuals are officers of Genome Canada and have employment agreements, including base salary and performance awards, which, as of March 31, 2009, fell within the following ranges:

Cindy Bell Executive V.P. Corporate Development	$197,027–$238,334
Michael Morgan Chief Scientific Officer	$186,480–$223,776
Guy D'Aloisio V.P. Finance	$176,923–$215,607
Marc Desmarais V.P. Government Relations	$171,187–$205,424
Carol Anne Esnard Chief Administrative Officer	$149,098–$180,774
Claudine Renauld V.P. Communications & Public Affairs	$126,682–$154,405

Employees

The following individuals are employees of Genome Canada and have employment agreements, including base salary and performance awards, which, as of March 31, 2009, fell within the following ranges:

Karen Dewar Director, National Genomics Programs	$128,671–$141,538
Karen Kennedy Director, International Genomics Programs (up to January 16, 2009)	$128,671–$141,538
Hélène Meilleur Director of Operations	$96,729–$107,370
Normand Therrien Finance Officer	$100,067

Management Discussion and Financials

Since the creation of Genome Canada in 2000, the federal government has committed $840 million to the corporation for the purpose of supporting large-scale, leading-edge research in genomics and proteomics.

During this period the corporation has realized a further $87 million in investment earnings, which have also been applied to support research. In addition, all research projects supported by Genome Canada through federal investment are required to be co-funded with other parties, including provinces, universities, the private sector, and other national and international organizations. As of March 31, 2009, more than $900 million in co-funding commitments have been raised.

Currently, Genome Canada has two active funding agreements with Industry Canada. One relates to the Federal Budget Plan 2007 for $100 million and the other to the Federal Budget Plan 2008 for $140 million. Funds provided under these two agreements are fully committed to research projects, technology platforms, and operations.

A rigorous competitive process determines which research projects and technology platforms in Canada will be funded. Projects are selected through a system of peer review that includes an assessment of the scientific merit of the proposal and a concurrent due diligence review of the proposed management structure, the proposed budget and related financial data, including co-funding. Reviewers are chosen for their recognized expertise in the science and management of large-scale genomics/proteomics projects and are all from the international scientific community to avoid conflict of interest. Genome Canada's Board of Directors makes the final decision on which applications to fund, based on recommendations received from the international panel of reviewers.

Guided by the terms and conditions of the funding agreements with each of the six Genome Centres, Genome Canada disburses funds to each for approved projects and platforms. In turn, each Centre directs the funds to individual projects and platforms located within its region. The operations of the Centres themselves are supported by Genome Canada.

Financial Highlights 2008–09

In the year ended March 31, 2009 Genome Canada dispersed a total of $87.7 million for both its own operations and for the funding of projects, platforms and Genome Centre operations.

Operations

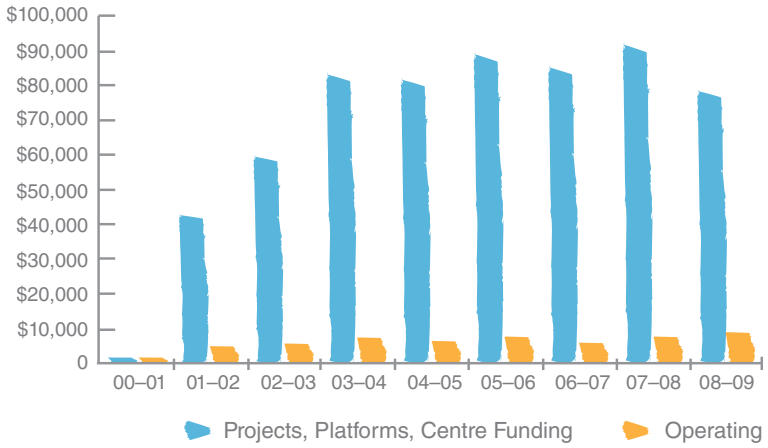
- The cost of operations totals $8.9 million, of which 34% relates to salaries and benefits, 21% to the cost of external committees and working groups, and 18% to professional fees, including one-time initiatives such as the Performance Audit and the Evaluation.
- Significant operational and programmatic activities that occurred during the year include the international adjudication and review of research proposals in the Applied Genomics Research in Bioproducts or Crops (ABC) competition, the implementation and completion of a second Position Paper exercise, the assessment and review of research proposals related to potential International Consortium Initiatives, the undertaking of a Performance Audit (value for money audit), and the completion of a formal third-party Evaluation of Genome Canada.

