Registration - New Frontiers in Research Fund - NordForsk-led Joint Initiative - 2024

Application ID:	NFRFJ-2024-00088	**Administering Organization:**	McGill University
Applicant:	Roy, Denis	**Funding Opportunity:**	New Frontiers in Research Fund - NordForsk-led Joint Initiative
Title:	CASTAF: Climate Change Adaptation Strategies for Arctic Fisheries		

Application Details

Application title
CASTAF: Climate Change Adaptation Strategies for Arctic Fisheries

Language of the application
English

Does your proposal involve Indigenous research as defined by SSHRC?
Yes

International Call Details

Primary Application ID
195338

Primary Application - Lead applicant
J. Rasmus Nielsen

Proposed role of Canadian participants in the proposed project
Understanding how climate change will impact the availability of Arctic marine living resources is a worldwide concern (i.e., NordForsk call). A warming Arctic will change harvested species' production, distribution, and availability, which will have important ecological, economic, and cultural consequences for northern communities, countries, and international relations. CASTAF: Climate Change Adaptation Strategies for Arctic Fisheries project (#195338), aims to use broad-scale ecosystem modeling to predict the impacts of Arctic warming on northern-based fisheries in 3 large Arctic marine regions (Barents Sea, Icelandic Sea, and Baffin Bay). CASTAF plans to use the Atlantis modeling framework, which requires 3 types of data inputs: physical processes, biological processes supporting exploited resources, and the cultural/economic use of those resources. Based on this, CASTAF can formulate and offer adaptive management strategies to maintain marine living resources' sustainability under different Arctic warming scenarios. However, because Arctic marine resources are less extensively exploited in Canada than in other Arctic countries, there is also a shortage of primary biological data available as inputs into broader-scale ecological models, such as Atlantis. FISHSENS, an integrated part of the CASTAF project, will build the much-needed fundamental ecological data on the living resources that are, and are likely to become, important targets of marine harvesting in Arctic Canada.
FISHSENS: Building Ecological Knowledge to Assess the Sensitivity of Canadian Marine Fishes to Atlantification, has Northern co-PIs, and will work closely with northern communities to co-produce genomic, chemical tracer, and movement ecology data for a list of key Arctic marine species supporting productive ecosystems in the Eastern Canadian Arctic. These data will be used to better understand the trophic interactions, population dynamics, and behaviours of key marine species, which are the very data needed as critical inputs into the large region-wide Atlantis models. Thus, results of the FISHSENS project will feed directly into the Atlantis model being developed for the Eastern Canadian Arctic and the Baffin Bay ecosystems. Together, the CASTAF and FISHSENS projects pair European expertise on broad-scale marine ecosystem modeling with Canadian ecologists, economists, and northern resource managers to better understand and safeguard Arctic marine-based fisheries for the future.

List of Participants

Participant	Primary Affiliation
Roy, Denis - Nominated Principal Investigator Assistant Professor McGill University, Natural Resource Sciences Canada	Assistant Professor McGill University , Natural Resource Sciences Canada
Martin, Zoya - Co-Principal Investigator Director of Fisheries and Sealing Government of Nunavut, Economic Development and Transportation Canada	Director of Fisheries and Sealing Government of Nunavut , Economic Development and Transportation Canada
Hussey, Nigel - Co-Principal Investigator Associate Professor University of Windsor, Integrative Biology Canada	Associate Professor University of Windsor , Integrative Biology Canada
McKinney, Melissa - Co-Principal Investigator Associate Professor McGill University, Natural Resource Sciences Canada	Associate Professor McGill University , Natural Resource Sciences Canada
MUKHOPADHYAY, KAKALI - Co-Applicant Associate Professor -Tenured McGill University, Department of Agricultural Economics Canada	Associate Professor -Tenured McGill University , Department of Agricultural Economics Canada
Beiko, Robert - Co-Applicant Professor Dalhousie University, Computer Science Canada	Professor Dalhousie University , Computer Science Canada

Collaborators

Name	Position	Department and Organization
Estevez-Barcia, Daniel	Research Associate	Fisheries and Shellfish, Greenland Institute of Natural Resources
Nutarak, Harvey	Director and manager	Fisheries, Baffin Fisheries Coalition

Socioeconomic Objectives

Primary	Code	Group
📍	RDS10805	Fisheries (including aquaculture and wild caught)
	RDS10104	Climate and climate change
	RDS10201	Environmentally sustainable human activities
	RDS10205	Control and care of the environment
	RDS11003	Tourism

