ArcticNet

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ANNUAL REPORT

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RAPPORT ANNUEL

15 | 17

ArcticNet

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ANNUAL REPORT

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RAPPORT ANNUEL

15 | 17

NCE RCE
Networks of Centres of Excellence of Canada | Réseaux de centres d'excellence du Canada

ArcticNet is hosted at Université Laval, Quebec City, Canada.

ArcticNet is funded by the Government of Canada through the Networks of Centres of Excellence program, a joint initiative of the Natural Sciences and Engineering Research Council, the Canadian Institutes of Health Research, the Social Sciences and Humanities Research Council and Industry Canada.

The Networks of Centres of Excellence are unique partnerships among universities, industry, government and not-for-profit organizations aimed at turning Canadian research and entrepreneurial talent into economic and social benefits for all Canadians. An integral part of the federal government's Innovation Strategy, these nation-wide, multidisciplinary and multisectorial research partnerships connect excellent research with industrial know-how and strategic investment.

The ArcticNet Network of Centres of Excellence was incorporated as a not-for-profit corporation under the name "ArcticNet Inc." in December 2003.

Canada

Together in the study of a changing Canadian Arctic

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Travailler ensemble à l’étude de l’Arctique canadien de demain

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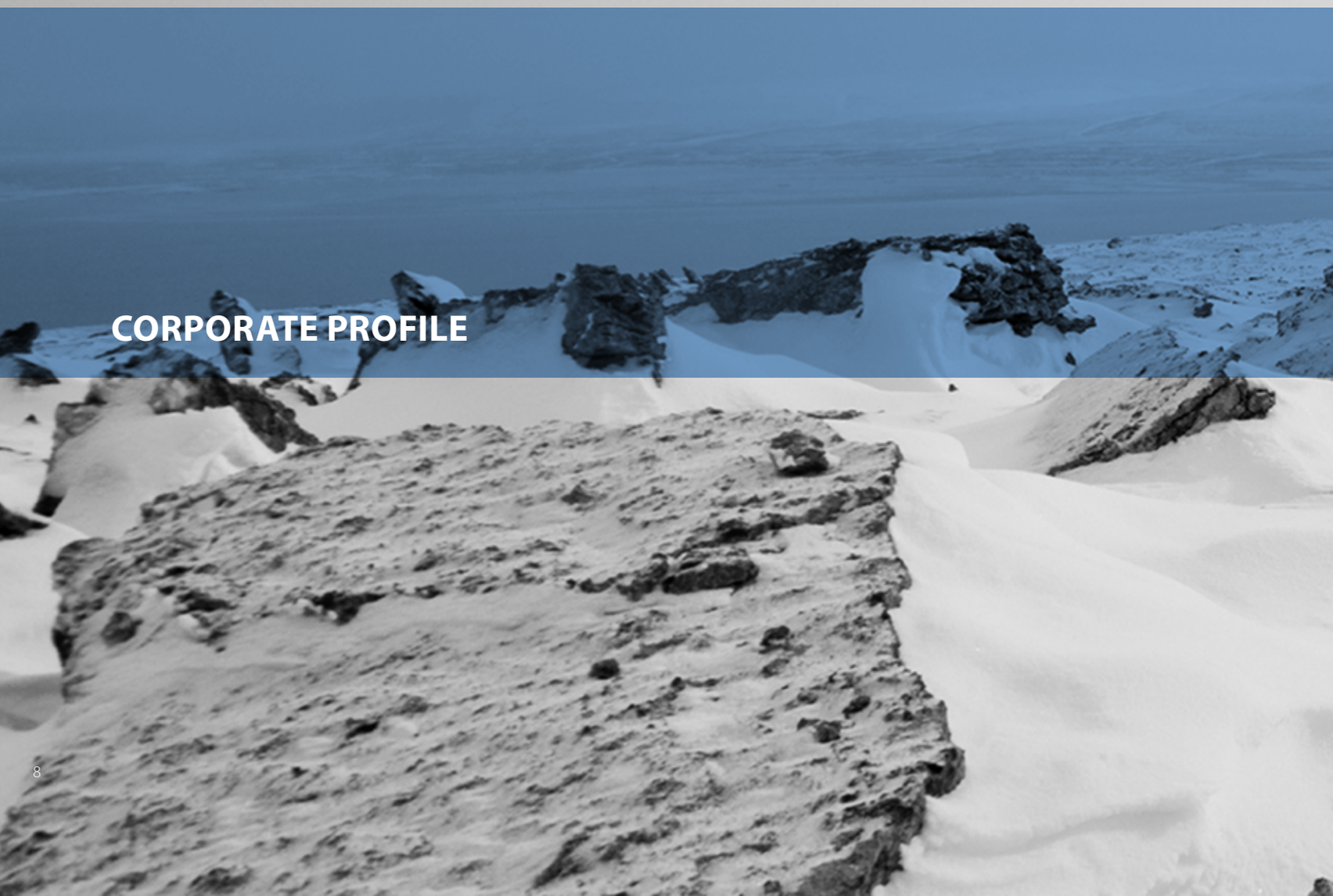
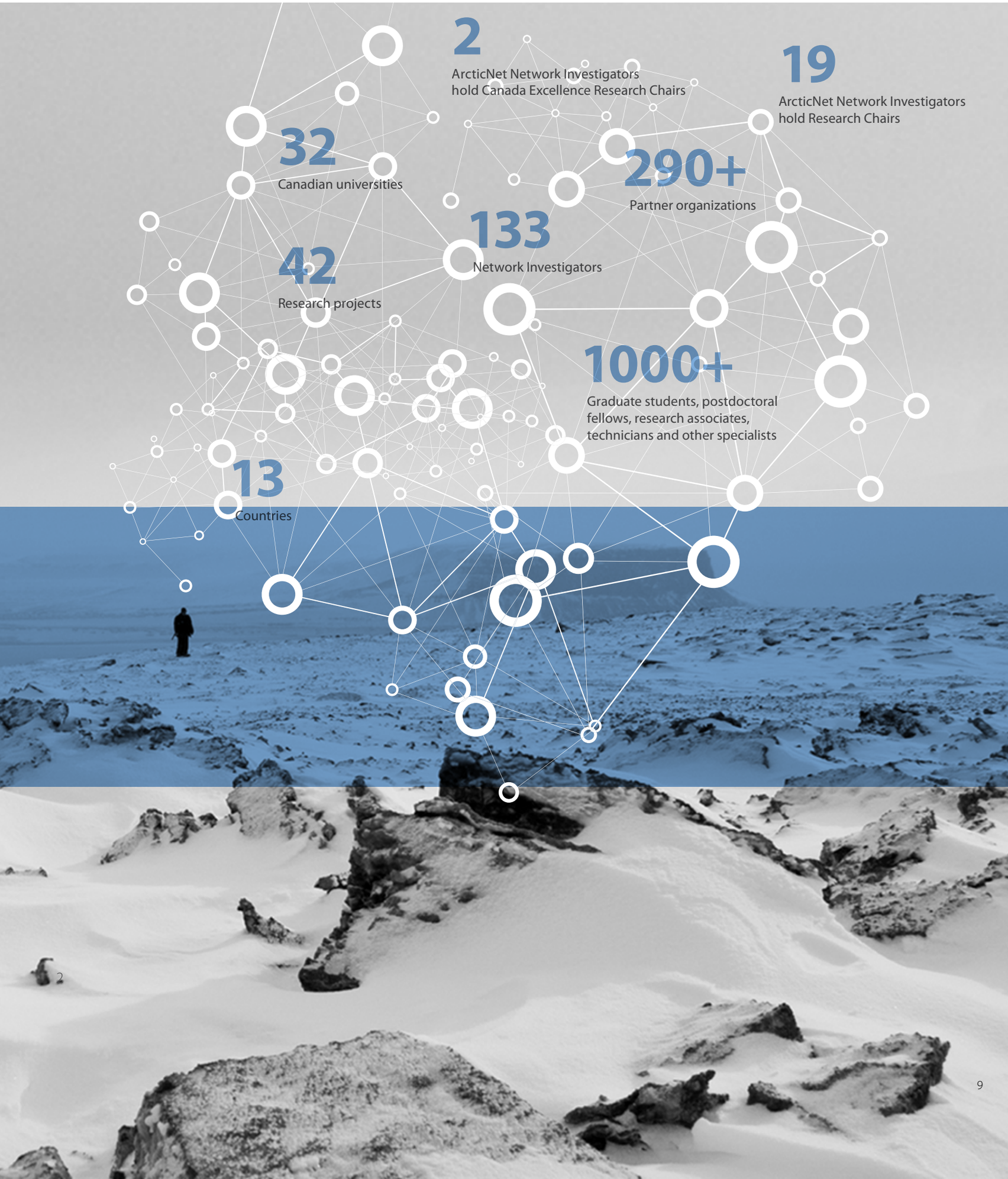
Understanding the transformation of the Arctic environment is one of the great challenges faced by Canadians, the Canadian government and the national and international scientific communities.

ArcticNet brings together scientists and other experts in the natural, human health and social sciences with their partners in Inuit organizations, northern communities, governments and the private sector to help Canadians prepare for the impacts and opportunities brought by climate change and modernization in the Arctic.



CORPORATE PROFILE


2
ArcticNet Network Investigators hold Canada Excellence Research Chairs
19
ArcticNet Network Investigators hold Research Chairs
32
Canadian universities
290+
Partner organizations
133
Network Investigators
42
Research projects
1000+
Graduate students, postdoctoral fellows, research associates, technicians and other specialists
13
Countries

OUR VISION

A future where improved observations, modelling, capacity-building and knowledge exchange enable researchers, Inuit, Northerners and decision-makers to jointly develop adaptation strategies minimizing negative impacts and maximizing positive outcomes resulting from the transformation of the Canadian Arctic.

OUR MISSION

- **Build** synergy among research Centres of Excellence in the natural, human health and social Arctic sciences.
- **Involve** Inuit, Northerners, government and the private sector in the steering of the Network and scientific process through bilateral exchange of knowledge, training and technology.
- **Increase** and update the observational basis needed to address the ecosystem-level questions raised by climate change and modernization in the Arctic.
- **Provide** academic researchers and their national and international collaborators with stable access to the coastal Canadian Arctic.
- **Consolidate** national and international collaborations in the study of the Canadian Arctic.
- **Contribute** to the training of the next generation of experts, from north and south, needed to study, model and ensure the stewardship of the changing Canadian Arctic.
- **Translate** our growing understanding of the changing Arctic into regional impact assessments, national policies and adaptation strategies.