Projects, Platforms and Centres

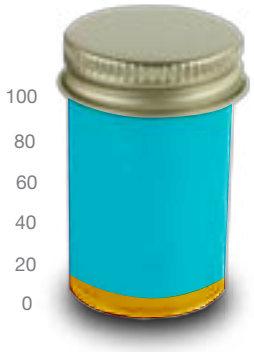
- From inception to March 31, 2009, Genome Canada disbursements to projects, platforms and Genome Centre operations total $616 million.
- From total disbursements of $78.8 million in fiscal year 2008–09, $44.3 million was directed to projects approved through Competition III, $11.5 million to Science and Technology Platforms, and $10.3 million to International Consortium Initiatives.
- As of March 31, 2009 a total of $48 million remains as deferred contributions, representing disbursements that will be made in subsequent years for Genome Canada operations and for approved projects and platforms.
- Through the combined efforts of Genome Canada, Genome Centres and project leaders, it is estimated that over $900 million in co-funding has been raised and committed from inception to March 31, 2009, bringing the total committed value of investments in genomics and proteomics research through Genome Canada to over $1.7 billion.

Annual Expenditures

(in thousands of dollars)

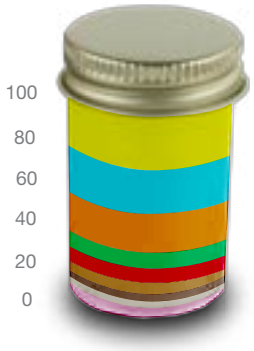


Total Expenditures 2008–09
(in thousands of dollars)



Projects, Platforms and Centres	$78,780.6	89.8%
Genome Canada Operations	$8,949.1	10.2%
Total	$87,728.7	100%

Genome Canada Operations 2008–09

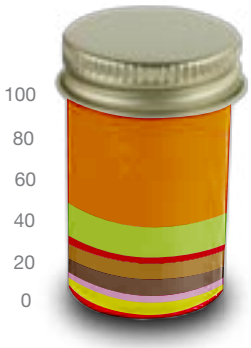


Salaries including Contracted Positions	$3,062.2	34.2%
Committees and Working Groups	$1,847.6	20.6%
Professional Fees	$1,573.1	17.6%
Communications and Outreach	$607.8	6.8%
Workshops and Symposia	$596.3	6.7%
Other	$453.6	5.1%
Accommodation	$287.9	3.2%
Travel and Representation	$261.4	2.9%
GE^{3}LS	$259.2	2.9%
Total	$8,949.1	100%

Projects, Platforms and Centres By:

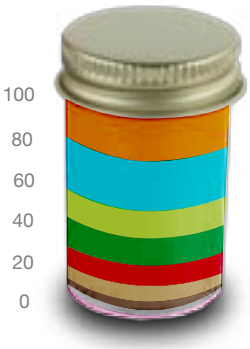
Program Category

FY 2008–09



Competition III	$44,343,765	56.3%
Platforms	$11,462,680	14.6%
Applied Human Health	$2,125,144	2.7%
Centres	$6,005,470	7.6%
Structural Genomics Consortium	$6,640,363	8.4%
Genome Canada/Espana	$43,878	0.1%
P^{3}G	$2,265,600	2.9%
Bovine	$96,634	0.1%
Technology Development	$4,341,899	5.5%
IRC	$1,345,121	1.7%
Other	$110,000	0.1%
Total	$78,780,554	100%

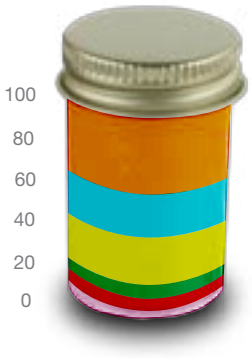
Cumulative Since 2000



Competition III	$150,579,785	24.4%
Competition II	$146,167,515	23.7%
Platforms	$81,358,385	13.2%
Competition I	$80,644,367	13.1%
Applied Human Health	$59,865,253	9.7%
Centres	$46,884,983	7.6%
Structural Genomics Consortium	$23,219,983	3.8%
Genome Canada/Espana	$7,723,082	1.3%
P^{3}G	$6,610,984	1.1%
Bovine	$6,243,584	1.0%
Technology Development	$4,341,899	0.7%
IRC	$2,363,006	0.4%
Other	$110,000	0.0%
Total	$616,112,826	100%

