



SPREADING THE VALUE OF GENOMICS

Genomics researchers continue to lead the way in saving not just honeybees, but Canada's food supply

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Covering almost two-thirds of the province's total landmass, BC's forests generate more than \$9 billion in economic activity each year.

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How do Atlantic salmon find their way back to their natal streams after marine migration? How does their immune system work to resist specific pathogens?

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Atlantic salmon swim to the forefront of science

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SPREADING THE VALUE OF GENOMICS

means translating research findings into real world results.

Results that can make a real difference to our province, like practical tools for protecting our natural resources, new ways of diagnosing and treating disease, and better methods for developing alternative sources of clean energy.

Genomics research is delivering these benefits all over British Columbia. Ask the cancer patient whose early diagnosis saved her from “a lifetime of worry”...or the beekeepers who are trying to rebuild their honeybee colonies...or the foresters who are planting trees in a changing climate...or the international research team that is working to improve the management of wild and commercial salmon fisheries.

Genomics has the potential to help solve challenges that are of critical importance to our province, our country and our world—from disappearing honeybees to climate change to sustainable healthcare. Read on to find out more.



DR. ALAN PELMAN
Board Chair

WELCOME TO GENOME BC'S NEXT DECADE OF SUCCESS

Thanks to the work of our excellent researchers over the past decade, genomics breakthroughs are happening right in our own backyard — in innovative universities, hospitals, research centres and companies across BC. On the health front, our researchers are leaders in developing personalized medicine applications to optimize screening for specific cancers and improve treatment for kids with life-threatening diseases — among many other innovations.

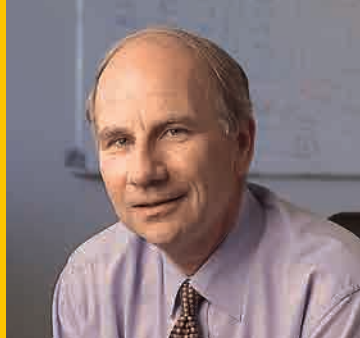
Also heartening to me personally, as someone who hails from the natural resources sector, are the genomics tools being developed for BC's forestry, bioenergy, agriculture, fisheries and environment sectors, such as breeding programs to reverse our troubling honeybee decline and improved enzymes for converting wood waste into biofuels.

As they say, there's no such thing as an overnight success. In the case of Genome BC, our accomplishments are the result of careful strategic planning. During our first decade, we laid a foundation of expertise for conducting large-scale genomics science in BC, which helped position our scientists as world-class.

We have now launched our third five-year plan, which takes us to 2015. It further evolves the balance of our funding programs towards translating research results into applications, in order to secure benefits for families in BC.

A heartfelt thanks to our outstanding board members for their experienced leadership, as they help guide Genome BC into the next decade, which is sure to be another exciting one for the organization.

Dr. Alan Pelman
Board Chair

**DR. ALAN E. WINTER**

President and CEO

**DR. BRAD POPOVICH**

Chief Scientific Officer

Genome BC moved from success to success in fiscal year 2010-2011. We began the year in a celebratory mood, as 2010 marked a decade of innovation at Genome BC. Our key 10th anniversary event featured Sir Mark Walport, Director of the UK's Wellcome Trust, who in the inaugural Dr. Don Rix Distinguished Keynote spoke of the most promising genomics developments in cancer, Parkinson's and global epidemics.

Throughout the year, we continued to secure investments for genomics research, allowing us to continue spreading the value of genomics across the province for the benefit of BC families.

Many of our newest programs are designed to help genomics-based applications transition into the clinic or marketplace. The Proof-of-Concept program and the Strategic Opportunities Fund for Industry are accelerating research with strong commercial potential. The Genomics and Health: Personalized Medicine Program is directly engaging healthcare providers, payers and regulatory bodies — a key step in ensuring our research can be applied to prevent, diagnose and treat disease.

And for the first time, we launched joint collaborative research programs with the Canadian Institutes of Health Research. Projects funded through these programs are shedding more light on devastating childhood diseases and how microorganisms affect human health.

Perhaps the year's biggest news came when Genome BC researchers were awarded \$24.9 million in federal funding — 43% of available funding — through Genome Canada's 2010 Large-Scale Applied Research Project Competition. We were able to leverage investments made by the provincial government to succeed in this national competition, which will ultimately benefit BC.

These innovative programs were all made possible due to the continued investment in Genome BC by the Province of BC, the federal government through Genome Canada and Western Economic Diversification Canada, and many other partners — and to the continued excellence of BC's internationally recognized scientists and dedicated staff.

Dr. Alan E. Winter
President and CEO

Genome BC occupies a unique position in the BC life sciences industry. The organization has funded genomics research for the past decade, not as a granting council or as a venture capital investment firm, but rather by awarding research and development contracts in the middle ground between these two investment models.

Strategically, these investments are positioned to provide an essential bridge between the world of academia, where knowledge is discovered and potential applications are identified, and the sectors where these genomic applications are needed to solve problems — in healthcare, agriculture, fisheries, forestry, mining, bioenergy and the environment.

Having played leadership roles in both academia and industry, I personally understand the challenges of bridging the chasm between these two worlds, and how policy and regulatory matters often become critically important as we try to move discoveries into application, whether it's a new genomics-based medical diagnostic or a new genomics-based tool for monitoring water quality.

We are supporting researchers across British Columbia to take their knowledge further and translate their discoveries into applications. Through our translational funding programs, we are facilitating the process by asking end-users what problems need solving in their sectors, and how genomics-based applications can help solve those problems.

I look forward to working with BC's excellent researchers along the continuum from making new genomic discoveries to helping translate these into practical applications for the sectors that drive British Columbia's economy.

Dr. Brad Popovich
Chief Scientific Officer

THE BIG

When it comes to overall survival rates and cancer care, BC is an acknowledged national and international leader. But the numbers still tell a sad story. Cancer genomics is paving a road to hope.

Cancer breakthroughs herald era of personalized treatment

There's a reason they call it 'The Big C.' Although the province is a national leader in overall survival rates and cancer care, last year nearly 10,000 people died of cancer and 21,600 new cases were diagnosed in BC — about 1,000 more new cases and 100 more deaths than the year before. Costs to treat patients are also rising: the province's spending on cancer care, through the BC

Cancer Agency, has increased from \$204.9 million in 2001 to \$517 million in 2010 — a 152% increase.

Cancer genomics is paving a road to hope. In the not so distant future, the genomes of cancer tumours will routinely be sequenced as part of the clinical evaluation of many cancer patients, helping to usher in the much-anticipated era of 'personalized' treatment. Cancer clinicians will use the information to tailor treatments to a patient's individual

genetic makeup — and even to a patient's unique tumour genes.

For the past decade, Genome BC has made significant investments in cancer genomics projects undertaken at the BC Cancer Agency, many of which are leading to a more personalized and cost-effective approach to cancer diagnosis and treatment — and better outcomes for patients and their families.



10,000

people died of
cancer last year in BC

21,600

new cancer
cases diagnosed
last year in BC

152%

increase over 10 years
in provincial spending
on cancer treatment

CHILDHOOD BRAIN CANCER: BETTER QUALITY OF LIFE FOR SURVIVORS

Whole cranial irradiation — radiation directed to the entire brain — is a lifesaver for some kids diagnosed with medulloblastomas, the most common form of childhood brain cancer.

But because their nervous systems are still developing, many children are left with severe growth and intellectual deficits, permanent memory and speech challenges and profound physical problems — resulting in a staggering burden for them and their families and annual health care costs estimated at over \$100 million.

A new genomics research project co-funded by Genome BC and Genome Canada is investigating four sub-types of medulloblastomas. They're known to have distinct outcomes — some far better than others — but this information has not yet been translated into a standard of care. Co-led by Drs. Marco Marra, Michael Taylor and David Malkin, the team has set their sights on achieving a high resolution genome-wide dissection of

the different tumour types, which has never been done before. “We’re aiming to analyze at least 1,000 cases,” explains Marra.

The team’s main goal is to identify markers that differentiate between the different tumour types, culminating in an assay for predicting a patient’s prognosis more effectively. In future, if a child’s prognosis turns out to be very good, radiation can be avoided altogether, preventing associated life long side effects.

Other project goals include searching for new drug targets within the tumours and identifying genetic risk factors predisposing children to the disease. Related research outcomes will help guide treatment decisions and better assess the economics of using the assay in a clinical setting.

“The end-goal is to improve long-term clinical care, and benefit patients and their families,” says Marra.



Dr. Marco Marra

FINN SULLIVAN: THE BOY WHO LIVED



Every time Finn Sullivan had to undergo a treatment at BC Children’s Hospital, he was given a ‘courage’ bead. Diagnosed at 21 months with rhabdomyosarcoma, a rare cancer of the soft tissues, Finn had hundreds of courage beads when his journey ended just over 18 months later in October 2008.

“We want Finn measured by how he lived,” explains Finn’s father, Patrick. “We celebrate him by approaching life the way he did: running, jumping, bouncing, dancing, singing, loving, smiling and riding.”