INTRODUCTION

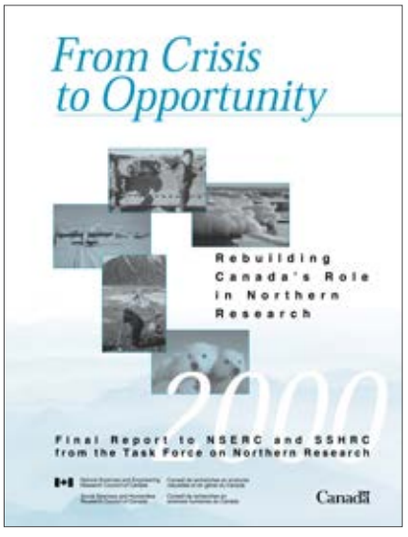
'FROM CRISIS TO OPPORTUNITY' AND THE IMPACT OF ARCTICNET

In 2000, the seminal report of the NSERC/SSHRC Task Force on Northern Research (Hutchinson et al., 2000) aptly captured the abysmal state of academic Arctic sciences in Canada. Among many strategic recommendations, the report demanded the creation of a Network of Centres of Excellence focusing on the Arctic with greater access to Canadian Coast Guard icebreakers for research. In 2003-2004, by implementing most of the Report's recommendations, the ArcticNet NCE, supported by its main core infrastructure the scientific icebreaker CCGS *Amundsen*, jump-started a spectacular revitalization of Canada's research effort in the North.

No other initiative has had a larger impact in transforming modern Canadian Arctic research (Hik, 2010), in integrating its different forces, and orienting it towards answering the needs of stakeholders and the formulation of policy.

SINCE 2004, ARCTICNET HAS:

- Formed one of the most dynamic networks of Arctic experts in the world;
- Involved Inuit at all levels of the Network from fieldwork to the Board of Directors;
- Created unprecedented synergy among the natural, social and health sciences;
- Leveraged its NCE core funding by a factor of 3 to 5 depending on year;
- Mobilized and successfully deployed Canada's only dedicated research icebreaker;
- Provided its researchers with improved access to the services of the Polar Continental Shelf Program;
- Trained over 1,260 graduate students and postdoctoral fellows (56.3% female);
- Helped establish over 85 Arctic specialists in universities and government departments;
- Supported 29 new research chairs including two Canada Excellence Research Chairs;
- Managed over 22 ArcticNet and non-ArcticNet major programs on the *Amundsen*;
- Established significant science collaborations with 11 countries;
- Delivered nine of the Canadian International Polar Year (IPY) programs including the two largest in the world;
- Partnered with the private sector in several multi-million dollar research programs;
- Conducted Inuit health surveys in 48 of the 51 communities of the Canadian Arctic;
- Delivered 47 projects directly supporting Inuit adaptation, health & well-being and education;
- Contributed vastly to Canadian and International Regional assessments (Beaufort & AMAP);
- Implemented Integrated Regional Impact Studies (IRIS) in four regions of the Arctic;
- Coordinated the ArcticNet Scientific Meeting (ASM), Canada's annual Arctic conference;
- Organized two editions of the international *Arctic Change* Conference;
- Played a pivotal role in the organization of the IPY closing conference in 2012;
- Developed and supported the successful Polar Data Catalogue (PDC);
- Engaged policy makers and stakeholders through the IRIS process and the ASM;
- Obtained major philanthropic support for northern research and capacity building;
- Attracted the $3M annual Arctic Inspiration Prize in support of northern initiatives;
- Fostered *Sentinel North,* a major R&D effort to bring new technologies in the North;
- Reached out to the general public to bolster Canada's Arctic dimension;
- Helped bring Arctic issues to the forefront of political agendas in Canada and abroad.



As ArcticNet enters its final year of NCE funding, we are looking back over those tremendous accomplishments of the Network in fulfilling its central objective, namely, to study the impacts of climate change and modernization in the coastal Canadian Arctic. As these contributions to excellence in Canada's "science ecosystem" culminate, to highlight only a few from 2015-2017 is a challenge!

- ArcticNet has built 16 new partnerships during the last Phase of its NCE Program, including significantly increasing contributions from philanthropic sources.
- The Network is seeing the fruition of its efforts to disseminate knowledge to decision-makers through its Integrated Regional Impact Studies (IRIS) and is now transforming this process to increase its relevance through the creation of a dynamic, knowledge-sharing IRIS Portal platform.
- The capacity and momentum in Arctic research created by ArcticNet has stimulated the creation of large academic "spin-off " programs such as the Hudson Bay System Study - *BaySys* Collaborative Research and Development project and most recently the *Sentinel North* Canada First Excellence Research program.
- Exemplifying the long-term value in basic research investments, the Network saw a profound impact on policy-making this year in the contribution of its scientific results to the Newfoundland and Labrador government's decisions during the Muskrat Falls controversy.

Hik, D. 2010. *A northern science policy for Canada.* 2030 North National Planning Conference. Session Paper No. 4.
Hutchinson T. et al. 2000. From crisis to opportunity: rebuilding Canada's role in northern research. NSERC/SHRC.

MESSAGE FROM ARCTICNET'S SCIENTIFIC DIRECTOR, EXECUTIVE DIRECTOR, AND CHAIR - BOARD OF DIRECTORS

As ArcticNet enters its fourteenth year, we can look back on an unmatched trans-sectoral program of 119 research projects providing a wealth of information about the Canadian Arctic; four Integrated Regional Impact Studies detailing the consequences of climate change with recommended adaptation strategies; and an unprecedented effort to integrate university and government northern research efforts in collaboration with Inuit partners.

As the NCE funding of ArcticNet ends in March 2018, many fear the fast erosion of the remarkable coherence the Network has created among Arctic specialists in academia, the government, the North and internationally, as well as with the users of research results in Canada and abroad. Many also apprehend a return to the dark ages of the 1990's when university-based Arctic specialists had to piggy-back federal programs and logistics for want of a coordinated approach to the study of the Canadian Arctic by universities (Hutchinson et al., 2000). Since the dawn of modern research in the Canadian Arctic in the 1950's, investments have tended to shift from government-based research to university-based research. It could be argued that, relative to other countries, the consolidation of Arctic sciences in Canada has suffered from this alternation. Why should Canadian Arctic science be concentrated in either the universities or the government departments at a given time, and not in both sectors at the same time? Ending this counter-productive academia-departments pendulum would help build the coordination and synergy needed to form a credible national effort in a country with limited funding capacity and daunting international expectations to deliver on Arctic sciences. In addition, the long overdue research and training capacity in the North and by the North that is rightfully demanded by the territories (Territorial Premiers, 2016) is needed to complete the research dimension of a new Canadian northern strategy. The alternative notion that some federal agency will be the one and only provider of Arctic knowledge and logistics is unhelpful and runs against the will of the present Government to foster Canadian competitiveness by rallying forces in academia, the public sector and the private sector.

Following the recommendations of the recent review of Canada's fundamental sciences (Naylor et al., 2017), the NCE program has cracked open the door to the possibility of renewing networks like ArcticNet beyond their 14-year limit through a new competition with a relatively modest budget ($75M over 5 years for new and old networks). ArcticNet will be proposing its continued vision of an integrated field of Canadian Arctic Sciences for the sustainable development of Canada's North based on the following strategic objectives:

1. Broaden the Network for Canadian Arctic science and Northern knowledge. Expand the geographic and cultural scope of ArcticNet from the maritime Arctic (Inuit Nunangat) to include the Yukon, the continental sectors of the NWT, Nunavut, the northern First Nations and Métis peoples; and expand the network to include emerging centres of excellence in academia, the North, and the public and private sectors.

2. Mobilize scientific information and northern expertise. Advance a comprehensive approach for the complementary sharing of natural, health and social science information with northern knowledge and the expertise of Inuit, First Nations and Métis peoples. Expand the trans-sector (natural, social, health, adding engineering) research program that underpins the Integrated Regional Impact Studies (IRIS) and, in close collaboration with the Arctic Council Arctic Monitoring and Adaptation Program (AMAP), transform existing IRISes into dynamic web-based resources continuously updated online.

3. Arctic research logistics. Implement an integrated approach to terrestrial logistics based on the successful model of Amundsen Science, and mobilize a second research icebreaker for Canada to answer the growing national and international demand for coastal and offshore access to the Arctic.

4. Strengthen and encourage diverse partnerships. Expand engagement with the private and philanthropic sectors in northern research and social development and seek greater collaboration with non-governmental organizations.

5. Territorial and Inuit-led research and training programs. Building on the ArcticNet Inuit partnership and the vision expressed by the Territorial Premiers, support the development of research and training capacity in the North for Northerners and Indigenous peoples including accelerating the creation of a distributed Network of northern universities in the Yukon, NWT, Nunavut, Nunavik and Nunatsiavut; support the realization and implementation of Territorial and Inuit Research Strategies; and promote Arctic science and northern knowledge for training and youth engagement.

6. Northern health. Support the improvement of physical and mental health in the Canadian North in close partnership with Inuit, First Nations, Métis, Territorial and Provincial health organizations.

7. "Big Science" in the Canadian Arctic. Provide the Canadian research community with the financial seeding and logistics capacity to participate in and take the leadership of large multi-national endeavours to study and monitor the changing Arctic in both Canadian and circum-polar contexts.

Again as in the late 1990's, Canadian Arctic science is at a crossroad and requires a new roadmap. ArcticNet will continue to explore all possible avenues for the funding and consolidation of university-based northern research with the overarching goal of providing a strong academic component to Canada's emerging new northern strategy. We thank the entire Canadian and international Arctic science community for your past and future support of our efforts.