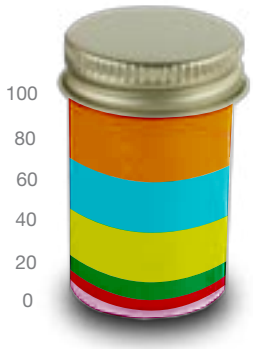
By Region

FY 2008–09



	Ontario	$31,113,598	39.5%
	Quebec	$15,817,086	20.0%
	British Columbia	$20,491,047	26.0%
	Prairie	$3,827,505	4.9%
	Alberta	$4,402,863	5.6%
	Atlantic	$3,128,455	4.0%
	Total	$78,780,554	100%

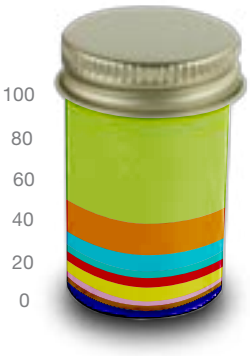
Cumulative Since 2000



	Ontario	$206,740,992	33.5%
	Quebec	$152,401,991	24.7%
	British Columbia	$147,620,357	24.0%
	Prairie	$52,908,936	8.6%
	Alberta	$29,933,744	4.9%
	Atlantic	$26,506,806	4.3%
	Total	$616,112,826	100%

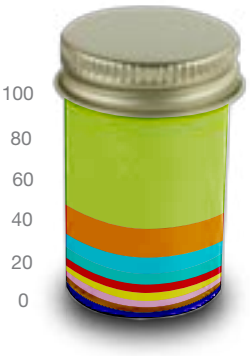
By Sector

FY 2008–09



Health	$43,487,920	55.2%
Platforms	$11,820,214	15.0%
Centres	$6,274,070	7.9%
Agriculture	$2,280,833	2.9%
Forestry	$3,286,512	4.2%
New Technologies	$5,805,994	7.4%
Environment	$1,164,729	1.5%
Fisheries	$2,664,050	3.4%
GE^{3}LS	$1,996,232	2.5%
Total	$78,780,554	100%

Cumulative Since 2000



Health	$356,203,754	57.8%
Platforms	$82,760,435	13.4%
Centres	$47,153,583	7.7%
Agriculture	$32,616,498	5.3%
Forestry	$24,135,626	3.9%
New Technologies	$24,266,936	3.9%
Environment	$16,442,351	2.7%
Fisheries	$17,884,550	2.9%
GE^{3}LS	$14,649,093	2.4%
Total	$616,112,826	100%

Outlook 2009–10

Deferred contributions of $48 million are committed to research projects and platforms approved through previous competitions, and are scheduled for disbursement in subsequent years.

Funding from Industry Canada under the two currently active funding agreements is provided to Genome Canada in annual installments based on estimated cash requirements for the year. Under these agreements, over $200 million is expected to be received over the four-year period ending 2012–13 to finance already-approved research projects and operations.

Genome Canada's operational plan for 2009–10 calls for continued development of national and international research funding initiatives; ongoing monitoring and management of projects from Competition III, projects from the Applied Genomics Research in Bioproducts or Crops (ABC) competition, International Consortium Initiatives, as well as Science and Technology Platforms; implementation of a national GE^{3}LS strategy, and addressing the observations and findings raised in the Performance Audit and Evaluation completed in 2008–09.

Financial Statements

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Auditors' Report to the Directors

We have audited the statement of financial position of Genome Canada as at March 31, 2009 and the statements of operations and changes in net assets and cash flows for the year then ended. These financial statements are the responsibility of the Corporation's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these financial statements present fairly, in all material respects, the financial position of the Corporation as at March 31, 2009 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles. As required by the Canada Corporations Act, we report that, in our opinion, these principles have been applied on a basis consistent with that of the preceding year.