Fields of Research

Primary	Code	Division / Group / Class / Subclass (Field)
★	RDF1051001	Natural sciences / Earth and related environmental sciences / Natural environment sciences / **Indigenous peoples environmental knowledge**
★	RDF1060401	Natural sciences / Biological sciences / Ecological applications / **Ecological impacts of climate change**
★	RDF1060603	Natural sciences / Biological sciences / Genetics / **Conservation genetics**
	RDF1020899	Natural sciences / Computer and information sciences / Bioinformatics / **Bioinformatics, n.e.c.**
	RDF5020111	Social sciences / Economics and business administration / Economics / **Environment and natural resources economics**

Keywords

Arctic warming
Biocomplexity
Fish genomics
Ecological tracers
Tracking
Economic valuation of Arctic fishes
Sensitivity analyses
Indigenous knowledge co-production
Resource availabitlity
Atlantis modeling framework

Summary of Proposal

The world is warming, and Arctic marine ecosystems are doing so at 4 times the global average. This allows sub-Arctic species encroachment into Arctic marine areas, creating no-analog ecosystems with unpredictable outcomes. Already at the edge of their thermal tolerances, many native species must either shift their distributions, become extirpated, or be replaced by sub-Arctic predators or competitors. This will impact northerners who rely on marine species for food, cultural symbols, and natural resources supporting local economies. While integrated ecosystem approaches can predict and inform adaptive management strategies coping with warming conditions on species distribution and availability, many species central to Arctic marine ecosystem production, are severely data deficient. For >1400 marine fishes in the Canadian Arctic, knowledge of their population number, size, connectivity, and trophic relationships is insufficient to use as input into ecosystem-based modeling. This limits our ability to apply such large-scale ecosystem models in the Canadian Arctic, as proposed by our NordForsk partners (CASTAF project). As an integrated part of CASTAF, FISHSENS will fill this gap by developing much-needed genomics tools, coupled with diet (chemical tracers), and movement (electronic tracking) data, to assess climate change sensitivity, and predict the population status of Arctic marine fishes. Focal species will be determined by knowledge co-production with northern co-PIs, and derived data will feed into 4 deliverables; (1) Quantifying Arctic marine fishes sensitivity to warming conditions through a sensitivity analysis framework; (2) Generating regional-specific fish monitoring resources (SNP chips) and making monitoring data available to stakeholders through an online data hub; (3) Developing a system of environmental-economic accounts valuing the natural capital of species supporting northern fisheries; and (4) Inputting data into the Atlantis modeling framework (CASTAF) predicting ecosystem-level changes and their consequences on northerner-based fisheries in the Eastern Canadian Arctic. Northern co-PIs are pivotal to FISHSENS by providing samples, and management/monitoring advice for the Eastern Canadian Arctic. We know of no other large-scale initiative, in Canada or abroad, intending to use such multidisciplinary techniques to safeguard Arctic marine biodiversity and enable sustainable outcomes for northern communities affected by a warming world.

Proposed Budget

Direct Costs Year 1	Indirect Costs Year 1	Year 1 Total
$800,000	$200,000	$1,000,000
Direct Costs Year 2	**Indirect Costs Year 2**	**Year 2 Total**
$800,000	$200,000	$1,000,000
Direct Costs Year 3	**Indirect Costs Year 3**	**Year 3 Total**
$800,000	$200,000	$1,000,000
Direct Costs Year 4	**Indirect Costs Year 4**	**Year 4 Total**
$800,000	$200,000	$1,000,000
Total Direct Costs	**Total Indirect Costs**	**Total**
$3,200,000	$800,000	$4,000,000

Suggested Reviewers

Name	Position	Department and Organization	Areas of Expertise
Barluenga, Marta	Tenured Scientist and head of research department	Biodiversidad y Biología Evolutiva, Museo Nacional de Ciencias Naturales	Expertise in ecology and evolution, Biodiversity of fishes
Genner, Martin	Professor	School of Biological Sciences, University of Bristol	Historical phylogeography in fish, Influence of climate change and fishing on marine fish assemblages, Conservation genetics of marine species
Pearce, Tristan	Associate Professor	Department of Geography, University of Northern British Columbia	Geography, Cumulative impacts of environmental changes, Knowledge uptake by stakeholders, Community outreach
Somers, Daryl	President	Independent, Somers Consulting	Reviewer on large scale genomics projects, Genomics methods and project design, genomic/genetic application to agriculture and natural resources, breeding programs, International project mangement

Reviewer Exclusions

Name	Department and Organization

No information to display