Finn’s favourite activities have become a mantra for “Team Finn,” which has raised over \$1 million for pediatric cancer.

“It started with a small group of friends who wanted to remember Finn by participating in the Ride to Conquer Cancer. Now there are over 100 riders and we’re one of the top fundraising teams — and we’re not done yet.”

The family has a special term for the infectious spirit that’s moved people to donate or get involved in Team Finn: “Finnspiration.” Twin brother Baird and older sister Sarah also keep Finn’s spirit alive by “fun-raising” to help other sick kids.

“As a tribute to Finn, we have 33 courage beads on our bike jersey,” says Patrick. “Each year we remove one bead to acknowledge the difference research is making. We do this because we strongly believe genomics offers the promise to change the story for other Finns.”

Making sure the kids are all right: tackling rare childhood cancers

Rare childhood cancers often have a poor prognosis. With support from Genome BC, the Canadian Pediatric Cancer Genome Consortium is probing the genomes of six of the most therapeutically challenging childhood cancers to find out why some tumours spread or come back, and why some of the most aggressive tumours are so resistant to therapy. The project leader, UBC’s Dr. Poul Sorensen explains, “the opportunity here is to make significant inroads into finding new therapies and offer this information to the international pediatric oncology community.”

DANA GROSS: HEREDITARY BREAST CANCER SURVIVOR



The lump in Dana Gross' breast was only 1mm in diameter. "It was so small my regular mammogram didn't detect it. Even when my MRI showed something 'unusual', my doctor said it didn't look like anything to worry about," explains the 48 year old.

As a precaution, a biopsy was done. To Dana's shock it came back positive for a grade 3 "triple-negative" breast cancer, a sub-type that's more aggressive and less responsive to standard treatment.

Dana credits the BC Cancer Agency's Hereditary Cancer Program for the early detection, which allowed her to have an immediate lumpectomy and avoid chemotherapy and radiation. She was referred to the program after her mother, who has fought breast cancer three times, tested positive for the harmful *BRCA1* mutation two years ago. Inherited mutations of the *BRCA1* and *BRCA2* tumour suppressor genes have been linked to a much higher chance of developing breast and ovarian cancer.

"My mother is such an amazing role model. But seeing your mother go through cancer three times — it does cross your mind that you could end

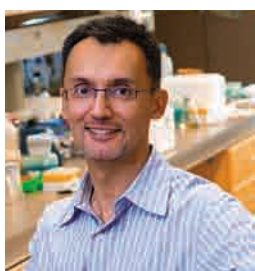
up with it too," says Dana, who moved to Vancouver from Memphis, Tennessee, four years ago, along with her husband and two daughters.

At their mother's urging, both Dana and her sister got tested. Both tests came back positive.

"It was a bit scary, but we didn't dwell on it. We had some big decisions to make."

While her sister opted to have a risk-reducing bilateral mastectomy (removal of healthy breast tissue), reconstruction and salpingo-oophorectomy (removal of healthy fallopian tubes and ovaries), Dana elected to have just the salpingo-oophorectomy and take part in an MRI breast-screening program. When her first MRI detected the aggressive breast cancer, Dana went ahead with the bilateral mastectomy and reconstruction.

"The surgeries were hard, but I don't sit around feeling sorry for myself. Not having them would have meant a lifetime of worry. What I feel is grateful — grateful my sister and I knew what we were dealing with."



Dr. Aly Karsan

Reducing diagnosis time for hereditary breast cancer

If a woman inherits a mutation in the *BRCA1* or *BRCA2* gene, her lifetime risk to develop both breast and ovarian cancer is greatly increased over that of other women in the general population. Dr. Aly Karsan, Head of Clinical Diagnostics at the BC Cancer Agency, is implementing a new genomics-based technology, with funding from Genome BC, for dramatically speeding up the testing for these mutations. The sooner a woman knows she may be at risk, the sooner she and other family members can take preventative action.



\$2.2 billion

contributed annually
to the Canadian
agricultural economy by
honeybee pollination

\$500 million

contributed annually to
BC agricultural production
by honeybee pollination



New research helping honeybee breeders out of a **STICKY SITUATION**



The real buzz about honeybees is that Canada's \$5 billion fruit and crop production industry depends on them. The pollination efforts of honeybees are estimated to contribute in excess of \$2.2 billion to Canada's agricultural economy each year, resulting in crops ranging from tree fruit and bush berries, to field cucumbers and broccoli. In BC, honeybee pollination is responsible for nearly \$500 million in agricultural production every year.

But according to the Canadian Association of Professional Apiculturists, over-winter honeybee colony losses were 21% last year, one and a half times the past national average. Here in BC almost 10,000 honeybee colonies were either dead or unproductive after wintering and cold weather was not the only cause. These losses threaten not only our honey production, but also our food supply.

Genome BC is supporting the development of technology to breed a more resistant honeybee — and hopefully improve the survival rates of the colonies. It's a critical tool for ensuring the future health and viability of our honeybees — our tiny, yet mighty, pollinators.

'HYGIENIC' BEES COULD REVERSE BEE DECLINE

Honeybees are dying in record numbers, a fact that's mystifying both beekeepers and scientists alike.

The numbers tell a troubling tale: the long-term average for over-winter hive losses has risen dramatically in Canada and the U.S., jumping from approximately 15% to about 30% in just five years.

It's an alarming problem for beekeepers, and potentially disastrous for the rest of us. About a third of our food sources come directly or indirectly from plants pollinated by honeybees.

"This problem has turned beekeeping into an almost charitable endeavour. Each year beekeepers struggle to rebuild the number of bees in their hives and each year they lose

more bees," says Dr. Leonard Foster, a UBC biochemist who specializes in the study of host-pathogen interactions, both in bees and in humans.

Although scientists haven't figured out exactly what's causing the sudden rise in deaths, they suspect a few culprits, including a virus-spreading mite and a new fungus.

With funding from Genome BC, Foster is using genomics and proteomics to identify promising biomarkers for disease resistance that can potentially be used in the selective breeding of bees. One of the most promising biomarkers is for traits that produce a more 'hygienic' bee.

"What we found is that some bees keep their hives cleaner than others. Bees with this better hygiene behaviour appear to have more resistance to disease."



To fast track the selection of these more fastidious bees, Foster and his team are now working with commercial beekeepers across BC, Alberta and Manitoba to test the performance of bees bred to have better hygiene behaviour against unselected bees.

THE PRIDE OF MCBRIDE



When Leonard Foster visited Prince George this past March, he was greeted like a rock star by the audience of high school students from his hometown of McBride, BC. But Foster wasn't there to give a concert, he was there to give a talk about his honeybee research.

"I graduated from McBride Secondary and my mom and dad both taught there for years. So I think they were just clapping because they knew my name," laughs Foster, in his typical self-deprecating style.

Foster may not be a rock star, but he is a rising star in the world of bee research. It's a fascination dating back to his high school days when he isolated an antibacterial compound from a beehive product for a science fair project. "That connected me to bee researchers at Simon Fraser University and every summer I worked there in a bee research lab."

After completing a PhD at the University of Toronto focused on how insulin regulates blood glucose, followed by post-doctoral studies at an internationally acclaimed proteomics lab in Denmark, Foster was one of the first faculty members hired by UBC for the Centre for High-Throughput Biology in 2005.

"When I set up my lab, my main interest was to study host-pathogen interactions. Half of my lab is set up to study honeybee viruses and mites, the other half focuses on how bacteria control cell-signaling pathways in humans."

During his first Genome BC-funded project, Foster identified desirable pathogen-resistant traits in natural bee populations. Now he's working with beekeepers across Canada to test these results. The work is not only expected to have a significant economic impact on beekeeping operations, it will also help protect our food supply, much of which grows due to honeybee pollination.

It's no wonder Foster's research is creating such a 'buzz'.

WINE MASTER OF THE OKANAGAN



Howard Soon has been in the BC wine business for 31 years, back when it was known more for jug wines than fine wines. Those days have changed. The veteran wine master was part of a BC wine revolution in the late 1980s that brought in world-class winemaking techniques and better grape management — a move that saw BC wines take top honours at Paris and Los Angeles wine competitions. As head of Western Canada winemaking at Andrew Peller, owner of award-winning BC brands Calona, Peller Estates, Sandhill and Red Rooster, Soon is now part of a newer revolution: using advanced genomics technologies in winemaking. He's on the Scientific Advisory Board of the Grape and Wine Genomics project, a Genome BC and Genome Canada initiative involving UBC's Wine Research Centre and several international scientists. Concerned with unlocking the genetic secrets of grapevines and wine yeasts, the research helps wine masters like Soon apply genomics right in the vineyard.

Q What did you know about genomics before becoming involved with Genome BC-funded grape genomics research projects?

A I am a UBC grad in biochemistry. I took a third year genetics course with David Suzuki. That was a few years back, but concepts like recombinant DNA are still close to my heart.

Q What are some of your main challenges as a winemaker?