KPMG LLP

Chartered Accountants, Licensed Public Accountants

Ottawa, Canada
May 7, 2009

GENOME CANADA
Statement of Financial Position

March 31, 2009, with comparative figures for 2008

	2009	2008
Assets		
Current assets:		
Cash and cash equivalents (note 4)	$ 13,175,182	$ 40,021,004
Interest receivable	201,105	414,532
Prepaid expenses	186,271	345,433
Other receivables	72,563	122,654
	13,635,121	40,903,623
Investments (note 5)	35,402,451	63,754,360
Capital assets (note 6)	102,965	122,908
	$ 49,140,537	$ 104,780,891
Liabilities and Net Assets		
Current liabilities:		
Accounts payable and accrued liabilities	$ 911,828	$ 637,536
Deferred contributions (note 7)	48,125,744	104,020,447
Deferred contributions related to capital assets (note 8)	102,965	122,908
Net assets:		
Unrestricted net assets	–	–
Commitments (note 11)		
Guarantees (note 12)		
	$ 49,140,537	$ 104,780,891

See accompanying notes to financial statements.

On behalf of the Board:

Director

Director

GENOME CANADA
Statement of Operations and Changes in Net Assets

Year ended March 31, 2009, with comparative figures for 2008

	2009	2008
Revenues:		
Amortization of deferred contributions (note 7)	$ 87,683,590	$ 99,935,091
Amortization of deferred contributions related to capital assets (note 8)	46,071	62,914
	87,729,661	99,998,005
Expenses:		
Contributions to Genome Centres and approved projects	78,780,554	92,307,378
General and administrative	5,592,126	4,243,630
Communications and public outreach	607,830	681,492
External committees	1,847,556	2,221,119
Workshops and symposiums	596,299	429,265
Ethical, environmental, economic, legal and social issues related to genomics (GE^3LS)	259,225	52,207
Amortization of capital assets	46,071	62,914
	87,729,661	99,998,005
Excess of revenues over expenses, being net assets, end of year	$ –	$ –

See accompanying notes to financial statements.

GENOME CANADA
Statement of Cash Flows

Year ended March 31, 2009, with comparative figures for 2008

	2009	2008
Cash flows from operating activities:		
Excess of revenues over expenses	$ –	$ –
Items not involving cash:		
Amortization of capital assets	46,071	62,914
Amortization of deferred contributions (note 7)	(87,683,590)	(99,935,091)
Amortization of deferred contributions related to capital assets (note 8)	(46,071)	(62,914)
Excluded from the decrease in deferred contributions (note 10)	(1,410,199)	(2,002,756)
	(89,093,789)	(101,937,847)
Interest received on investments (note 7)	3,912,514	8,115,976
Grant received from Government of Canada	29,500,000	6,700,000
Deferred contributions related to capital assets (note 8)	26,128	34,412
Change in operating assets and liabilities:		
Decrease (increase) in other receivables	50,091	(19,925)
Decrease (increase) in prepaid expenses	159,162	(172,517)
Increase in accounts payable and accrued liabilities	274,292	114,529
	(55,171,602)	(87,165,372)
Cash flows from investing activities:		
Disposition of investments	28,351,908	111,703,796
Purchase of capital assets	(26,128)	(34,412)
	28,325,780	111,669,384
Increase (decrease) in cash and cash equivalents	(26,845,822)	24,504,012
Cash and cash equivalents, beginning of year	40,021,004	15,516,992
Cash and cash equivalents, end of year	$ 13,175,182	$ 40,021,004

Supplemental cash flow information (note 10)

See accompanying notes to financial statements.

GENOME CANADA
Notes to Financial Statements

Year ended March 31, 2009

The Corporation was incorporated on February 8, 2000 under the Canada Corporations Act as a not-for-profit organization and has the following objectives:

(a) The development and establishment of a co-ordinated strategy for genomics[2] research to enable Canada to become a world leader in areas such as health, agriculture, environment, forestry and fisheries;

(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 (GE[3]LS), 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.

1. Significant accounting policies:

(a) Cash and cash equivalents:

Cash and cash equivalents consist of cash as well as highly liquid short-term investments. The Corporation considers highly liquid short-term investments as those having a maturity of less than three months from the date of acquisition.

(b) Revenue recognition:

The Corporation follows the deferral method of accounting for contributions which include grants 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 purchase of capital assets are deferred and amortized to revenues on a declining balance basis at a rate corresponding to the amortization rate for the related capital assets.

1. Significant accounting policies (continued):

(c) Investments:

Investments are designated as held-for-trading, and recorded at fair value. The comparative figures are recorded at cost. Fair value is determined at quoted market prices. Sales and purchases of investments are recorded at the settlement date. Transaction costs related to the acquisition of investments are expensed.