Louis Fortier
Scientific Director

Leah Braithwaite
Executive Director

Bernie Boucher
Chair – ArcticNet Board

Naylor et al. 2017. Canada's Fundamental Science Review. Investing in Canada's future. www.sciencereview.ca/eic/site/059.nsf/eng/home
Territorial Premiers (Yukon, NWT and Nunavut), 2016. A Pan-Northern Approach to Science, 2016. www.anorthernvision.ca/PanNorthernScience.html

RESEARCH AND MONITORING

INTEGRATED REGIONAL IMPACT STUDIES

ArcticNet's 42 research projects also contribute to four Integrated Regional Impact Studies (IRISes). Each of the four IRISes corresponds to one of the main political-physiographic-oceanographic regions of the coastal Canadian Arctic. These studies translate knowledge into action by bringing researchers and stakeholders together to generate timely region-specific roadmaps and practical policy recommendations, which help northern communities develop sustainability plans. As most ArcticNet projects operate across the Canadian Arctic, many contribute to several of the four studies.

Update on IRIS 1

In 2015, ArcticNet published its IRIS 1 report, *From Science to Policy in the Western and Central Canadian Arctic: An Integrated Regional Impact Study of Climate Change and Modernization*. The publication is the result of years of research and consultation to identify environmental, health and societal vulnerabilities and climate change adaptation priorities for Northerners living in the Inuvialuit Settlement Region, the North Slope of Yukon and Herschel Island and the Kitikmeot region of Nunavut.

"This assessment is unique in that not only does it synthesize some of the most up-to-date climate-related knowledge within the region and present it in a form that is understandable by non-scientific audiences, but that it was developed at all stages in close collaboration with the people who live in the North and deal with adaptation issues on a day-to-day basis."

Gary Stern, co-editor of the study and Professor in the Clayton H. Riddell Faculty of Environment, Earth, and Resources, University of Manitoba

The 432-page study includes 10 detailed topic-defined chapters covering marine contaminants, human health, travel and navigation, food and cultural security and resource development. Also included in the document is a Synthesis and Recommendations section that highlights the key priorities and interests identified by stakeholders in the regions.

ArcticNet's Executive Director along with the IRIS 1 Coordinator attended the Beaufort Sea Partnership meeting in Inuvik in October 2015 to present the *Western and Central Arctic study* to some of the Network's key stakeholders. A second launch was held in Cambridge Bay in February 2016 during the 17th annual Kitikmeot Trade Show. This was followed by a side meeting held by Nunavut representatives from the Nunavut Planning Commission, the Nunavut Impact Review Board, the Nunavut Water Board, the Government of Nunavut and Nunavut Tunngavik Inc. to introduce and discuss the findings of the IRIS 1 assessment.

IRIS 1: Western and Central Arctic

Leader: *Gary Stern, University of Manitoba*

Coordinator: *Ashley Gaden*

IRIS 2: Eastern Arctic

Leader: *Trevor Bell, Memorial University of Newfoundland*

Coordinator: *Tanya Brown*

IRIS 3: Hudson Bay

Leader: *David Barber, University of Manitoba*

Co-Leader: *Zou Zou Kuzyk, University of Manitoba*

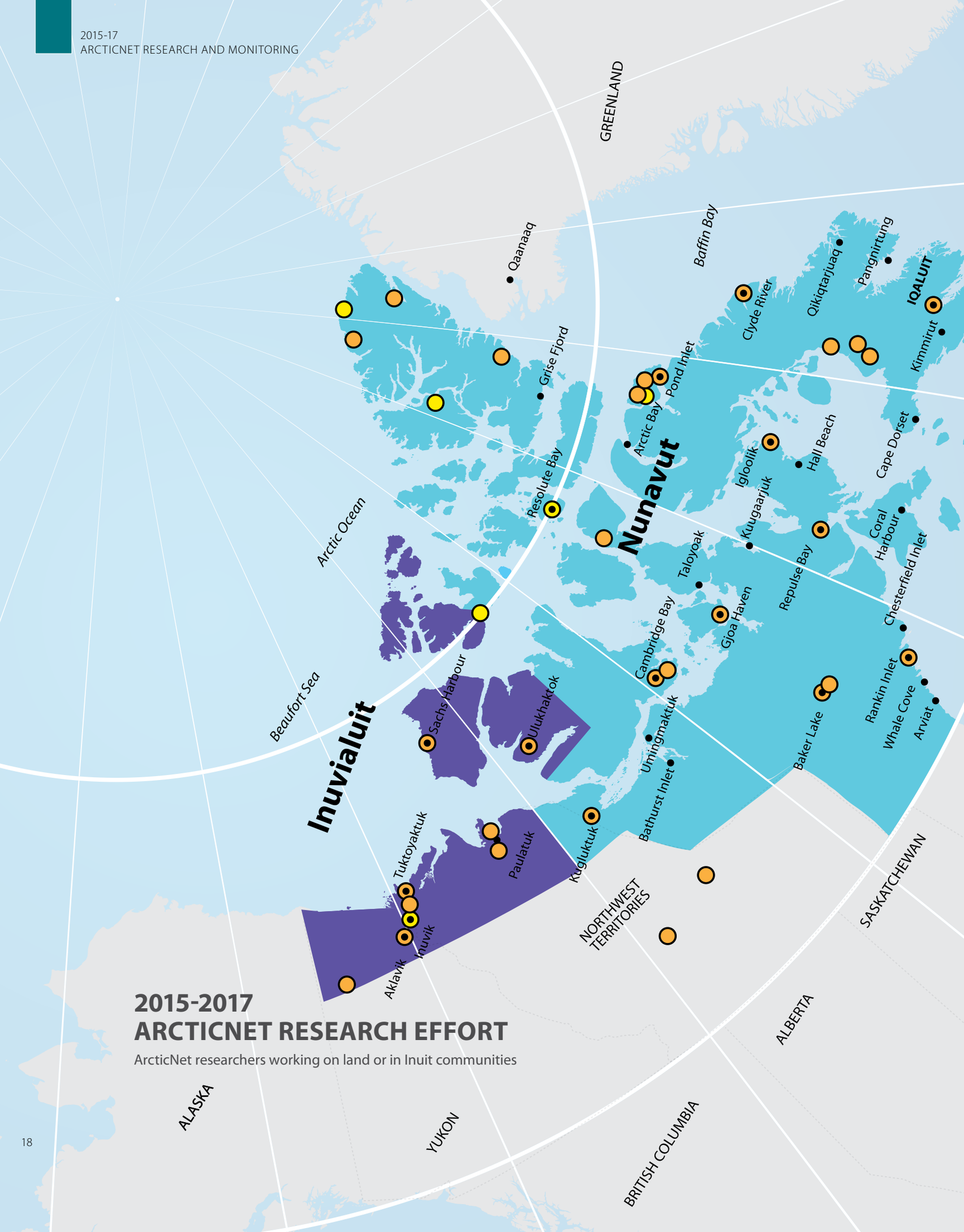
Coordinators: *Lauren Candlish and Michelle Kamula*

