

GENOMICS FOR FISHERIES AND AQUACULTURE

Genomics is supporting a strong, competitive and sustainable fisheries and aquaculture sector in Canada.



GENOMICS: The science that aims to decipher and understand the entire genetic information of an organism.

FISHERIES AND AQUACULTURE:

A sector of strategic importance to Canada*

* Figures from *Canadian Fisheries & Aquaculture – How genomics can address sector challenges*, Genome Canada, 2013.



25%

Proportion of the world's coastline owned by Canada



**\$14.7
BILLION**

Annual contribution of fisheries and aquaculture to the Canadian economy



130,000

Jobs supported by the sector



16%

Projected increase in global fish consumption (between 2011 and 2021), implying significant potential gains to the Canadian economy



1%

Canada's current contribution to world fisheries production (captured and farmed)



GenomeCanada



GenomeBritishColumbia



GenomeAlberta



GenomePrairie



OntarioGenomicsInstitute



GenomeQuébec



GenomeAtlantic

CHALLENGES FACING THE FISHERIES AND AQUACULTURE SECTOR TODAY

- Finding ways to increase production efficiency and product quality.
- Ensuring production is sustainable, which includes maintaining healthy eco-systems.
- Providing safe products.
- Ecosystem sustainability.
- Societal acceptance of genomics-based technologies.

“Canada’s commitment to genomics-based research and development in priority areas...has helped to create a competitive, innovative environment in which to operate.”

– Keng Pee Ang, Vice-President, Research, Cooke Aquaculture Inc.



GENOMICS

Boosting the sector in many ways

GENOMICS IS HELPING TO:

- **Enhance production** through selective breeding programs, optimizing fish diets and making hatcheries more effective.
- **Improve fish health** by contributing to the development of therapeutics and vaccines, disease management, understanding infectious diseases and parasites and the relationship between environmental stressors and fish health.
- **Protect conservation and fish populations** through better monitoring of wild fish migration, understanding differences in wild and farmed stocks as well as population health and species abundance.
- **Maintain ecosystem integrity** by supporting species survival and genetic variation, as well as the sustainability of coastal and inland water ecosystems.

WHY CANADA CAN LEAD IN FISHERIES AND AQUACULTURE GENOMICS:

- ✓ Canada's large-scale genomics investments (in people, science and technology) make the country a global leader in fish and shellfish genomics.
- ✓ Canadian scientists conduct cutting-edge research on how genomics can be applied to traditional species (e.g., halibut, salmon) and alternative species (Arctic charr, Brook charr, sablefish).
- ✓ Canadian advances provide the potential for low-cost biotechnology applications that are more sensitive, more accurate, faster, and more efficient.
- ✓ How we apply our genomics research capacity to improving product quality, environmental sustainability of farmed species, wild species conservation, and biodiversity protection gives us a competitive advantage in the global market.





BUILDING ON SUCCESS

Canada's research investments in fish and aquaculture genomics to date have resulted in significant developments, including:

- **Disease resistance** – researchers used marker-assisted selection to develop strains of Atlantic salmon that are resistant to infectious pancreatic necrosis.
- **Population health** – researchers identified the genomic signature associated with increased mortality in migrating Fraser River Sockeye salmon, which has raised awareness of the need for more research on infectious diseases among wild stocks.
- **Stock management** – researchers developed a microarray chip to monitor wild salmon stocks, which is being used by the Department of Fisheries and Oceans and over 70 labs around the world.
- **Production Efficiency** – producers enjoy a 20 per cent reduction in grow-out time for halibut because of genomic research results.

Canada's Opportunity

Canada can leverage genomics in the fisheries and aquaculture sector for more productive and competitive industry growth, while protecting wild stocks and ecosystems for the benefit of Canadians. Opportunities for the sector are detailed in the recent strategy paper *Aquaculture—How Genomics Can Address Sector Challenges*, available on Genome Canada's website at www.genomecanada.ca/en/sectorstrategies.



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