(d) Capital assets:

Capital assets are stated at cost. Amortization is provided for using the declining balance method at the following annual rates:

Asset	Rate
Furniture and fixtures and office equipment	20%
Computers and software	50%
Telecommunication equipment	30%

Leasehold improvements are stated at cost and amortized using the straight line method over the term of the lease.

(e) Pension plan:

The Corporation maintains, for the benefit of almost all of its employees, a defined contribution pension plan. The cost of the plan is recorded in the statement of operations as it is incurred. The charge for the year totals $142,223 ($140,565 in 2008).

(f) Use of estimates:

The preparation of financial statements in conformity with Canadian generally accepted accounting principles requires the use of estimates and assumptions that affect the reported amounts of assets and liabilities, disclosure 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. 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.

2. Adoption of new accounting standards:

(a) Section 1535, *Capital Disclosures*:

The Corporation implemented the Canadian Institute of Chartered Accountants ("CICA") Handbook Section 1535, *Capital Disclosures*, which establishes standards for disclosing information about an entity's capital and how it is managed. Implementation of these recommendations had no effect on the financial statements for the year ending March 31, 2009, except for the additional note disclosure in note 9.

(b) Section 3862 and Section 3863, *Financial Instruments – Disclosures and Presentation*:

In December 2006, the CICA issued new accounting standards: Handbook Section 3862, *Financial Instruments – Disclosures* and Handbook Section 3863, *Financial Instruments – Presentation*. These standards were expected to be effective for the Corporation's financial statements for the year ended March 31, 2009. However in December 2008, the CICA eliminated the requirement for not-for-profit entities to adopt these standards. The Corporation has continued to disclose and present financial instruments under Handbook Section 3861, *Financial Instruments – Disclosure and Presentation* for the year ended March 31, 2009.

3. Future accounting standards:

In September 2008, the CICA issued Section 4470, *Disclosure of Allocated Expenses by Not-for-Profit Organizations*. This new section establishes disclosure requirements for not-for-profit organizations that report expenses by function and allocate expenses to a number of functions to which the expenses relate. These not-for-profit organizations will be required to disclose additional information regarding their accounting policies adopted for the allocation of expenses among functions, the nature of these expenses, the basis on which the allocations are being made, and the value of the allocations. This standard will come into effect for the Corporation's fiscal year beginning on April 1, 2009.

The Corporation is currently assessing the impact of this new accounting standard on its financial statements.

4. Cash and cash equivalents:

	2009	2008
Cash	$ 52,142	$ 124,222
Short-term investments	13,123,040	39,896,782
	$ 13,175,182	$ 40,021,004

5. Investments:

	Cost	2009 Market	Cost	2008 Market
Government of Canada bonds	$ 5,054,276	$ 5,093,933	$ 5,054,276	$ 5,123,213
Corporate bonds and debentures	20,256,495	18,115,011	34,154,286	32,812,473
Mortgage-backed securities	6,770,717	6,451,212	12,257,804	11,992,516
Provincial Government bonds	5,537,906	5,742,295	13,784,748	13,826,158
	$ 37,619,394	$ 35,402,451	$ 65,251,114	$ 63,754,360

The interest rates at the end of the year range from 1.52% to 5.80% (1.52% to 6.00% in 2008) and maturity dates vary from April 30, 2009 to February 12, 2037 (June 2, 2008 to February 12, 2037).

6. Capital assets:

	Cost	Accumulated amortization	2009 Net book value	2008 Net book value
Furniture and fixtures and office equipment	$ 191,005	$ 132,771	$ 58,234	$ 69,929
Computers and software	294,744	257,135	37,609	42,219
Telecommunication equipment	32,134	25,012	7,122	8,252
Leasehold improvements	72,681	72,681	–	2,508
	$ 590,564	$ 487,599	$ 102,965	$ 122,908

Cost and accumulated amortization at March 31, 2008 amounted to $564,436 and $441,528 respectively.

7. Deferred contributions:

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

The Corporation currently operates under two active funding agreements with Industry Canada. The terms and conditions of these agreements call for payments to be made to the Corporation annually, subject to the appropriation by Parliament, at the beginning of each fiscal year, based on the estimated cash requirements for the coming year.