IRIS 4: Eastern Subarctic

Leader: *Michel Allard, Université Laval*

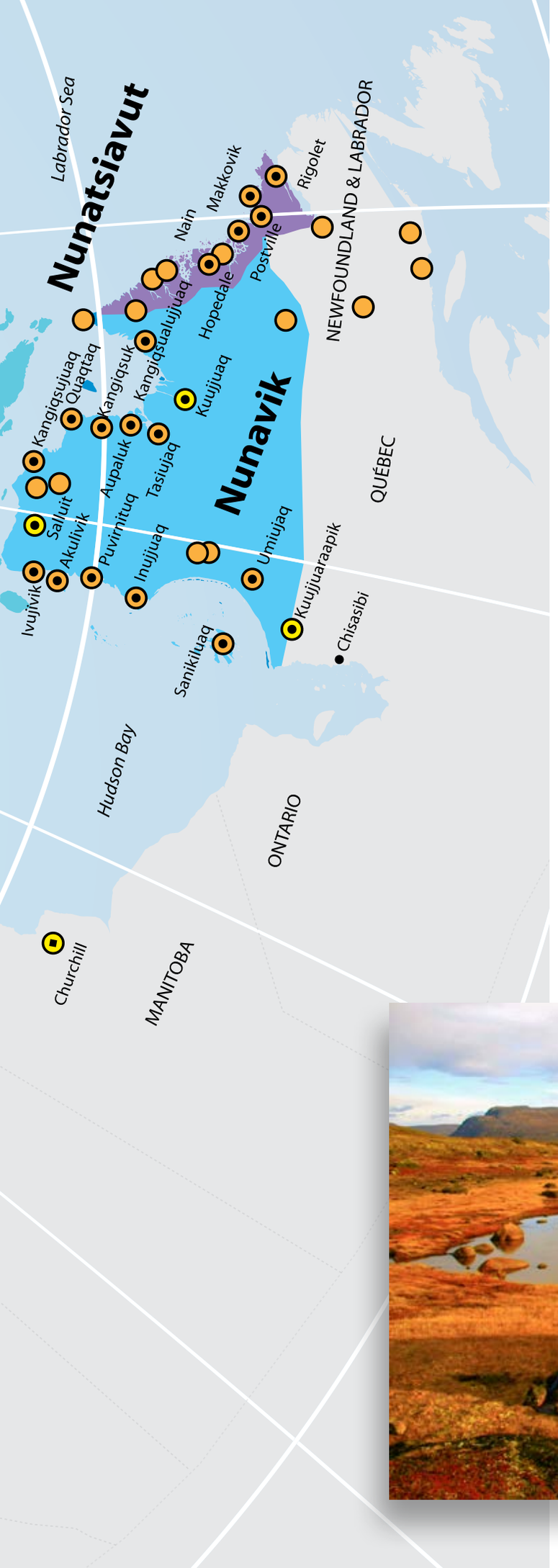
Coordinator: *Mickaël Lemay*

IRIS Program Manager: *Mickaël Lemay*



2015-2017
ARCTICNET RESEARCH EFFORT

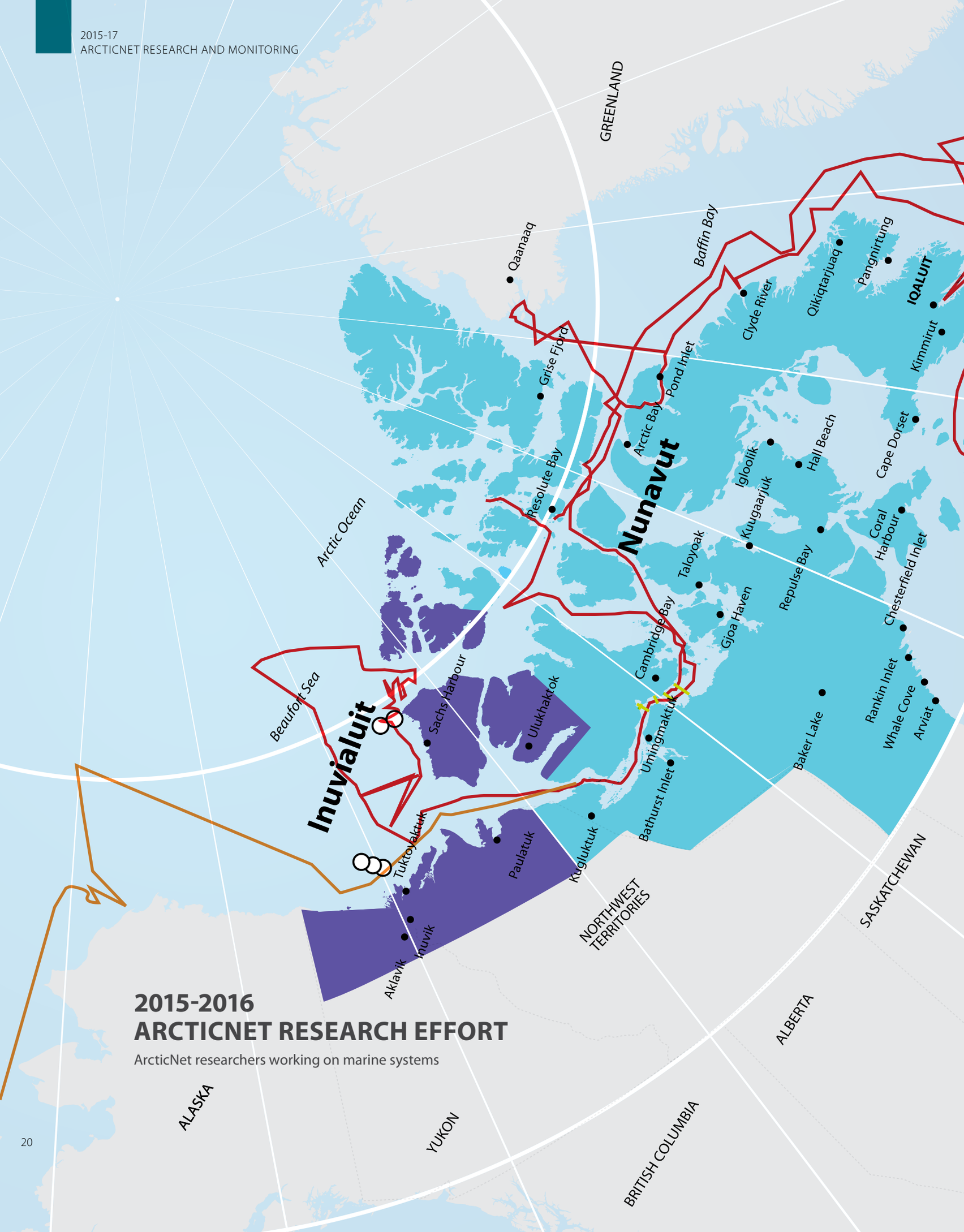
ArcticNet researchers working on land or in Inuit communities



ArcticNet researchers working on land or in Inuit communities can rely on a network of research stations and laboratories such as the ones maintained by the Polar Continental Shelf Program (PCSP), the Centre d'études nordiques (CEN), the Nunavik Research Centre, the Churchill Northern Studies Centre, the Aurora Research Institute and the Nunavut Research Institute.

ArcticNet's research program continues to support a multidisciplinary approach to address the challenges facing the coastal Canadian Arctic, with the objective of filling identified knowledge gaps to help the formulation and implementation of policies and adaptation strategies. ArcticNet addresses the present state of the coastal Canadian Arctic, and aims to anticipate the nature and magnitude of the impacts of climate change and modernization at the regional level over the coming 40 years.

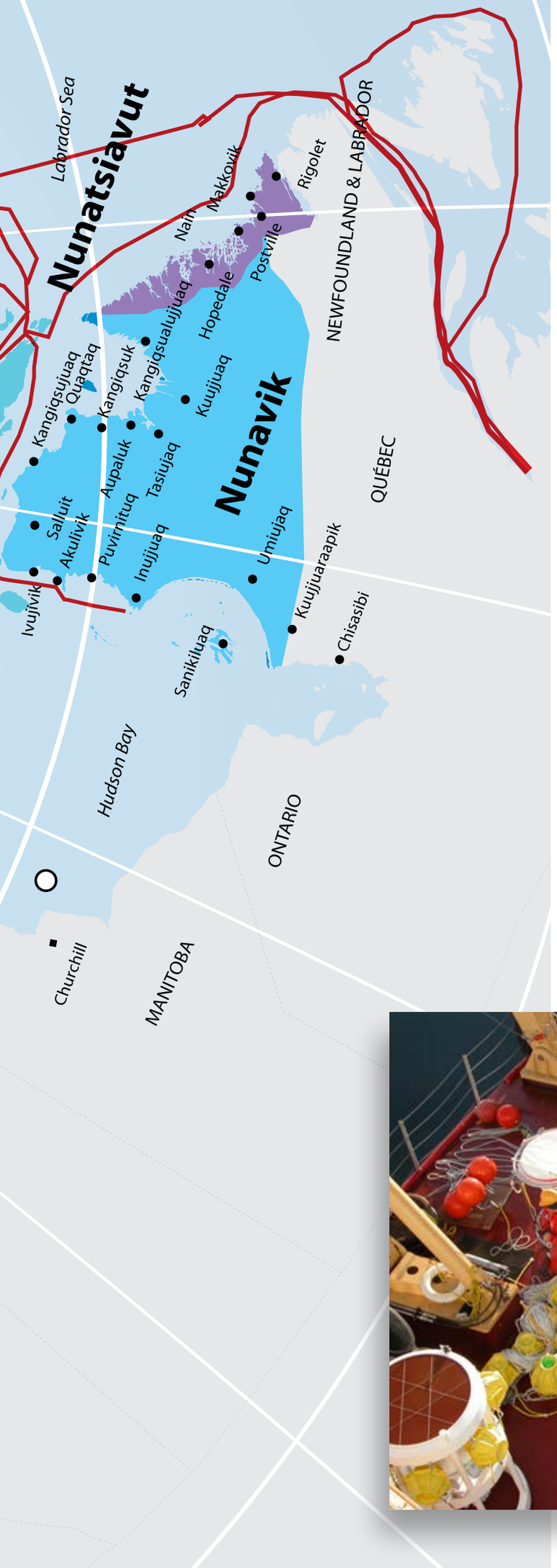
- Terrestrial Observatory
- Research Location
- Inuit Community



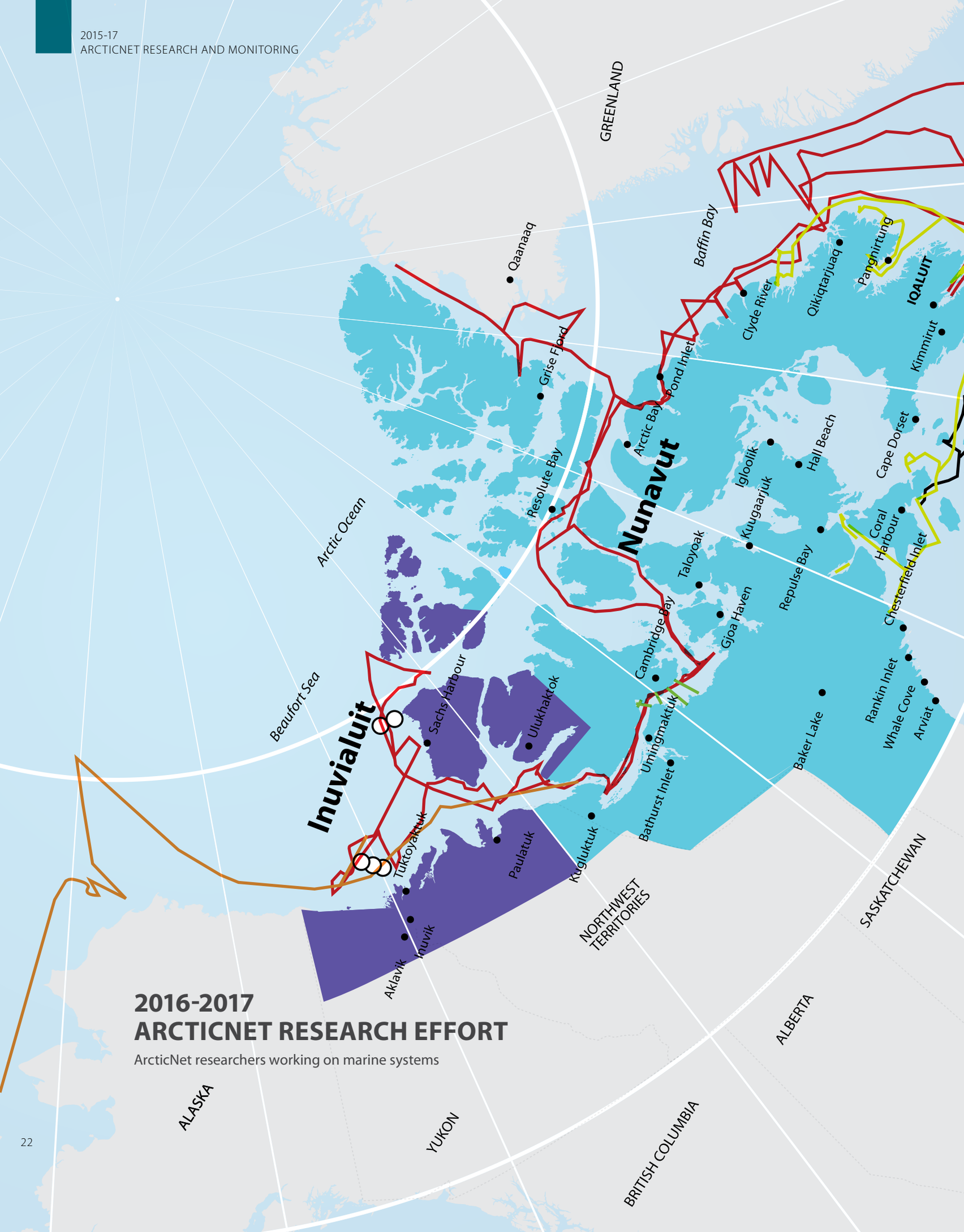
2015-2016
ARCTICNET RESEARCH EFFORT

ArcticNet researchers working on marine systems

In 2015 ArcticNet announced the funding of 42 new projects as part of its Phase IV research program. Research teams from 32 universities across Canada collaborate with stakeholders from Inuit organizations, northern communities, research institutes, industry as well as government and international agencies, creating a unique multi-disciplinary and cross-sectorial environment. The Network's 42 research projects focus on four main themes: marine systems, terrestrial systems, Inuit health, education and adaptation, knowledge co-production and implementation, and they operate across northern Manitoba, northern Yukon and the four Inuit regions of Canada: the Inuvialuit Settlement Region, Nunavut, Nunavik and Nunatsiavut.