A Great wine comes from a certain amount of heat stress. But by the end of July, in the full heat of the Okanagan sun, you walk a tightrope. You don't want to kill the vine or stress it with too much heat, and you don't want to overwater just to cool it down.

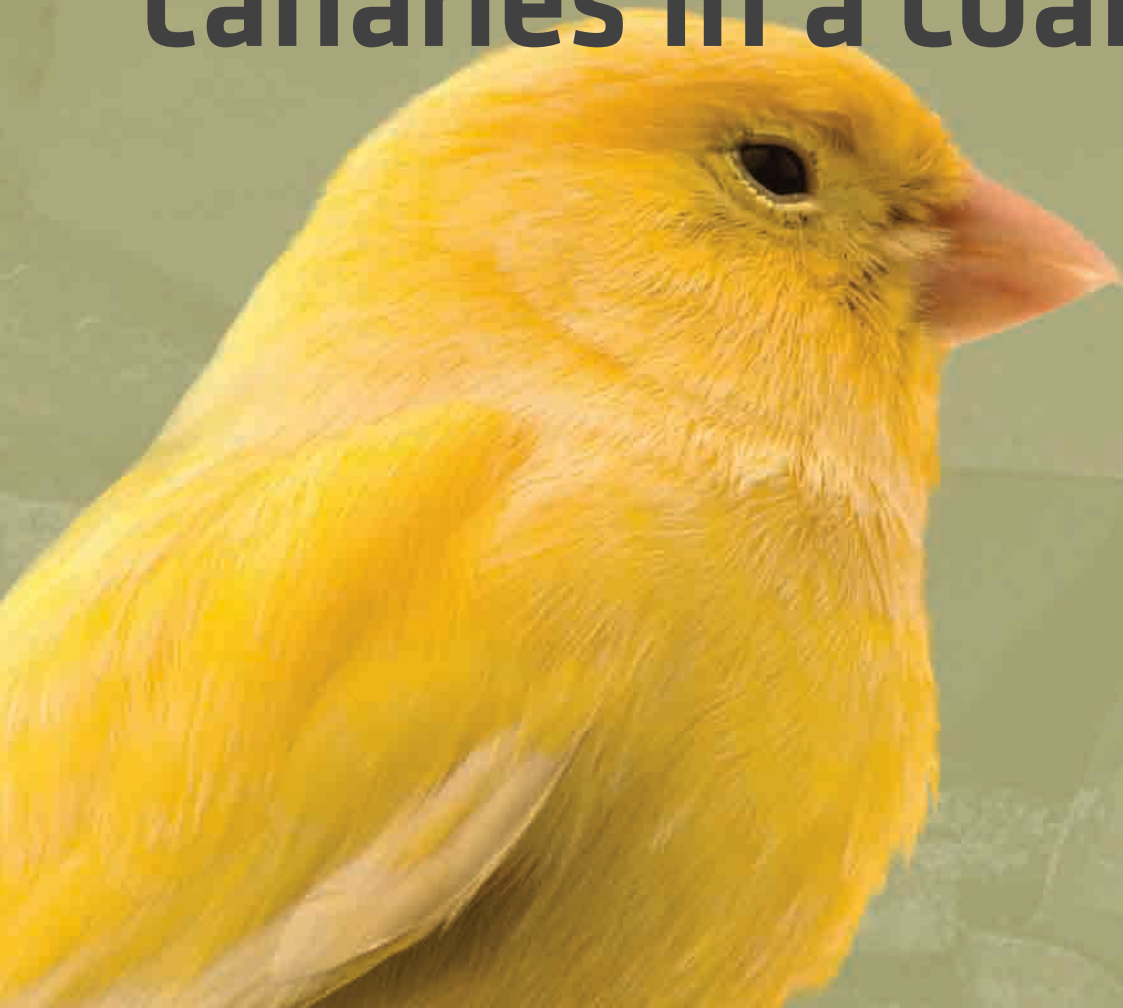
Q How do you manage that challenge now?

A We have all kinds of 'fancy' instrumentation, but sometimes you just have to take a shovel and dig down to see if there's enough water in the soil. You have to feel the dirt with your hands at the root level. Our vineyard managers use their experience and intuition, as well as the instruments, to help them manage irrigation.

Q What's your view of using advanced genomics technologies in such an old-world industry?

A I believe in it. The work they're doing at the Wine Research Centre at UBC is very results-oriented. The new technologies can tell us how grapevines and wine yeasts are actually responding to conditions in the vineyard and in our wine fermenters. In winemaking, every day matters and every grape matters. This research will put practical tools in the hands of our grape managers and our winemakers, to help understand what's really going on.

ENVIRONMENTAL canaries in a coal mine





Animals have been used as early warning systems to protect human health since at least the early 1900s, when coal miners began taking canaries into the mines to monitor the presence of toxic gases. If the bird started to show any sign of sickness, miners would flee for safety.

More recently, animals such as frogs and mussels have been used as ‘bioindicators’ for monitoring the health of an environment or ecosystem, such as a coastal area or a watershed.

These sentinel species can be monitored for biochemical, physiological, or behavioural changes, which could indicate stressors within their ecosystem. And because they tend to accumulate chemicals and other substances from very low concentrations in their environment, these living organisms can alert us to the presence of different pollutants and their cumulative effects — on animals and humans alike.

Genomics is taking this type of environmental monitoring to a whole new level. Effects from pollutants or other environmental stressors often manifest themselves first at the molecular level, well before they show obvious physical signs. Scientists are using genomics tools to detect these effects sooner, help identify possible causes and measure impacts on the environment as well as human health.



THE BULLFROG'S SERENADE



You can't mistake the loud calls of *Rana catesbeiana*, commonly known as the wild bullfrog. While we may not always appreciate the bullfrog's serenade, we can thank it for acting as a silent sentinel — a biological early warning system — for potential negative effects of certain chemicals on our waterways, our ecosystems and our health.

Dr. Helbing and I have been collaboratively pursuing the frontiers of aquatic toxicogenomics for over a decade. Our labs worked together to pioneer the application of “omic” methods to understand the potential deleterious effects of complex mixtures, pesticides and emerging chemicals on both fish and amphibians. Support from Genome BC has been instrumental in our continuing efforts to explore and develop these critical aquatic toxicogenomic methods.

Graham C. van Aggelen

Head, Environmental Toxicology
Environment Canada, Pacific Environmental
Science Centre



The bullfrog's development from tadpole to frog is quite amazing, and shares similarities with how humans develop from fetus to baby,” says Dr. Caren Helbing, associate professor in the department of biochemistry and microbiology at the University of Victoria and lead investigator of the Genome BC-funded frogSCOPE project. “Because the thyroid is quite involved in bullfrog tadpole development, it turns out that the bullfrog is a useful biological sensor for problems in thyroid hormone action — both in the bullfrog and in people.”

The hormone-secreting thyroid gland is part of the endocrine system. This system of glands influences almost every cell, organ and function of the human body, helping to regulate growth and development, tissue function, metabolism and reproductive processes.

In the early 1980s, scientists discovered a link between pollutants and other chemicals that make their way into the municipal water system — including pesticides, industrial effluents and various pharmaceuticals — and the disruption of the endocrine system in animals and humans. The U.S. Endocrine Disruptor Resource Center has identified about 50 of these so-called “endocrine-disruptors.”

“The problem is that the effects are typically sublethal in wildlife — which means they

are hard to identify using traditional technologies, unlike the more obvious lethal effects of certain toxic chemicals,” explains Helbing.

“The effects are often manifested first at the molecular level,” she adds. “Using genomics technologies, we can use bullfrogs as ‘wet canaries in the coal mine’ to identify the presence of certain chemicals in a specific ecosystem, and monitor their biological effects.”

Working closely with regulatory agencies such as Environment Canada and several municipalities, Helbing is also developing a genomics-based tool for monitoring certain known endocrine-disruptors in municipal wastewater.

“Right now, current methods to monitor chemicals in municipal wastewater are ineffective in detecting low levels of biologically relevant pollutants. But even low levels have been linked to devastating effects on health, including diabetes, obesity, and metabolic and reproductive disorders, which all have a considerable impact on the healthcare system.”

Dr. Helbing's considerable contribution to the environmental assessment field was recognized last May with the Craigdarroch Research Award for Excellence in Innovation and Entrepreneurship, one of UVic's highest research honours.

SHELLFISH WARNING

Mussels are dying on BC's coasts — can genomics help stem the tide?



You'll have to forgive mussels for feeling a tad self-conscious. After all, they're being closely watched all over the world.

As 'sessile' or non-moving filter feeders, mussels siphon water, giving them an increased capacity to accumulate contaminants. This innate ability to reflect local environmental conditions has prompted countries around the world to launch "mussel watch" programs, turning the mussel into a critical bioindicator for pollution in aquatic environments.

In BC, mussels have been trying to tell us that something within their ecosystem is terribly amiss. All along the coast, bi-valves have been dying in unprecedented numbers. These mass mortalities are puzzling scientists and threatening coastal economies.