As at March 31, 2009, the status of these agreements is:

	Agreement dated March 29, 2007	Agreement dated March 31, 2008
Amount committed by Industry Canada	$ 100,000,000	$ 140,000,000
Amount received by the Corporation	36,200,000	–
Balance to be received in subsequent years	$ 63,800,000	$ 140,000,000

Subsequent to March 31, 2009, an amount of $82.9 million was received from Industry Canada, of which $63.8 million relates to the March 2007 agreement and $19.1 million relates to the March 2008 agreement.

Deferred contributions related to expenses of future periods represent these unspent externally restricted grants and related investment income, which are for the purpose of providing grants to eligible recipients and the payment of operating and capital expenditures in future periods.

7. Deferred contributions (continued):

Deferred contributions consist of:

	Balance as at March 31, 2007	Transactions during the year	Balance as at March 31, 2008	Transactions during the year	Balance as at March 31, 2009
Grants	$ 600,000,000	$ 6,700,000	$ 606,700,000	$ 29,500,000	$ 636,200,000
Investment income:					
Interest received	76,787,290	8,115,976	84,903,266	3,912,514	88,815,780
Interest receivable	1,807,024	(1,392,492)	414,532	(213,428)	201,104
Loss on disposal	(216,015)	(1,269,863)	(1,485,878)	(514,847)	(2,000,725)
Fair value adjustment	(635,879)	(698,481)	(1,334,360)	(869,224)	(2,203,584)
	77,742,420	4,755,140	82,497,560	2,315,015	84,812,575
Amount amortized to revenues	(484,677,586)	(99,935,091)	(584,612,677)	(87,683,590)	(672,296,267)
Amount invested in capital assets	(530,024)	(34,412)	(564,436)	(26,128)	(590,564)
	$ 192,534,810	$ (88,514,363)	$ 104,020,447	$ (55,894,703)	$ 48,125,744

8. 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:

	2009	2008
Balance, beginning of year	$ 122,908	$ 151,410
Add restricted contributions	26,128	34,412
Less amounts amortized to revenue	(46,071)	(62,914)
	$ 102,965	$ 122,908

9. Capital management:

The Corporation defines capital as its deferred contributions related to expenses of future periods.

The Corporation's objectives in managing capital are to safeguard its ability to continue as a going concern and pursue its strategy of promoting genomics research to eligible projects that meet the mandate and criteria of its funder, the Government of Canada, and provide benefits to other stakeholders. Management continually monitors the impact of changes in economic conditions on its investment portfolio and its funding commitments. There were no changes to the Corporation's approach to capital management during the year.

10. Supplemental cash flow information:

	2009	2008
Non-cash transactions excluded from the increase (decrease) in deferred contributions (note 7):		
Loss on disposal of investments	$ (514,847)	$ (1,269,863)
Amount transferred to capital assets	(26,128)	(34,412)
Amortization of discounts/premiums from fixed-term investments	–	635,879
Fair value adjustment	(869,224)	(1,334,360)
	$ (1,410,199)	$ (2,002,756)

11. Commitments:

(a) 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, 2009, the payments committed are approximately: $106,554,051 in 2010, $22,767,198 in 2011 and $31,763,087 for other future years.

11. Commitments (continued):

(b) Management services:

The Corporation has entered into an agreement for management services expiring in July 31, 2011. As at March 31, 2009, the payments committed amount to $384,000 in 2010, $384,000 in 2011 and $128,000 in 2012.

(c) Consulting:

The Corporation has entered into five consulting agreements expiring at various dates in 2009 and 2010. The payments committed amount to $194,399 in 2010.

(d) Contribution agreement:

The Corporation has entered into a contribution agreement for an educational exhibit. As at March 31, 2009, the payment committed is $100,000 in 2010.

(e) Operating leases:

The Corporation leases its premises and equipment under long-term operating leases, which expire at various dates between 2009 and 2013. The minimum aggregate lease payments are approximately as follows:

2010	$ 134,882
2011	134,843
2012	134,843
2013	130,129
2014	21,362
	$ 556,059

12. Contingencies:

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

13. Fair value of financial instruments:

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

The fair value of the investments is disclosed in note 5 to the financial statements.

14. Comparative figures:

Certain comparative figures have been reclassified to conform with the financial statement presentation adopted in the current year.

Acknowledgements

The paintings in this Annual Report were created by children at Arc-en-ciel Catholic Elementary School in Ottawa. Our thanks to the school administration and to the 'budding artists' in Valérie Meilleur's Grade 1 class.

Government of Canada

Genome Canada would like to thank the Government of Canada for its support.