CCGS *Amundsen*
CCGS *Sir Wilfrid Laurier*
R/V *Martin Bergmann*
Marine Observatory



2016-2017
ARCTICNET RESEARCH EFFORT

ArcticNet researchers working on marine systems

ArcticNet is committed to providing its Network Investigators, students and partners with well-coordinated land and sea access to the coastal Canadian Arctic. Only through improved and stable access can researchers establish the long-term studies and obtain the observations necessary to understand and document the changes occurring in the Arctic. Through collaborative partnerships, researchers also have access to the expertise of northern communities, regional authorities and governments across the four Inuit regions of Canada. At sea, ArcticNet researchers use the CCGS *Amundsen* as their principal research platform for investigating the coastal Arctic. They were also able to take advantage of opportunities for collaboration on the CCGS *Sir Wilfrid Laurier*, CCGS *Des Groseilliers*, R/V *Martin Bergmann* and MV *Nuliajuk*.

- CCGS *Amundsen*
- CCGS *Sir Wilfrid Laurier*
- CCGS *Des Groseilliers*
- R/V *Martin Bergmann*
- MV *Nuliajuk*
- Marine Observatory

CCGS *Amundsen*

38,000+
nautical miles transited during the 2015 and 2016 CCGS *Amundsen* expeditions

223,000+
nautical miles travelled by the CCGS *Amundsen* since 2003

1,700+
research days at sea on the CCGS *Amundsen* since 2003

On 17 April 2015, the state-of-the-art Canadian research icebreaker CCGS *Amundsen* left her homeport of Quebec City for an initial 18-day expedition offshore Newfoundland and Labrador as part of a collaboration between ArcticNet, Statoil Canada, the Research & Development Corporation of Newfoundland and Labrador, and Husky Energy. The collaboration brought together the best expertise in academia and industry to collect meteorological, sea ice, iceberg and environmental data and assess new data collection technologies related to safer operating practices in cold ocean regions.

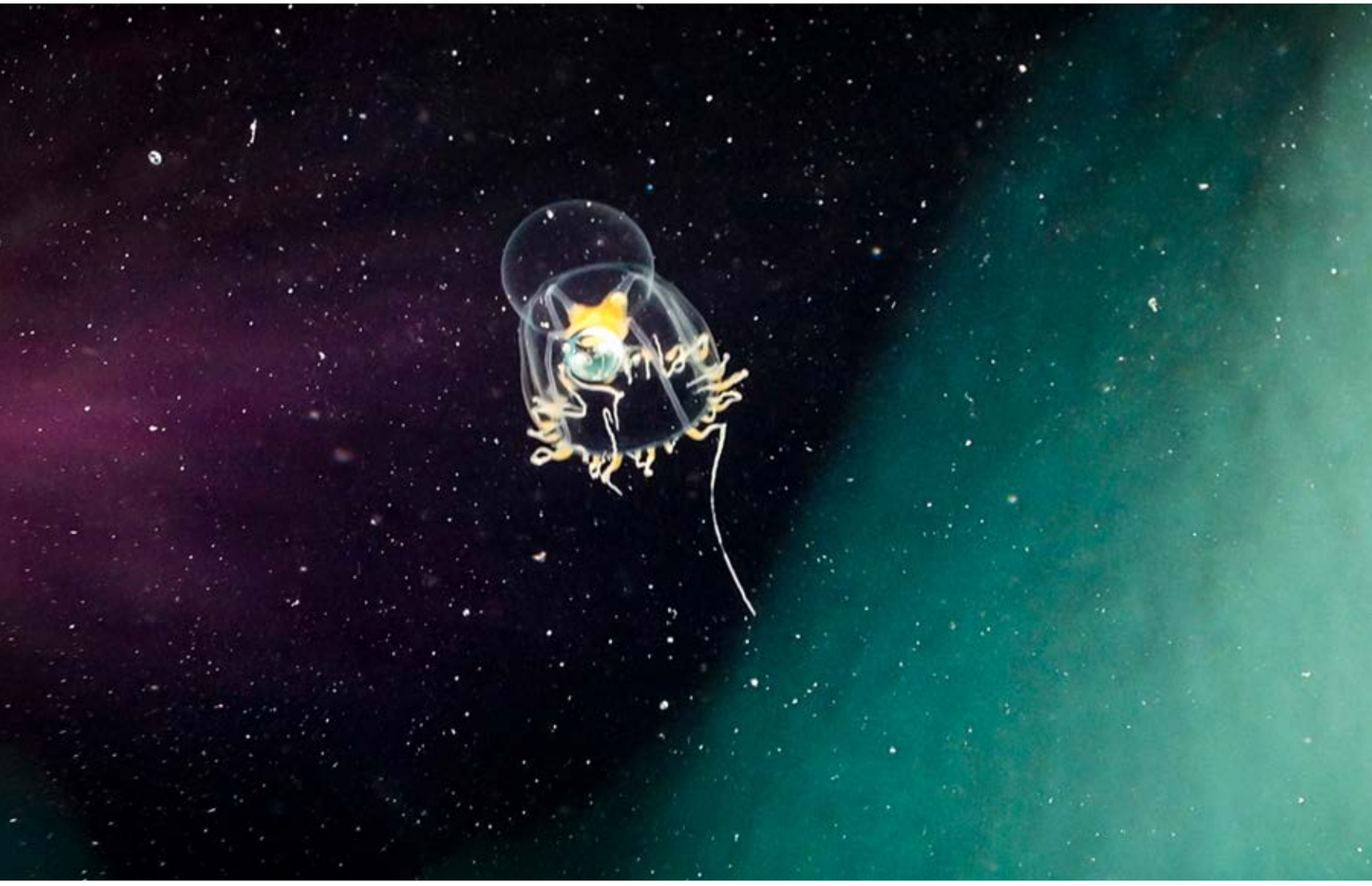
The ship returned to Quebec City after Leg 1 and departed again on 10 July for a 115-day expedition to the Canadian Arctic in support of ArcticNet's annual marine-based research program; the Integrated Beaufort Observatory (iBO) project; GEOTRACES, an international study of the marine biogeochemical cycles of trace elements and their isotopes; and a collaboration with Parks Canada and The W. Garfield Weston Foundation aimed at investigating the oceanographic conditions near and surrounding the shipwreck of the HMS *Erebus* in Queen Maud Gulf. Students and teachers from the Schools on Board program joined the research teams on board from Pond Inlet to Iqaluit before the ship returned to Quebec City on 1 November, after travelling 20 512 nautical miles throughout the coastal Canadian Arctic.

In 2016, the *Amundsen* left Quebec City on 3 June and travelled along the coasts of Baffin Island and Greenland as a part of the joint GreenEdge-ArcticNet program focused on studying the dynamics of the spring phytoplankton bloom and its role within the changing Arctic ecosystem. While conducting operations for the NETCARE (Network on Climate and Aerosols) program and ArcticNet's marine-based research program, the ship sailed North to Nares Strait, before transiting through the Northwest Passage to reach Queen Maud Gulf, where oceanographic moorings were deployed and recovered as part of The W. Garfield Weston Foundation collaboration. Before sailing back east, the *Amundsen* conducted oceanographic sampling operations and mooring deployments in the Beaufort Sea/ Amundsen Gulf region for the iBO project. The Schools on Board program joined the expedition from the 17th September to the 25th October travelling from Kugluktuk to Pond Inlet prior to the ship's return to Quebec City on 6 October after 125 days at sea.

Exceptional Funding for the CCGS *Amundsen*

In January 2017, the Honourable Kirsty Duncan, Minister of Science, announced $18.2M in funding to ensure the ongoing operations and maintenance of the Canadian research icebreaker CCGS *Amundsen*. This grant, corresponding to 100% of the amount requested, was allocated through the Major Science Initiatives (MSI) Special Competition of the Canada Foundation for Innovation (CFI).

Among those present for the official announcement held at a press conference at Université Laval were the Minister of Families, Children and Social Development, the Vice-President, External Relations and Communications for the CFI and the Rector of Université Laval as well as representatives from the Canadian Coast Guard and the *Amundsen* and ArcticNet teams. This extraordinary investment by the CFI will allow the ship to maximize its days at sea in the Canadian Arctic over the next few years while enabling science of the highest international calibre.



MARINE SYSTEMS

In 2015-2017, ArcticNet researchers used the CCGS *Amundsen* as the primary platform for conducting marine sampling operations and monitoring activities. Research conducted from several other vessels, as well as community-based research programs and remote sensing techniques complimented this effort.

Sixteen projects aimed at evaluating changes in the marine environment of the coastal Canadian Arctic generated key outcomes and impacts.

KEY IMPACTS

- Northern involvement was strengthened through the engagement and training of local community members and youth to establish a monitoring network for nonindigenous species in Arctic ports and collect data on the impacts of hydroelectric development and climate change on ecosystems of southeast Hudson Bay.