"Mussels along BC's coastal areas are under some kind of severe stress," says Dr. Helen Gurney-Smith, a biologist with Vancouver Island University's Centre for Shellfish Research and co-investigator of a Genome BC-funded project on

mussel genomics. "There have been huge and sudden mortalities, but we don't know why it's happening. These losses were immediately apparent in cultured situations, but have also been happening in wild populations."

To identify genes involved in environmental stress responses, Gurney-Smith and her team exposed two species of marine mussels to a range of natural and man-made environmental stressors, including temperature, hypoxia, salinity, bacteria and physical disturbance.

"Genomics is giving us a powerful new way to develop an understanding of how these mussel populations are changing in response to a variety of stressors and changes in their environment, including climate change events like higher temperatures and acidity in the water," says Gurney-Smith.

A result will be a genomics tool for identifying and measuring stressors in the bi-valves, which can eventually be used by aquaculture operators and environmental monitoring groups around the world.



The genomics work by Dr. Helen Gurney-Smith is of significant benefit to the BC shellfish industry. The results of her research are helping us to match specific mussel populations to specific areas and choose broodstock more precisely, allowing for better growth and survival.

Gordon King
Subtidal Division Manager,
Taylor Shellfish Inc.

two-thirds
of BC's total landmass
is covered by forest

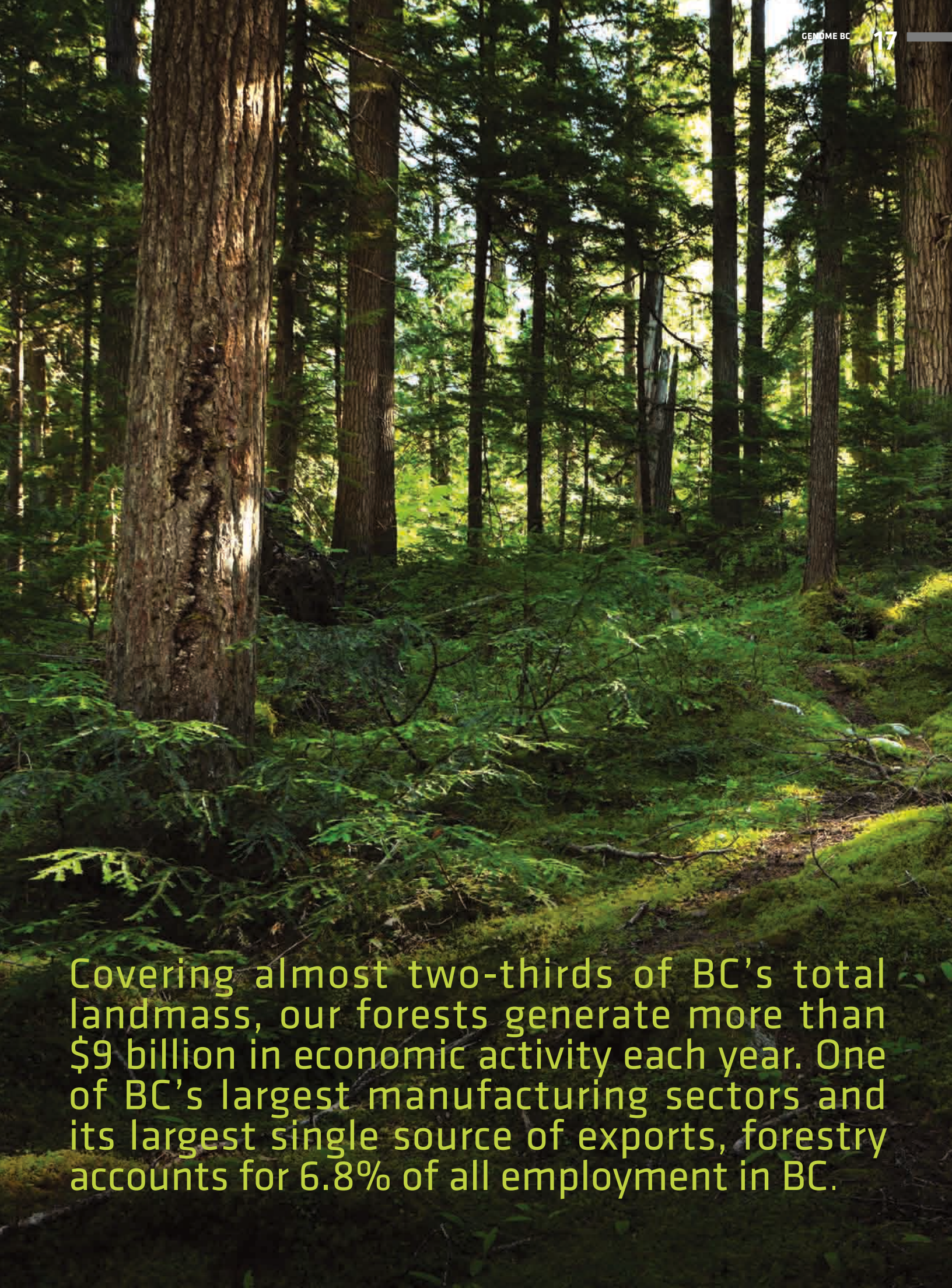
6.8%
of all employment
in BC is in the
forestry sector

\$9 billion
in economic activity is
generated annually by
BC forests

ROOTING FOR BC FORESTS

The forest industry is facing mounting challenges, with climate change at the top of the list. Warmer winters and drier conditions have triggered BC's massive mountain pine beetle epidemic. These invasive beetles have already cost the economy millions of dollars and affected 17.5 million hectares of BC forests (more than five times the size of Vancouver Island).

Genome BC continues to invest in a robust forestry genomics portfolio which is playing an important role in BC's efforts to manage our forests. Our funded researchers are identifying genetic features that provide an accurate diagnosis of invading organisms, and key genes that confer adaptive traits against pest infestation, disease and environmental changes.



Covering almost two-thirds of BC's total landmass, our forests generate more than \$9 billion in economic activity each year. One of BC's largest manufacturing sectors and its largest single source of exports, forestry accounts for 6.8% of all employment in BC.

PLANTING THE RIGHT TREE IN THE RIGHT PLACE

On average, more than 200 million tree seedlings are planted each year on public forest land in BC. That's more than 6 billion since reforestation programs began in the 1930s.

But what happens when locally grown seedlings, the ones used to regenerate forests in a specific region, are no longer well adapted to a changing local climate?

"What trees have to do is synchronize with the available growing season," notes Dr. Sally Aitken, professor of forest sciences at UBC, and a co-leader of an applied Genome BC-funded research project that's examining how trees are adapting to BC's changing climate.

"For instance," Aitken adds, "if they don't shut down their growth before temperatures get low, they can experience cold damage. If they shut down growth too early, they can be shaded out and die. If we can identify seedlings with the traits that make them resilient to a certain climatic area, they'll be more likely to thrive."

Over the past decade, central BC has experienced unusually mild winters and hot, dry summers. This change in climatic conditions has been blamed for higher tree losses due to pests like the mountain pine beetle. As local climates continue to change, stressors could become even more severe, posing serious concerns for the future health and productivity of forests in BC and across Canada.

Aitken's team is one of the first in the world to use a three-pronged approach to help predict the right seedlings for specific



climatic conditions: genome sequencing, climate change modeling and geospatial analysis.

"We've developed climate change modeling software called Climate WNA that integrates historical and current climate data from local weather stations with regional predictions of climate change. This gives us predictions of future conditions under a range of climate change scenarios, at any location in western North America," explains Aitken.

The geospatial analysis identifies specific climatic patterns — such as temperature or moisture — associated with the frequency of a particular genetic variation or important genetic trait, such as cold or drought hardiness.

Because they're western Canada's two most economically important tree species, the team is focusing their efforts on lodgepole pine and interior spruce. Using the three-pronged approach, the team will be able to deliver policy recommendations for the reforestation of these important trees for future climates.

The end-goal is to ensure the right trees get planted in the right climatic areas to improve the long-term health of forests in BC as well as generate economic benefits.

"This project is very much connected with operational forestry activities," notes Aitken. "We're working with key partners in the provincial government and focusing on tree species that are the most economically important to the province."



"This project is very much connected with operational forestry activities."

— Sally Aitken

HAVING OVERSIGHT FOR FOREST GENETICS RESEARCH,

tree breeding, seed orchards, the provincial tree seed centre, as well as regulations and standards that govern tree seed use in British Columbia — I recognize the potential value and benefits of Dr. Sally Aitken's genomics project. Identifying the genes involved in adapting trees to a range of climatic conditions, assessing the adaptive capacity of spruce and pine populations, and developing climate-based seed zones will assist practitioners in better matching trees to different planting sites. The project's associated socio-economic research will also assist us in assessing the benefits of employing these novel techniques.

Brian T. Barber, MA, RPF

*Director, Tree Improvement Branch
Ministry of Forests, Lands and Natural Resource Operations*

MOUNTAIN WOMAN



If having a full-grown black bear jump on your tent in the middle of the night isn't enough to scare you away from the rugged wilderness, then you are probably destined for mountain life.

