

V LAY SUMMARY

In a maximum of **one-half (1/2) page**, describe the proposed research in a way that can be understood by a lay audience. Be sure to indicate how the proposed research will result in social and/or economic benefits. This summary may be used by Genome Canada to inform the public and other stakeholders about the value of genomics research.

The polar bear is the top arctic terrestrial predator, depending on both sea-ice to hunt seals and land for denning and other pivotal aspects of its life cycle. It is a sentinel of arctic environmental change as we expect that its numbers will diminish as sea ice declines, as preferred prey become less common, and as human activities increase. Polar bears also occupy a central place in Inuit culture, spirituality and hunting practices, featuring prominently in their traditional knowledge system called Inuit Qaujimajatuqangit (IQ). Canada is home to ~15,000 polar bears or approximately two-thirds of the global population, with Nunavut the Northwest Territories having management jurisdiction over most of these. Canada must show international leadership in polar bear conservation, as its actions in management, monitoring and research are key to ensuring the species persistence globally and providing insights on the state of arctic ecosystems.

Our project **BEARWATCH: Monitoring Impacts of Arctic Climate Change using Polar Bears, Genomics and Traditional Ecological Knowledge** will develop a non-invasive biomarker toolkit and community-based monitoring program that combines leading-edge genomics with comprehensive social science, all set within a framework of collaboration with northern communities, Indigenous organizations, and territorial and other levels of government. Results of our Genome Canada project will deliver: 1. A flexible, verified faecal-based molecular toolkit for polar bears that can be extended to other large wildlife species, 2. A fee-based, searchable, geo-referenced database that combines IQ and other Indigenous Traditional Ecological Knowledge (TEK) with polar bear genetic identity/sex, and ecological and physiological measures that permit assessment of bear health. 3. A community-based monitoring program that provides ongoing data for tracking changes in polar bear populations and a tangible means for financially supporting members of Arctic Indigenous communities.

This faecal-based toolkit provides a powerful way to monitor polar bears in real-time and non-invasively, reflecting the desires of Indigenous communities and northern governments, and thus the needs of partner environmental consulting firms like Environmental Resources Management (ERM) and Contango. The outcomes of our research will be enduring, have positive impacts for northern communities, and provide key insights for polar bear management and tracking the changing ecosystems of the Canadian Arctic. This work will truly situate Canada as a world leader in genomics-based, community-oriented research for wildlife management.