- Based on surveys completed in Baffin Bay in 2016, biodiversity has been carefully catalogued at pristine sites of the Disko Fan bamboo coral forest, allowing a dramatic comparison to nearby sites damaged by trawling in 1999 and directly informing Canada's Ocean Protection Plan.

- With the Arctic region being more susceptible to accidental releases of different types of hydrocarbon pollution since Canada's National Energy Board approved offshore drilling in 2011, the need for improving oil spill prevention and response has been exacerbated. In 2015-2017, two projects were dedicated to mapping oil spills and studying the potential for biodegradation by microorganisms.

- Preliminary data related to contaminant processes and exposure in the Canadian Arctic marine ecosystem indicated that permafrost slumping increases mercury loading to Arctic rivers, a phenomenon that will accelerate with climate change.

- Multibeam sonar mapping combined with various bottom sampling techniques highlighted the nature of numerous geological hazards within Frobisher Bay as to guide environmental impact assessment and sustainable development. Furthermore, new sectors of the seabed in Baffin Bay, Baffin Island fjords, Nares Strait and Labrador and Beaufort seas were mapped to study the geological history, geomorphology and sedimentary processes of the Canadian Arctic seafloor.

- Oceanographic moorings as well as satellite remote-sensing allowed the recording of physical and biogeochemical processes related to phytoplankton blooms in the western Arctic, as well as in Baffin Bay, respectively. Examination of satellite records also showed thinning of sea ice in the eastern Canadian Arctic.

HIDDEN BIODIVERSITY AND VULNERABILITY OF HARD-BOTTOM AND SURROUNDING ENVIRONMENTS IN THE CANADIAN ARCTIC

Project Leaders: Philippe Archambault (Université du Québec à Rimouski) and Evan Edinger (Memorial University of Newfoundland)

Hard bottom seafloors are the most understudied Arctic benthic ecosystems although they are highly vulnerable to fishing activity and other anthropogenic stressors. This project examines the biodiversity and ecological processes of deep marine habitats in the Canadian Arctic, documenting: (1) the functional role of corals and sponges; (2) cryptic and microbial diversity associated with habitat-forming species; (3) microbial communities in relation to biogeochemical processes; and (4) the determinants of fish assemblages. Based on surveys completed using the CCGS *Amundsen*'s Remotely Operated Vehicle in 2016, biodiversity at pristine sites of the Disko Fan bamboo coral forest in Baffin Bay can now be compared with nearby sites damaged by trawling in 1999.

REMOTE SENSING OF CANADA'S NEW ARCTIC FRONTIER

Project Leader: Marcel Babin (Université Laval)

This project focuses on the adaptation of new technologies to the study of the Arctic Ocean, including: (1) algorithms for satellite remote-sensing of phytoplankton, primary production, particulate organic matter, dissolved organic carbon, and bacterial growth; (2) ecosystem models of the impacts of climate change and industrialization on resources and services (fisheries, navigation, minerals, energy, tourism); (3) profiling floats, ocean gliders and autonomous underwater vehicles; and (4) state-of-the-art geo-referenced data archiving systems. Preliminary analysis of the 2015-2016 data from Baffin Bay has provided a better understanding of the physical and biogeochemical processes triggering the onset of the phytoplankton spring bloom around the ice edge in the expanding seasonal ice zone.

SEA ICE - UNDERSTANDING AND MODELLING OCEAN-SEA ICE-ATMOSPHERE BIOGEOCHEMICAL COUPLING IN A CHANGING CLIMATE

Project Leader: David Barber (University of Manitoba)

This project provides knowledge on interactions and exchange at the ocean-sea ice-atmosphere (OSA) interface through: (1) observations at micro to global spatial scales, (2) community-based monitoring meshing Western and Inuit expertise, and (3) the development of tools to estimate the state of the snow/sea ice system from satellite microwave remote-sensing. Based on this knowledge, researchers will model future changes in Arctic sea ice and their impacts on ecological and geochemical cycles operating across the OSA interface. Examination of a 14-year satellite record has shown thinning of sea ice in 9 out of 12 sub-regions of the eastern Canadian Arctic.

MONITORING MARINE BIODIVERSITY WITH EDNA; A NEW COST-EFFECTIVE METHOD TO TRACK RAPID ARCTIC CHANGES

Project Leader: Louis Bernatchez (Université Laval)

Environmental DNA (eDNA) analysis, a novel sampling approach that detects traces of DNA in water, can identify local species from only a few liters of seawater. In partnership with a network of molecular, invasion and benthic ecologists and policy makers (the Coastal SEES Collaborative Research Network), this project seeks to optimize the eDNA method for Arctic marine ecosystems to aid in detecting biodiversity shifts and invasive or non-native species.

The project has provided training to local northern community members and research staff to establish a community-based eDNA monitoring network to detect nonindigenous species in Arctic ports.

AUTOMATED ICE AND OIL SPILL MAPPING – PROTECTING ARCTIC COASTAL REGIONS AND COMMUNITIES

Project Leader: David Clausi (University of Waterloo)

Canadian Ice Service personnel manually interpret satellite images to provide ice maps for shipping and icebreaking, to aid hunting and safe transportation on ice for Arctic communities, and to identify oil slicks. Automated ice interpretation is crucial for rapid and accurate ice map generation and, to date, no system reliably detects oil spills in oceans. This project is developing next-generation machine algorithms that can analyze radar-based imagery for ice mapping and oil spill detection. Incorporating traditional knowledge into the development of the automated system will make output ice types more meaningful to Northerners. The algorithms will also support the new RADARSAT Constellation Mission (RCM) planned for launch in 2018.

ARCTICNET LONG-TERM OCEANIC OBSERVATORIES: CONTINUATION AND SYNTHESIS OF THE EXISTING DECADAL RECORDS OF PHYSICAL AND BIOGEOCHEMICAL SIGNALS

Project Leader: Dany Dumont (Université du Québec à Rimouski)

ArcticNet has deployed oceanographic moorings supporting recording instruments at different depths in the Canadian Arctic since 2002. These autonomous instruments record current speed and direction, salinity, temperature, nutrients, chlorophyll, and ambient noise, and collect particles sinking from the ocean surface layer to the seafloor year-round. The ArcticNet-LTOO project is assessing variations in this multiyear record to detect any recent changes in marine ecosystems and the services they provide to local communities. Latest results show that, with warmer conditions in the western Arctic, new fall blooms can result in phytoplankton export to depth that is at the same levels in October-November as during the usual spring-summer peak production.

INTEGRATED MARINE GEOSCIENCE TO GUIDE ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABLE DEVELOPMENT IN FROBISHER BAY, NUNAVUT

Project Leader: Evan Edinger (Memorial University of Newfoundland)

This project maps bottom types and marine geohazards (landslides, slope failure, tsunamis), as well as the distribution of marine biodiversity in Frobisher Bay. In 2015 and 2016, multibeam sonar mapping combined with various bottom sampling techniques highlighted the nature of numerous submarine slope failures and other geological hazards within Frobisher Bay; and long-term variation in species composition has been examined by revisiting sites sampled in the 1970s and 1980s. By 2018, most of the Bay will have been mapped and sensitive habitats that might require protection from infrastructure, resource and fisheries development will be identified.

INNOVATIVE RESEARCH ON MONITORING MARINE MAMMALS TO MITIGATE IMPACTS OF A CHANGING ARCTIC

Project Leader: Steven Ferguson (University of Manitoba)

Arctic marine mammals are vulnerable to ongoing sea ice loss and changes in prey abundance. This project is bridging scientific methods and traditional ecological knowledge to study the diet, migration, habitat use, abundance and reproductive success of seals, whales, and polar bears, and their response to changes in sea ice patterns, food web structure, disease prevalence, and contaminant levels. Community-based monitoring programs are being used to engage Northerners in research, management and conservation partnerships. This approach is providing a greater understanding of how Arctic marine mammals use their environment, which helps identify critical habitats, early warnings of change, and critical connections among ecosystem components.

THE ARCTIC COD (*BOREOGADUS SAIDA*) ECOSYSTEM OF THE BEAUFORT SEA: SYNTHESIS OF DECADAL RECORDS

Project Leader: Louis Fortier (Université Laval)

ArcticNet's annual research expeditions typically occur in September-October in the Beaufort Sea, resulting in a lack of data from direct observation for most of the annual cycle. The feeding ecology of Arctic cod, a key component of the marine ecosystem, remains, thus, poorly documented. The project explores interannual variations in key indices of Arctic cod ecology to correlate these to environmental trends. A multi-year record of zooplankton abundance in sediment traps on the Beaufort Sea slope is being used to study the annual cycle of calanoid copepods and their nauplii, the main prey of Arctic cod fry. Preliminary data indicate strong interannual variations in timing and abundance of nauplii prey related to interannual variations in sea-ice regime.

THE POTENTIAL FOR NATURAL OIL SPILL BIODEGRADATION BY MICROORGANISMS IN CANADA'S ARCTIC MARINE ENVIRONMENT

Project Leader: Casey Hubert (University of Calgary)

With Canada's National Energy Board approving offshore drilling in the Arctic in 2011, the region is now more susceptible to accidental releases of different types of hydrocarbon pollution through drilling and shipping activities. The ability of bacteria to degrade hydrocarbons is an ecosystem service that the microbes provide to extraction industries producing and transporting hydrocarbons. To help fully realize these benefits, this project documents the chemistry, physiology and ecology of these marine microorganisms. Results to date reveal that hydrocarbon biodegradation in Canada's Arctic Ocean is possible, and that some variability exists between regions and for different contaminant mixtures.

FRESHWATER-MARINE COUPLING IN HUDSON BAY: A STUDY OF WINTER ESTUARINE PROCESSES IN THE COASTAL CORRIDOR IN SOUTHEAST HUDSON BAY AND EFFECTS OF ENVIRONMENTAL CHANGE

Project Leader: Zou Zou Kuzyk (University of Manitoba)

Hudson Bay receives a tremendous amount of freshwater from ice melt and rivers that drain over 40% of Canada. Freshwater influences sea ice production, water column winter mixing, surface nutrient replenishment, and deep-water formation. This project, in partnership with Inuit and Cree communities, addresses long-standing concerns about the impacts of hydroelectric development and climate change on the ecosystems of southeast Hudson Bay. Recent observational data from Inuit experts suggest that oceanographic conditions have changed in the coastal corridor, with more freshwater in winter than expected.