Sally Aitken was only 12 when the surprise visitor attacked the tent she was sharing with a friend while camping on her family's remote property in Alberta. Although they didn't know it at the time, the bear had just killed a calf and a dog at a nearby farm.

The girls began yelling and banging pots, distracting the bear long enough so they could sneak away to a neighbouring ranch a couple of kilometres away.

"Maybe I was too young to know how serious it was, but it really didn't scare me. I stayed calm and was intrigued by the bear more than anything else," remembers Aitken, who later returned to the camp to find the bear had destroyed it.



Now director of the Forest Sciences Program at UBC, Aitken didn't let the experience affect her. She's spent a lifetime camping, hiking, backcountry skiing, kayaking — and doing research — in and around BC's mountains. It's an affinity that dates back to a childhood summer spent roaming the Burgess Shale, high in the Canadian Rocky Mountains.

"My father was a geologist, so we spent one summer up there," says Aitken, who grew up in Calgary. "My sister, brother and I played with rocks all day. We didn't understand the geological and evolutionary importance of where we were — or how really, really old those rocks were — we just loved being up there."

Gamboling around one of the world's most famous fossil fields rubbed off. Aitken peppered her father with

questions about evolution, until he finally suggested she read Darwin's *On the Origin of Species*. She was only 11. Combining her love of the mountains with her early fascination with evolution — Aitken set her sights on studying forest genetics even before graduating from high school.

"I knew I wanted to study applied science, something that would allow me to spend time up in the mountains, and I knew I wanted to study evolution. Forest genetics had both."

Aitken's main research focus is adapting genetic resource management to climate change, but she also enjoys teaching. The chance to live in BC, along with greater research and teaching opportunities, were the reasons she left a faculty position at the University of Oregon's Pacific Northwest Tree Improvement Research Cooperative to join UBC in 1996.

"Because we teach most of the future professional foresters in BC at UBC, we can have a huge impact on the profession."

But Aitken doesn't confine her teaching to the classroom. Every fall, she takes 30 alpine ecology students backpacking for a week around the Elfin Lakes area in Garibaldi Provincial Park near Squamish.

And if an enormous black bear should make a surprise visit to their camp? "No problem," laughs Aitken.



FROM BEETLE KILL TO BIOFUEL

Climate change and a diminishing global oil supply have sparked a quest for more carbon-neutral and renewable sources of energy.

First-generation biofuels, mainly ethanol and biodiesel, have been on the market for several decades. But because they're made from sugars, starches and oils derived from crops, such fuels compete for the use of agricultural land and water. As a result, scientists have turned to genomics to find new ways to convert biomass into usable energy.

Genome BC-funded researchers are developing ways to improve biomass conversion from wood waste and even sunflower stalks. This is more complex and expensive than converting food crops like corn. Using genomics, they're working to improve industrial enzymes and refine the conversion process, making it more efficient and cost-effective. It's work that's helping to optimize the development of sustainable biofuels, which could someday replace fossil fuels on a global scale.

MIXING A BETTER COCKTAIL



It covers the floors of lumber and pulp mills all over the province: piles of sawdust and other wood residue that's of little or no commercial value.

Combine that with millions of hectares of dead lodgepole pine killed by the voracious mountain pine beetle, and it's easy to see why BC has an overabundance of unmerchantable wood and wood waste.

But where some see waste, others see opportunity.

Dr. Jack Saddler, former dean of forestry and current professor of bioenergy at UBC, has spent the last several decades researching different ways to convert the wood waste's cellulose, hemicellulose and lignin components into fuels and chemicals. The biggest challenge has been figuring out how to do it cost-effectively.

"Another way to look at this wood waste is as a biomass substrate, which can be transformed into a usable source for producing biofuels," Saddler explains. "However, nature designed lignocellulosic biomass such as trees to be *extremely* difficult to break down."

Saddler figured enzymes might provide the answer. Routinely produced by organisms such as mushrooms and other fungi, cellulase enzymes help to decompose fallen trees and dead plants.

"If these enzymes could be used to speed up the process of converting the wood's biomass into usable components, it could make the production of wood-based biofuels commercially viable."

But they were simply too expensive to use in the conversion process.

Enter Novozymes, a Danish bioinnovation company and the world's biggest producer of industrial enzymes used in a range of applications from softening fabrics to enhancing the taste of beer. With funding from Genome BC, Dr. Saddler's team was able to partner with the company to experiment with ways of using genomics to improve the cellulase enzymes — making them much cheaper and faster to use.

"We've been using genomics to mix and match different enzyme 'cocktails' to identify which cocktail works best on which wood substrate," explains Saddler. "We found that it's not a one-size-fits-all proposition. Different kinds of woody biomass need a different cocktail mix."

Saddler's work helped Novozymes dramatically reduce the cost of developing commercial enzyme mixes for rapidly breaking down wood waste. The industrial enzyme producer has already sold the genomics-optimized enzyme preparations to major biofuel companies around the world, including Brazil-based AMG and the EU's INBICON.

"Creating biofuel from wood waste — it's like making a silk purse out of a sow's ear," says Saddler.

At Novozymes, we see 'bioconversion' — the biochemical conversion of biological materials into products we normally derive from petrochemicals — as the means to establish a more sustainable future for society. Our R&D program to create fuels from biomass is the biggest in Novozymes' history. However, the field is complex and requires radical innovations. University-based research, such as Dr. Jack Saddler's project at UBC, is playing a large role, whether in the creation of a novel process, the optimization of enzymes or microorganisms, or an in-depth understanding at a molecular level of what needs to take place to efficiently convert a biological material into a fuel or chemical.

Claus Crone Fuglsang
Managing Director, Novozymes Inc.



An underwater photograph showing several salmon swimming towards the surface. The water is clear and blue, with sunlight filtering through from above. The fish are in various positions, some near the surface and others further down. The focus is sharp on the fish in the foreground, showing their scales and fins in detail.

Every day around the world, 6 million people sit down to a meal featuring BC salmon and other seafood — more than 2 billion meals every year. Our researchers are working to keep diners asking...

SALMON AGAIN?

According to the United Nations Food and Agriculture Organization, global demand for fish has increased by 3.1% per year since 1961, more than double the world's average population increase. BC is helping to meet this growing demand: in 2009, more than 100 species of fish, shellfish and marine plants were harvested from BC's oceans and fresh waters, with production reaching 252,800 tonnes at a landed value of approximately \$697 million.

Commercial fisheries are a significant contributor to the provincial economy and the social fabric of numerous coastal communities. But our fisheries resources are declining. To ensure their protection

and to safeguard the livelihoods of communities dependent on fisheries, we need innovative strategies for sustainable management practices and improved production of aquaculture species.

Genome BC's research projects are tackling fisheries major challenges including the increased demand for food products, broodstock development, sea lice infestation and climate change. The results are providing a better understanding of how environmental changes, such as the effects of toxic algae and diseases and the interaction of pathogens and parasites, are affecting fish and other aquatic species.

ATLANTIC SALMON SWIM TO THE FOREFRONT OF SCIENCE

In this unprecedented research collaboration between Canada, Chile and Norway, a team of scientists is closing the gap on what science knows about the Atlantic salmon.

How do Atlantic salmon find their way back to their natal streams after marine migration? How does their immune system work to resist specific pathogens? What genetic markers are responsible for growth, disease resistance and maturation? These are important questions because as a group, salmonids contribute to local and global economies through wild and recreational fisheries, as well as sustainable aquaculture operations. Used extensively for ecotoxicology studies, they're also a sentinel species for monitoring the aquatic environment.

The International Cooperation to Sequence the Atlantic Salmon Genome is a multi-phase research initiative formed to chart new knowledge about this salmonid species. The challenges facing fisheries and aquaculture in BC are not limited to only our region — other regions in the world face similar challenges. Therefore, Genome BC is collaborating with international partners including the Chilean Economic Development Agency, InnovaChile, the

Norwegian Research Council and the Norwegian Fishery and Aquaculture Industry Research Fund to collectively conduct the research.

The goal is a complete genome sequence that identifies and physically maps all the genes in this fish and to provide a reference sequence for other salmonids. An important public resource, the information will contribute to better management of wild fish stocks, breeding selection for commercially important traits, and programs for food quality, security and traceability.

"There are about 25,000 species of fish, but only half a dozen of those have had their genomes sequenced," explains Simon Fraser University's Dr. Willie Davidson, a biochemist and one of the Cooperation's principal investigators. "What we learn about the genome of the Atlantic salmon will be very applicable to the whole group of salmonids — Pacific salmon, rainbow trout, Arctic char. One of the results of the research is a set of gene based tests that will be important to conservation biology and improving salmon aquaculture."

PUBLIC OUTREACH HIGHLIGHTS



Geneskool is Genome BC's signature educational outreach program. Through this program, volunteer scientist-presenters from Genome BC and Let's Talk Science travel hundreds of kilometres throughout the province, bringing molecular biology to regions where there are fewer opportunities for students to interact with advanced lab technology. All activities have been designed to align with the BC Ministry of Education Prescribed Learning Outcomes.



This past year Genome BC was honoured to be invited by the Haida Gwaii nation to deliver the Geneskool program to their high school students in Queen Charlotte City and Masset.

YEAR IN REVIEW HIGHLIGHTS



April 2010

At the LifeSciences BC Awards Gala, the Genome BC Award for Scientific Excellence was awarded to Drs. Marco Marra, Rob Holt and Steven Jones from the Michael Smith Genome Sciences Centre at the BC Cancer Agency.



May 2010

For the first time, Genome BC hosted a booth at the BIO International Convention and was visited by Dr. Moira Stilwell, MLA Vancouver-Langara, then also Minister of Advanced Education and Labour Market Development.



Genome BC supported the PMC-Sierra 5K Science Fair Fun Run with proceeds going to the Dr. Michael Smith Science Fair Endowment.

June 2010

Genome BC welcomed new board members Ida Goodreau and Edward Safarik. Alan Pelman was named Board Chair to succeed David Dolphin, who completed his term.



July 2010

Minister of State (Democratic Reform) Steven Fletcher toured the Michael Smith Genome Sciences Centre at the BC Cancer Agency.



August 2010

The Honourable Lynne Yelich, Minister of State for Western Economic Diversification, along with Joan McIntyre, MLA for West Vancouver-Sea to Sky, announced funding for Genome BC's new Proof-of-Concept program.



Gene Screen BC is a partnership initiative between Genome BC and the BC Clinical Genomics Network. The program is a film competition aimed at creating a collective of short films that inform and excite the public, with a focus on high school students, teachers and healthcare professionals about the issues related to genetics, genomics and human health. The films are used in outreach programs across BC and Canada and made available to the world through YouTube. www.genescreenbc.com



Bringing Genomics Home is Genome BC's community engagement program that provides a forum for citizens to learn about genomics research and how the results impact people and communities all over BC. This past year the program visited Nanaimo where Dr. Helen Gurney-Smith and Bruce Schmidt spoke about current genomics research on mussels and aquaculture. The program also went to Cranbrook where Dr. Jennifer Gardy engaged with guests about genomics and how it influences human health "from outbreaks to breakouts."



September 2010

The winners of the 1st Annual Gene Screen BC Film Competition were announced.



November 2010

Sir Mark Walport, Director of the UK's Wellcome Trust, delivered the inaugural Dr. Don Rix Distinguished Keynote to more than 300 people at the Vancouver Convention Centre.

Genome BC celebrated 10 years of innovation with a keynote address by Dr. Henry Friesen.

Genomics researchers from BC and across Canada networked with federal ministers and staff in Ottawa at Genomics on the Hill.



January 2011

Genome BC, along with other Canadian Genome Centres, co-hosted a networking reception at the Plant and Animal Genome Conference in San Diego.

Dr. Brad Popovich was appointed Chief Scientific Officer for Genome BC.



February 2011

Genome BC partnered with the Centre for Drug Research and Development to host a Leadership Session on "Translational Research Centres — Leading Global Models" at BioPartnering North America held in Vancouver.

AUDITORS' REPORT

To the Board of Directors of Genome British Columbia

We have audited the accompanying financial statements of Genome British Columbia, which comprise the statement of financial position as at March 31, 2011, the statements of operations and changes in net assets and cash flows for the year then ended, and notes, comprising a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian generally accepted accounting principles, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

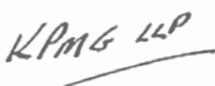
Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable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

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on our judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, we consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

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

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of Genome British Columbia as at March 31, 2011, and its results of operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.



Chartered Accountants
Vancouver, Canada
June 3, 2011

Statement of Financial Position (Expressed In Canadian Dollars)

March 31, 2011 and 2010	2011	2010
Assets		
Current assets:		
Cash	\$ 5,849,533	\$ 1,471,580
Short-term investments (note 3)	106,169,138	94,827,804
Funding receivable	429,948	349,078
Other receivables (note 4)	76,825	31,319
Project advances	1,053,606	3,079,474
Prepaid expenses	129,246	126,086
	113,708,296	99,885,341
Loan receivable (note 5)	200,000	186,916
Capital assets (note 6)	993,958	2,163,610
Other long-term asset (note 7)	175,818	162,807
	\$ 115,078,072	\$ 102,398,674
Liabilities and Net Assets		
Current liabilities:		
Accounts payable and accrued liabilities (note 8)	\$ 3,193,564	\$ 2,939,220
Deferred lease inducement	-	18,075
Deferred contributions:		
Future expenses (note 9)	110,890,550	97,277,769
Capital assets (note 10)	993,958	2,163,610
	\$ 115,078,072	\$ 102,398,674

Commitments (note 12)

See accompanying notes to financial statements.

Approved on behalf of the Board:



Dr. Alan Pelman
Chair



Mr. Frank Holler
Director

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

<i>Years ended March 31, 2011 and 2010</i>	2011	2010
Revenues:		
Amortization of deferred contributions related to future expenses (note 9)	\$ 25,800,081	\$ 29,875,227
Amortization of deferred contributions related to capital assets (note 10)	1,228,585	1,392,405
Investment income	2,181,954	3,173,593
	29,210,620	34,441,225
Expenses:		
General and administrative	5,238,711	4,497,341
Project expenditures	22,743,324	28,551,479
Depreciation	1,228,585	1,392,405
	29,210,620	34,441,225
Excess of revenues over expenses, being net assets, end of year	\$ —	\$ —

See accompanying notes to financial statements.

Statement of Cash Flows *(Expressed In Canadian Dollars)*

<i>Years ended March 31, 2011 and 2010</i>	2011	2010
Cash provided by (used in)		
Operations:		
Excess of revenues over expenses	\$ —	\$ —
Items not involving cash:		
Depreciation	1,228,585	1,392,405
Amortization of deferred contributions related to future expenses (note 9)	(25,800,081)	(29,875,227)
Amortization of deferred contributions related to capital assets (note 10)	(1,228,585)	(1,392,405)
Accretion of loan receivable	(13,084)	(12,228)
Unrealized (gain) loss on short-term investments	239,393	(51,288)
	(25,573,772)	(29,938,743)
Funding (note 9)	39,458,784	17,049,219
Change in assets and liabilities:		
Funding receivable	(80,870)	734,394
Other receivables	(45,506)	10,305
Project advances	2,025,868	(320,014)
Prepaid expenses	(3,160)	(15,372)
Accounts payable and accrued liabilities	254,344	(325,276)
Deferred lease inducement	(18,075)	(36,151)
	16,017,613	(12,841,638)
Investments:		
Change in short-term investments	(11,580,727)	11,895,790
Purchase of capital assets	(58,933)	(155,088)
	(11,639,660)	11,740,702
Increase (decrease) in cash	4,377,953	(1,100,936)
Cash, beginning of year	1,471,580	2,572,516
Cash, end of year	\$ 5,849,533	\$ 1,471,580

Supplemental cash flow information (note 11)
See accompanying notes to financial statements.

NOTES TO FINANCIAL STATEMENTS

(Expressed In Canadian Dollars) Years ended March 31, 2011 and 2010

1. Operations:

Genome British Columbia (the "Corporation") was incorporated on July 31, 2000 under the Canada Corporations Act as a not-for-profit organization and is exempt from income and capital taxes. The Corporation has the following objectives:

- a. develop and establish a coordinated approach and integrated strategy in British Columbia to enable British Columbia to become a world leader in selected areas of genomic and proteomic research, including agriculture, aquaculture, environment, forestry and human health, among others, by bringing together universities, research hospitals, other research centres and industry, as well as government and private agencies for the benefit of British Columbia;
- b. participate in national approaches and strategies to strengthen genomics research capabilities in Canada for the benefit of all Canadians;
- c. create a genome centre in British Columbia to ensure that researchers can undertake research and development projects offering significant socio-economic benefits to British Columbia and Canada, to provide access to necessary equipment and facilities, and to provide opportunities for training of scientists and technologies;
- d. establish a contractual relationship with Genome Canada, and contractual and collaborative relationships with others (including private and voluntary sectors and federal and provincial governments) in order to provide financial and personnel resources for the Corporation;
- e. address public concerns about genomics research through the organization of intellectual resources regarding ethical, environmental, legal and societal issues related to genomics; and
- f. increase public awareness of the need for genomics research and of the uses and implications of the results of such research, thereby helping Canadians understand the relative risks and rewards of genomics.

2. Significant accounting policies:

a. Short-term investments:

Short-term investments which are held for trading are recorded at fair value with gains and losses recorded in the statement of operations and changes in net assets in the period in which they arise. Short-term investments are comprised of a portfolio of funds managed by investment professionals.

b. Project advances:

The advances are comprised of amounts provided by the Corporation to approved research projects and platforms which have not yet been spent.

c. Capital assets:

Capital assets are recorded at cost. Depreciation is provided using the straight-line method as follows:

Asset	Years
Furniture and fixtures	5
Computers and software	3
Telecommunications equipment	5
Project equipment	4
Leasehold improvements	remaining lease term

d. Revenue recognition:

The Corporation follows the deferral method of accounting for contributions.