MAPPING OF ARCTIC CANADA'S SEAFLOOR: CONTRIBUTION TO GLOBAL CHANGE SCIENCE, SUSTAINABLE RESOURCE DEVELOPMENT, SAFE NAVIGATION OF THE NORTHWEST PASSAGE, GEOHAZARDS AND ARCTIC SOVEREIGNTY

Project Leader: Patrick Lajeunesse (Université Laval)

Using the CCGS *Amundsen*, this project is responsible for the acoustic mapping of the seabed relief and shallow subsurface sediments of the Arctic seafloor. Results are used for: (1) identifying marine geohazards to help manage risk to people and the environment in the context of resource development; (2) improving navigational charting and alternate shipping lanes; and (3) providing information on past climatic history in order to predict future climatic responses and their consequences. The ArcticNet mapping program currently represents the most extensive source of modern high-density bathymetric surveying in the Canadian Arctic Archipelago.

MARINE BIOGEOCHEMISTRY AND SURFACE EXCHANGE OF CLIMATE ACTIVE GASES IN A CHANGING ARCTIC SYSTEM

Project Leaders: Tim Papakyriakou (University of Manitoba) and Brent Else (University of Calgary)

The Arctic sea ice cover is changing dramatically in response to climate change, which in turn modifies the cycling of climate active gases (CO_2, CH_4, N_2O, DMS). To understand the role of the Arctic Ocean in the cycling of these gases, computer models use measurements from this project to quantify gas exchange, improve atmospheric budgets, and document the potential impacts of changes in gas exchange dynamics on ocean acidification, contaminant cycles and marine food webs. Ongoing research shows that the Canadian Arctic Archipelago is, so far, a weak source of atmospheric methane which is a powerful greenhouse gas.

ARCTIC GEOMICROBIOLOGY AND CLIMATE CHANGE

Project Leader: Søren Rysgaard (University of Manitoba)

As an important step toward improving climate change models, this project seeks to measure and understand the effects of sea ice and its snow cover on exchanges between the Arctic Ocean and atmosphere. Cutting-edge technology is used to document processes related to: (1) sea ice biogeochemical cycling, (2) sea-ice physical properties and processes, (3) hydrodynamics of Arctic shelf seawater and ice-covered fjord systems, (4) ice-algae and under-ice algal primary production, and (5) pesticide dynamics at the ocean-sea ice-air (OSA) interface. Novel data provide the first direct evidence that melt ponds concentrate and later release current use pesticides to the Arctic Ocean at the OSA interface in Resolute Passage.

UNDERSTANDING THE EFFECTS OF CLIMATE CHANGE AND INDUSTRIAL DEVELOPMENT ON CONTAMINANT PROCESSES AND EXPOSURE IN THE CANADIAN ARCTIC MARINE ECOSYSTEM: HOW CAN WE PREPARE?

Project Leader: Gary Stern (University of Manitoba)

Climate change, sea ice loss, increased resource extraction and shipping all have significant impacts on many aspects of transport pathways, chemical speciation, cycling and exposure of contaminants within Arctic marine ecosystems. Research derived from this project is providing the scientific basis for governments to take remedial and preventive action against contaminants in the Arctic marine environment. Preliminary data indicate that permafrost slumping increases mercury loading to Arctic rivers, a phenomenon that will accelerate under climate change.

ARC3BIO (MARINE BIODIVERSITY, BIOLOGICAL PRODUCTIVITY AND BIOGEOCHEMISTRY IN THE CHANGING CANADIAN ARCTIC)

Project Leaders: Jean-Éric Tremblay (Université Laval), Philippe Archambault (Université du Québec à Rimouski) and Michel Gosselin (Université du Québec à Rimouski)

Arctic marine ecosystems provide numerous services such as food provision, biodiversity, carbon storage and nutrient recycling. Arc3Bio documents how climate and human influence affect crucial ecosystem functions at different scales. Direct observations from icebreakers, satellites, and controlled experiments and models are assessing the impact of changing temperature, light availability and nitrogen supply on the productivity, diversity and biogeochemical fluxes in the pelagic and benthic ecosystems. This project produced a novel dataset on light reflectance by snow and ice that offers a promising means to improve remote-sensing estimates of primary productivity. Results so far indicate lower productivity than field measurements in marginal ice zones.

TERRESTRIAL SYSTEMS

In 2015-2017, ten projects were carried out across the coastal Canadian Arctic to monitor and evaluate changes to the terrestrial environment that impact the livelihood and wellbeing of northern populations. Preliminary results provided by researchers revealed significant changes in coastal dynamics, wildlife ecology and population shifts, as well as environmental alterations.

KEY IMPACTS

- A new model of wave and fast ice dynamics was tested in Hudson Bay and performed well. In the near future, such a model could help inform a framework for coastal planning and safety.

- Coastal surveys for northern infrastructure planning successfully classified the permafrost regime for 80% of Nunavik, a dramatic increase in mapped data of soil conditions.

- Multiple projects increased our understanding of wildlife population ecology and dynamics. Caribou research revealed that climate shifts are increasing the risk of sea ice travel for the already-threatened subspecies Peary leading to increasing genetic isolation. Additionally, data indicates that sport hunting is having a significant effect on the population decline of the Rivière-George herd.

- Research conducted in Lake Nettilling displayed genetic indications of extensive Arctic Char reproduction isolation. A project evaluating water security and quality revealed that mercury concentrations in landlocked Arctic Char are significantly higher in lakes impacted by permafrost disturbances than in unimpacted lakes.

- Work conducted on muskox health indicated that muskoxen may have low resilience to ongoing environmental challenges due to new pathogens. Similarly, muskox health seems to be declining in the western Arctic, raising concerns about food security for local people.

- Data reveal that in 2016 the Arctic experienced one of longest snow free summers on record since 1991 in the Inuvik region of the Northwest Territories and that this may be the new normal in the near future. In Milne Fiord, on Ellesmere Island, results indicate that because of the continuous thinning of the damming ice, the only remaining epishelf ecosystem in the Northern hemisphere is now on the brink of extinction.

- Research on the past and current limnological and biogeochemical status of Lake Hazen show that increased inputs of nutrients, contaminants and sediments, as well as the recent warming, have contributed to unprecedented changes compared to the previous 300 years.

PERMAFROST RESEARCH FOR NORTHERN INFRASTRUCTURE AND IMPROVED COMMUNITY LIFE

Project Leader: Michel Allard (Université Laval)

In support of community development and well-being, this project will: (1) map permafrost and its temperature to support infrastructure maintenance and construction (airports, roads and sea ports) in Inuit communities; (2) inform the selection of foundations for buildings, land use planning, urban architecture and land management; (3) create a computer-assisted course on permafrost for Inuit and the public; and (4) develop new engineering designs and materials for roads, airports and coastal infrastructures. To date the project has conducted detailed coastal surveys and classified over 80% of the Nunavik permafrost regime.

EFFECTS OF CLIMATE CHANGE ON CANADIAN ARCTIC WILDLIFE: ECOSYSTEM-BASED MONITORING AND MODELLING

Project Leaders: Dominique Berteaux (Université du Québec à Rimouski) and Gilles Gauthier (Université Laval)

Arctic ecosystems are undergoing major changes related to climate shifts. This project monitors 35 wildlife populations at 12 study sites in the Eastern Canadian Arctic. The ecosystem-scale exposures and vulnerability of the tundra to climate change is being identified and mapped at the regional scale through modelling. Northern Quebec is being used as a first case study to map tundra vulnerability, with plans to expand to the entire terrestrial Canadian Arctic. Integration of field knowledge via predictive models has demonstrated that climate shifts are increasing the risk for the threatened Peary Caribou of using sea ice for travel across the Arctic Archipelago, thus leading to genetic isolation.

POPULATION DYNAMICS AND PREDATOR-PREY RELATIONSHIPS IN MIGRATORY CARIBOU OF THE QUEBEC-LABRADOR PENINSULA IN THE CONTEXT OF CLIMATE AND ANTHROPOGENIC CHANGES

Project Leader: Steeve Côté (Université Laval)

The causes of plummeting numbers of migratory caribou in Canada are not fully understood. This project combines monitoring of radio-collared caribou and their predators, isotopic analyses and statistical modelling to examine how climate change, habitat modifications, industrial development, and sport and subsistence hunting interact with changes in predation levels, caribou demography and environmental variability to affect the abundance and distribution of two herds of migratory caribou. Preliminary analysis has shown that sport hunting decreased female caribou survival by 13% between 2015 and 2016, suggesting that hunting has a significant effect on the decline of the Rivière-George herd.

BIOLOGY OF THE THREE MORPHOTYPES OF ARCTIC CHAR IN THE NETTILLING LAKE SYSTEM: DEVELOPING SUSTAINABLE COMMERCIAL AND SUBSISTENCE FISHERIES IN NUNAVUT'S TWO LARGEST LAKES

Project Leader: Aaron Fisk (University of Windsor)

The subpopulation of sea-run char in Lake Nettilling is likely the largest in Nunavut but there is no estimate of the resident population. The large number of char migrating south from Nettilling to Amadjuak Lake through Amadjuak River raises the possibility of a viable winter fishery closer to Iqaluit. To inform sustainable management of this winter fishery, the project team samples, tags and monitors char in the river in summer, and in the many small frozen lakes along southern Amadjuak Lake in winter. Preliminary genetic results are showing very high levels of genetic structuring in the Lake Nettilling Arctic Char, indicative of extensive reproduction isolation.

MONITORING AND MANAGING MUSKOX HEALTH FOR FOOD SECURITY AND ECOSYSTEM AND SOCIO-ECONOMIC RESILIENCE: INTEGRATING TRADITIONAL, LOCAL, AND SCIENTIFIC KNOWLEDGE

Project Leader: Susan Kutz (University of Calgary)

Recent mortalities of muskoxen on Victoria and Banks Islands raise concerns about muskox health and food security for local people. The project aims to: (1) determine the current health status of muskoxen in the Inuvialuit Settlement Region and Kitikmeot, (2) evaluate the role of disease, contaminants, climate, disturbance, and stress, (3) investigate the ecology of three emerging muskox diseases, (4) develop indicators of health for muskox monitoring programs, and (5) establish a health surveillance system to inform management. Work conducted in 2016-17 suggests that muskox health is declining in the western Arctic and that muskoxen may have low resilience to ongoing environmental challenges due to new pathogens.