Externally restricted contributions:

Deferred contributions related to expenses of future periods represent unspent externally restricted funding and related investment income, which are for the purposes of providing funding to eligible recipients and the payment of operating and capital expenditures in future periods. Externally restricted contributions for expenses of a future period and related investment income are deferred and recognized as revenue in the year in which the related expenses are incurred. Deferred contributions related to capital assets represent the unamortized amount of contributions received for the purpose of purchasing capital assets. The amortization of such contributions is recorded as revenue in the statement of operations and changes in net assets. Restricted contributions related to the purchase of capital assets are deferred to and recognized as revenue using the same methods and amortization rates of the related capital assets.

Unrestricted contributions:

Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

e. Use of estimates:

The preparation of financial statements in conformity with 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 and the reported amounts of revenues and expenses. Significant areas requiring the use of management's estimates relate to the determination of the useful life of capital assets, accruals for project expenditures and the determination of the fair value of the other long-term asset. Accordingly, actual results could differ from these estimates.

f. Measurement and fair value of financial instruments:

Cash is designated as held for trading and is recorded at fair market value. Funding receivable, other receivables, and loan receivable are designated as loans and receivables and are recorded at amortized cost. Accounts payable and accrued liabilities are designated as other financial liabilities and are recorded at the amortized cost.

2. Significant accounting policies (continued):

Carrying amounts of certain of the Corporation's financial instruments, including funding and other receivables, accounts payable and accrued liabilities, approximate their fair value due to their short maturities.

g. Long-term asset:

The Corporation's long-term asset is available for sale and is recorded at cost which represents the determined fair market value at the date the instrument is issued. Subsequent declines in fair value will be recorded in the period that they occurred.

h. Valuation of long-lived assets:

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

i. Deferred lease inducement:

Tenant inducement received associated with leased premises is deferred and amortized on a straight-line basis over the term of the lease.

j. Related Foundation:

The financial information of Genome British Columbia Foundation, a not-for-profit entity that is commonly controlled by the Corporation, is not consolidated but disclosed in these financial statements.

k. Financial Instruments:

The Corporation has elected to defer applying the Canadian Institute of Chartered Accountants (CICA) Handbook Sections 3862, *Financial Instruments — Disclosure* and 3863, *Financial Instruments — Presentation*. Section 3862 and 3863 place increased emphasis on disclosures about the nature and extent of risks arising from financial instruments and how an entity manages those risks. The Corporation has elected to continue to apply the financial instruments disclosure and presentation standards in accordance with Section 3861.

l. Foreign Exchange:

The Corporation's monetary assets and liabilities denominated in foreign currencies are translated into Canadian dollars using exchange rates in effect at the balance sheet date. Revenue and expense items are translated at the rate of exchange prevailing on the date of the transaction. Foreign exchange gains and losses are included in the statement of operations and changes in net assets.

m. Revisions to Not-for-Profit accounting standards:

Effective April 1, 2012, the Corporation's current accounting framework will no longer exist. In December 2010 the CICA in conjunction with the Accounting Standards Board (AcSB) issued Part III — Accounting Standards for Not-for-Profit Organizations (Part III) of the CICA Handbook. Part III is effective for fiscal years commencing on or after January 1, 2012 and provides Canadian private sector not-for-profit organizations with a new financial reporting framework. The Corporation has the option to apply International Financial Reporting Standards (IFRS) or the newly approved Accounting Standards for Not-for-Profit Organizations.

The Corporation is currently evaluating the adoption of IFRS or the new Accounting Standards for Not-for-Profit Organizations.

3. Short-term investments:

The Board of Directors has overall responsibility for the establishment and oversight of the Corporation's short-term investments. The Board has established an Investment Committee, which is responsible for developing and monitoring the Corporation's investment policy. The overall objectives of the Corporation's investment policy are to achieve security of principal that ensures a return of the capital invested, to maintain the liquidity necessary to meet the cash flow requirements of the Corporation and to maximize the rate of return without affecting liquidity or incurring undue risk.

The Corporation's short-term investments are comprised of a portfolio of funds. The portfolio consists of investments in a Canadian money market fund and a bank guaranteed Canadian mortgage fund. The portfolio is managed by independent investment professionals in accordance with the Corporation's investment policy. All investments are recorded at fair value. The Corporation's short-term investments are subject to interest rate, market and liquidity risks.

Both the risk of significant changes in interest rates and the risk of significant changes in market prices are mitigated by the Corporation's policy that permits the portfolio manager to change the level of investment in either fund at short notice and the fact that interest earned on the portfolio is reinvested monthly at prevailing rates. The Corporation limits exposure to liquid asset credit risk through maintaining its short-term investments with a high-credit quality financial institution.

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

	2011	2010
Canadian Money Market Fund	\$ 26,851,374	\$ 28,911,264
Canadian Mortgage Fund	56,317,260	65,916,540
Term deposit maturing April 1, 2011	23,000,504	—
	\$ 106,169,138	\$ 94,827,804

The Corporation's term deposit was transferred into the short-term investment portfolio on April 1, 2011.

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

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

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

4. Other receivables:

	2011	2010
Sales tax	\$ 74,099	\$ 28,456
Other accounts receivables	2,726	2,863
	\$ 76,825	\$ 31,319

5. Loan receivable:

In May 2006 the Corporation made a loan to a British Columbian academic institution to assist in attracting a senior scientific researcher. The loan is in the amount of \$200,000, bears no interest, and is payable in full on May 9, 2011. It has a term of five years and is renewable for a further five years. The loan is recorded in the statement of financial position at its fair value. Its fair value is estimated using a net present value calculation with a discount rate of 7% per annum. The difference between the initial fair value and the principal amount was recorded in the statement of operations and changes in net assets as a discount and the loan receivable balance is accreted over the term of the loan using the effective interest rate method.

6. Capital assets:

March 31, 2011	Cost	Accumulated amortization	Net book value
Furniture and fixtures	\$ 54,977	\$ 50,076	\$ 4,901
Computers and software	340,124	274,760	65,364
Telecommunications equipment	27,696	20,104	7,592
Project equipment	7,596,680	6,681,863	914,817
Leasehold improvements	294,503	293,219	1,284
	\$ 8,313,980	\$ 7,320,022	\$ 993,958

March 31, 2010	Cost	Accumulated amortization	Net book value
Furniture and fixtures	\$ 54,977	\$ 43,453	\$ 11,524
Computers and software	282,620	243,738	38,882
Telecommunications equipment	27,696	14,687	13,009
Project equipment	7,596,680	5,520,289	2,076,391
Leasehold improvements	293,074	269,270	23,804
	\$ 8,255,047	\$ 6,091,437	\$ 2,163,610

7. Other long-term asset:

Other long-term asset includes subscription rights and common shares in an early stage biotechnology company (Investee) issued pursuant to a continuing collaborative research agreement. Each subscription right entitles the Corporation to one common share for no additional consideration and convert to common shares of the Investee upon certain triggering events or three years from issuance. At March 31, 2011, the Corporation held 68,950 (March 31, 2010 — 94,593) subscription rights and 200,014 (March 31, 2010 - 149,066) common shares of the Investee.

	Number	Cost
Balance at March 31, 2010	243,659	\$ 162,807
Additions	25,305	13,011
Balance at March 31, 2011	268,964	\$ 175,818

8. Accounts payable and accrued liabilities:

	2011	2010
Accounts payable	\$ 130,637	\$ 131,842
Accrued liabilities	3,062,927	2,807,378
	\$ 3,193,564	\$ 2,939,220

9. Deferred contributions related to future expenses:

The Corporation receives funding from Genome Canada, the Province of British Columbia, Western Economic Diversification Canada and from other sources to be held, administered and distributed in accordance with the related funding agreements between Genome British Columbia and other parties (note 12).

Deferred contributions related to expenses of future periods represent these unspent externally restricted funding, which are for the purposes of providing funding to eligible recipients and the payment of operating and capital expenditures in future periods. The changes in the deferred contributions balance for the year are as follows:

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

	2011	2010
Balance, beginning of year	\$ 97,277,769	\$ 110,230,759
Funding received or receivable during the period:		
Genome Canada	10,892,448	14,606,197
Province of British Columbia	25,014,400	–
Western Economic Diversification Canada	342,264	375,779
International collaboration	2,991,784	1,917,243
BC Clinical Research Infrastructure Network partners	150,000	150,000
Service Canada	4,288	–
Sponsorships	48,500	–
Other	15,100	–
	\$ 136,736,553	\$ 127,279,978
Other long-term asset	13,011	28,106
	136,749,564	127,308,084
Amount amortized to revenue	(25,800,081)	(29,875,227)
Amount transferred to capital assets purchased during the period (note 10)	(58,933)	(155,088)
	(25,859,014)	(30,030,315)
Balance, end of year	\$ 110,890,550	\$ 97,277,769

10. Deferred contributions related to capital assets:

Deferred contributions related to capital assets represent the unamortized amount of contributions received for the purchase of capital assets. The amortization of such contributions is recorded as revenue in the statement of operations and changes in net assets. The changes in the deferred contributions related to capital assets balance for the year are as follows:

	2011	2010
Balance, beginning of year	\$ 2,163,610	\$ 3,400,927
Allocation of funding for capital asset purchases (note 9)	58,933	155,088
	2,222,543	3,556,015
Less: Amount amortized to revenue	(1,228,585)	(1,392,405)
Balance, end of year	\$ 993,958	\$ 2,163,610

11. Supplemental cash flow information:

	2011	2010
Cash received for:		
Interest	\$ 2,238,181	\$ 2,875,588
Non-cash transactions:		
Change in other long-term asset	13,011	28,106

12. Commitments:**a. Funding:**

(i) The Corporation enters into funding agreements with Genome Canada (the agreements). In accordance with these agreements the Corporation agrees to secure on an on-going basis cash or cash equivalent commitments from other parties representing at least 50% of the total costs of the projects covered by the agreements. In addition, Genome Canada agrees to disburse an amount only up to the amount of the formal commitments from other parties. However, Genome Canada may provide funding notwithstanding the fact that formal commitments from other parties have not yet been secured. Genome Canada has also agreed that funds, provided in good faith, where commitments from other parties have not yet been secured, shall not be reimbursable to Genome Canada.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$50,145,068 related to Competition III, the Corporation has agreed, among other things, to provide Genome Canada with a co-funding plan for each project. A co-funding plan for each project has been provided to and accepted by Genome Canada.

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$2,371,285 related to Technology Development Competition, the Corporation has agreed, among other things, to provide Genome Canada with a co-funding plan for each project. A co-funding plan for each project has been provided to and accepted by Genome Canada.

12. Commitments (continued):

In accordance with an agreement entered into with Genome Canada with regard to a financial support commitment of up to \$11,431,003 related to Applied Genomics Research in Bioproducts or Crops Competition, the Corporation has agreed, among other things, to provide Genome Canada with a co-funding plan for each project. A co-funding plan for each project has been provided to and accepted by Genome Canada.

(ii) In accordance with an agreement with the Centre for Drug Research and Development (CDRD), the Corporation has agreed to contribute up to \$1,000,000 to jointly fund research and development projects in commercialization of genomics-related drug discoveries at CDRD. At March 31, 2011, the Corporation has contributed \$61,600.

(iii) In accordance with an International Cooperation Agreement entered into with four international funding partners, the Corporation has agreed to contribute up to \$2,000,000 to fund research in the Sequencing of the Atlantic Salmon Genome. At March 31, 2011, the Corporation has contributed \$1,518,500.

b. Operating lease and management agreements:

The Corporation has entered into operating lease agreements for office premises and management contracts which expire at various dates until August, 2015. Minimum payments for the next five fiscal years are as follows:

2012	\$ 316,112
2013	254,557
2014	263,115
2015	269,227
2016	112,178
Total	\$ 1,215,189

13. Genome British Columbia Foundation:

Genome British Columbia Foundation (the Foundation) is a registered charity established to promote and foster life sciences research for the public benefit by coordinating, sponsoring and carrying out educational conferences, seminars, workshops and symposiums. The Foundation is exempt from income and capital taxes.

The majority of the Foundation's Board of Directors are also members of the Corporation, and as such, the Corporation is presumed to control the Foundation. In accordance with the CICA Handbook Section 4450, the Corporation has chosen not to consolidate the Foundation but has followed the disclosure requirements. The Corporation has no economic interest in the Foundation.

Financial information of the Foundation for the year ended March 31, 2011 and 2010 are as follows:

	2011	2010
Cash and term deposits	\$ 1,717,190	\$ 2,177,378
Deferred contributions	(1,717,190)	(2,177,378)
Net assets	\$ –	\$ –
Revenues	\$ 513,000	\$ –
Expenses	(513,000)	–
Excess of revenue over expenses	\$ –	\$ –
Cash provided by (used in):		
Operations	\$ (460,188)	\$ 70,098
Investing	636,826	(26,514)

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

14. Capital management:

The Corporation considers its total assets to be its capital. A significant portion of its capital is comprised of short-term investments. How the Corporation manages its short-term investments is set out in note 3. The Corporation receives funding from Genome Canada, the Province of British Columbia, Western Economic Diversification Canada and from other sources to be held, administered and distributed in accordance with the related funding agreements between the Corporation and other parties (note 9). The Corporation uses these funds to achieve its objectives (note 1). The Corporation is not subject to debt covenants or any other capital requirements with respect to operating funding. Funding received for designated purposes must be used for the purpose outlined in the funding agreements. The Corporation has complied with the external restrictions on the funding provided.

15. Comparative figures:

Certain prior year figures have been reclassified to conform to the current year's presentation.

**IDA GOODREAU**

Former CEO, Vancouver Coastal Health; Adjunct Professor, Sauder School of Business; Director, Strategy, Centre for Healthcare Management UBC

Ida is the former CEO of Vancouver Coastal Health, one of six regional health authorities in BC. She has extensive executive management experience in healthcare, forestry and natural gas, and has worked in New Zealand, Norway, Ontario and BC.

She sits on the Boards of Fortis Inc. and Fortis BC and is a past Director of Shell Canada.

Ida is heavily involved in the community and non-profit sector and sits on the boards of the Vancouver Foundation, Streethome Foundation, Canada West Foundation, Justice Institute Foundation and Women's Leadership Circle.

**EDWARD SAFARIK**

President and CEO, Ocean Fisheries Ltd.

Ed Safarik is currently President and CEO of Ocean Fisheries Limited. He is also Chairman of the Fisheries Council of Canada (FCC), Chairman of the Herring Conservation & Research Society of BC (HCRS), a member of the Pacific Scientific Advice Review Committee and the Herring Industry Advisory Board (HIAB). He has served as Chairman of the Fisheries Council of BC, Chairman of the South Coast Salmon Advisory Board and South Coast Panel member on the Pacific Salmon Commission.

Ed graduated from UBC with a BA in economics and a degree in law. He is a member in good standing of the BC Bar Association.

In his capacity as Chairman of the FCC and HCRS, Ed is an advocate for sustainable fisheries that are economically viable. The benchmarks are managed by objective scientific principles and sound economic analysis. The HCRS has funded more than \$25 million in projects for scientific research and fisheries management. This includes funding for graduate students at various universities.

Ed has a special interest in DNA analysis and pathogenesis and is working with the BC fishing industry to establish a Fisheries Chair at a local university.

CORPORATE INFORMATION**Board of Directors**

(for fiscal year ended March 31, 2011)

Chair: Alan Pelman
Former Vice President, Technology, Weyerhaeuser Canada Ltd.

Vice-Chair: Ian de la Roche
Adjunct Professor, University of BC

Alan Winter
President & CEO, Genome BC

David Dolphin
Professor Emeritus, University of BC

Don Enns
President, LifeSciences BC

Ken Galbraith
General Partner, Ventures West Capital Ltd.

Ida Goodreau
Former CEO, Vancouver Coastal Health; Adjunct Professor, Sauder School of Business

Frank Holler
CEO & Partner, BC Advantage Funds

Peter J. O'Callaghan
Senior Partner, Blake, Cassels & Graydon LLP

Rosemary Ommer
Adjunct Professor (History); SSHRC Grants Facilitator, University of Victoria

Edward Safarik
President & CEO, Ocean Fisheries Ltd.

Michael Stevenson
Past President & Vice-Chancellor, Simon Fraser University

Management

Alan Winter
President & CEO

Tony Brooks
Chief Financial Officer & Corporate Secretary

Sally Greenwood
Director, Communications & Education

Gabe Kalmar
Executive Director, Operations

Brad Popovich
Chief Scientific Officer

Auditors

KPMG LLP
Vancouver, BC

Legal Counsel

Richards Buell Sutton LLP
Vancouver, BC

Thanks to Our Funders

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

Genome Canada
The Province of British Columbia
Western Economic Diversification Canada



GenomeCanada



Canada



Western Economic
Diversification Canada

Diversification de l'économie
de l'Ouest Canada

Acknowledgements

We would like to thank the following groups and individuals who assisted with this annual report: the management and staff at Genome BC, Genome BC-funded researchers, writer Elizabeth Morse and the Signals Design Group team.



SPREADING
THE VALUE
OF GENOMICS



OUR VISION

Genome Sciences will revolutionize many aspects of our lives and provide solutions to humankind's challenges.

OUR MISSION

Genome BC leads academia, government and industry to develop a world-class genome sciences region that will deliver social and economic benefits to British Columbia, Canada and beyond, through:

- Excellent projects and technology platforms,
- Innovative applications for the life sciences cluster,
- Strategic international collaborations, and
- Proactive leadership in exploring societal impacts of genome sciences

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