WATER SECURITY AND QUALITY IN A CHANGING ARCTIC

Project Leaders: Scott Lamoureux and Melissa Lafrenière (Queen's University)

This project uses an integrated watershed approach to identify how changes in climate and permafrost drive freshwater quality and availability, and understand the impacts on terrestrial ecosystems and northern communities. Sustainable local research capacity is built through a collaborative research program at Apex River, a potential future source of freshwater for Iqaluit, NU. Training and knowledge sharing opportunities are designed to address concerns about changes to river flow and water quality by local decision-makers and residents. Recent work has revealed that mercury concentrations in landlocked Arctic Char are significantly higher in lakes impacted by permafrost disturbances than in unimpacted lakes.

PROVIDING CLIMATE SCENARIOS FOR THE CANADIAN ARCTIC WITH IMPROVED POST-PROCESSING METHODS

Project Leader: Alain Mailhot (Institut national de la recherche)

Climatologists are faced with significant uncertainty in the predicted range of warming at regional and local scales that must be post-processed to obtain statistical properties similar to those of observations. This project aims to provide Canadian Arctic scientists, decision-makers and communities with temperature, precipitation, and wind speed scenarios. State-of-the-art post-processing methods represent extreme weather events and take into account observational uncertainties. Latest test simulations demonstrate that a new model of wave and fast ice dynamics performed well in Hudson Bay, and further model improvement will provide important information for coastal planning and safety.

THE ARCTIC SNOWCOVER: SENSITIVITY, CHANGE, AND IMPACTS ON TERRESTRIAL SYSTEMS, WATER RESOURCES AND COMMUNITIES

Project Leader: Philip Marsh (Wilfrid Laurier University)

In most regions, the snow season is shifting and decreasing, with changes in snow depth and density that directly impact humans and wildlife. This project improves our understanding of, and ability to model, changes in snow cover properties, including the complex links between snow, vegetation, permafrost and hydrology, in order to inform public policy and development. Surveys showed that 2016 had one of the longest snow free summers on record (1991-2016) in the Inuvik region of the Northwest Territories and that this may be the new normal in the near future.

COUPLED TERRESTRIAL-AQUATIC CLIMATE IMPACTS ON HIGH ARCTIC WATERSHEDS: USING THE LAKE HAZEN WATERSHED AS A SENTINEL FOR CHANGE

Project Leader: Vincent St. Louis (University of Alberta)

This whole-ecosystem study quantifies coupled terrestrial-aquatic impacts of climate change using the Lake Hazen watershed on Ellesmere Island as a sentinel system. The study measures: (1) net exchange of energy, H_2O, CO_2, and methane between the atmosphere and landscapes; (2) net mass change of glaciers; (3) chemical inputs from snowmelt, glacier melt and soil/permafrost thaw; (4) the metabolism of Lake Hazen itself; and (5) long-term biological and biogeochemical changes using sediment cores. Due to recent warming and increased inputs of nutrients, contaminants, sediments, etc., scientists found that the current limnological and biogeochemical status of Lake Hazen is currently unprecedented compared to the previous 300 years.

IMPACTS OF THE CHANGING GLOBAL ENVIRONMENT AT NUNAVUT'S NORTHERN FRONTIER

Project Leader: Warwick Vincent (Université Laval)

This project is tracking and evaluating environmental changes of the northern coastline of Ellesmere Island. It monitors: climate, snow and permafrost ground temperatures, lake ice, alpine glaciers, the Milne Ice Shelf, the surface motion of glaciers and ice caps, ice island production, drift and decay as marine hazards, and lake and fiord sediments to assess long-term variability; and studies trophic relationships within the food web of lakes and fiords. New results show that because of the continuous thinning of the damming ice in Milne fiord, the only remaining epishelf ecosystem in the Northern hemisphere is now on the brink of extinction.

INUIT HEALTH, EDUCATION AND ADAPTATION

During phase IV, ArcticNet conducted multidisciplinary research in all four Inuit regions of Canada: Inuvialuit, Nunavut, Nunavik and Nunatsiavut to address issues important to Inuit and Northerners. Nine projects were dedicated to health, education and adaptation and fostered a participatory approach.

KEY IMPACTS

- Five projects aimed to inform public health policies on enteric illnesses, wildlife diseases and the impacts of contaminants on human health, amongst others. New modeling tools were also developed to inform appropriate control and surveillance strategies.
- Key findings on contaminants revealed that a selenium compound in beluga mattaaq and in red blood cells of Nunavimmiut adults may decrease the distribution of toxic methylmercury to target organs.
- Two community research initiatives focused on improving access to education in the North and developing bilingual education strategies.
- With the goal of developing community sustainability plans adapted for climate change, a project examining Inuit vulnerability, resilience and adaptation revealed that sensitivity to changing climatic conditions are largely conditioned by non-climatic factors and processes.
- Novel results from a study focused on housing, health and well-being indicated that 51% of households in Nunavik, and 65% in Nunavut have overcrowded conditions.

DESIGNING AND IMPLEMENTING THE NUNAVIK HEALTH SURVEY *QANUILIRPITAA? 2017*

Project Leader: Pierre Ayotte (Université Laval)

Approximately 1000 Inuit from the 14 communities of Nunavik participated in the *Qanuippitaa? How are we?* health survey in 2004. *Qanuilirpitaa?* 2017 includes three components: (1) a follow-up of the health status of the 2004 participants covering chronic diseases, infectious diseases and mental health; (2) a new youth cohort to identify indicators of health and well-being pertaining to this critical component of the Inuit population; and (3) a diagnosis of health and well-being at the community level. This multi-scale, interdisciplinary and participatory study is critical for the development of multi-sectorial health, social and environmental policies in Nunavik.

COMMUNITY VULNERABILITY, RESILIENCE AND ADAPTATION TO CLIMATE CHANGE IN THE CANADIAN ARCTIC

Project Leader: James Ford (McGill University)

This project takes a community-based monitoring approach to develop a dynamic understanding of the processes and conditions affecting Inuit vulnerability, resilience and adaptation to climate change. Scientists are (1) replicating community vulnerability assessments conducted ten years ago to examine how continuing socio-ecological changes have affected human-environment interactions and (2) equipping Inuit hunters with GPS units to record land use data and following up with questions about their activities on the land. New results indicate that sensitivity to changing climatic conditions is largely conditioned by non-climatic factors and processes, for instance cold storage availability as an important determinant of Inuit food security.

FOODBORNE AND WATERBORNE DISEASE MITIGATION: COMMUNITY-BASED SURVEILLANCE FOR ENVIRONMENTAL HEALTH

Project Leader: Sherilee Harper (University of Guelph)

Globally, the highest rates of enteric illness have been reported in Iqaluit, Nunavut. Infectious diarrhea and vomiting can be caused by contaminated drinking water, contaminated food, animal- or person-to-person contact. Through a community-based monitoring system, researchers have identified and monitored the pathogens to better understand how people contract this illness. *Giardia* and *Cryptosporidium* parasites have been found, respectively, in 20% and 1.8% of water samples from rivers, and in 17% and 22% of canine fecal samples, recognizing water and pets as possible sources of pathogens to humans. Public health response options to reduce the high rate of illness will be examined with local authorities.

WILDLIFE DISEASES IMPORTANT FOR HUMAN HEALTH AND FOOD SAFETY IN THE CHANGING ENVIRONMENT OF THE EASTERN SUBARCTIC

Project Leaders: Patrick Leighton (Université de Montréal) and Emily Jenkins (University of Saskatchewan)

Wildlife diseases such as rabies and food-borne parasites disproportionately impact public health in Nunavik and Nunatsiavut compared to the rest of Canada. These diseases may be changing in response to changing climate, land use, and demographics in the area. Working with public health authorities, policy makers and Hunter/Trapper Organizations, this project is assessing and predicting the risk of exposure to diseases affecting both wildlife and people. Data collected on prevalence of three zoonoses has enabled the development of new modeling tools, such as the Arctic Rabies Model (ARM) simulation platform, to inform appropriate control and surveillance strategies.

ECOSYSTEM APPROACHES TO NORTHERN HEALTH

Project Leader: Mélanie Lemire (Université Laval)

While persistent organic pollutants are declining, mercury remains a topical issue and new chemicals are being found in Arctic environments with unknown health impacts. This project aims to (1) monitor contaminants transported over long distances in country foods and in northern populations; (2) determine the effects of new contaminants on human health; (3) mobilize knowledge to implement intervention strategies; (4) build environmental health capacity in the North; and (5) inform public health policies. Key findings reveal that Selenoneine, a significant selenium compound in beluga mattaaq and in red blood cells of Nunavimmiut adults, may decrease the distribution of toxic methylmercury to target organs (brain and foetus).

MOBILIZING KNOWLEDGE THROUGH A NETWORK OF INUIT EDUCATIONAL LEADERS AND RESEARCHERS: BILINGUAL EDUCATION IN INUIT NUNANGAT

Project Leader: Alexander McAuley (University of Prince Edward Island)

The development of a bilingual Inuit workforce, well prepared for current and future economic opportunities is vitally important. A network of Inuit educational leaders and researchers are deploying digital technologies to harness the expertise of Inuit and non-Inuit parents, educators, researchers and collaborators to develop and share effective, research-supported, bilingual education strategies. This innovative approach will contribute to student learning at the school and post-secondary levels. The network has already been successful in establishing the principles underlying effective bilingual education in Inuit Nunangat and made them available to the public through the website Akuttujuuk.ca.

FOUNDATIONS FOR STUDENT PERSISTENCE AND SUCCESS IN INUIT NUNANGAT

Project Leader: Melanie O'Gorman (University of Winnipeg)

Statistics, reports, and community observations show that further efforts are required to support Inuit students to reach their potential, and have their achievements acknowledged. Through the compilation, synthesis, and contextualization of existing data and initiatives, as well as case studies in selected Inuit communities, this research is contributing to an evidence base from which those working in education can develop and prioritize initiatives to improve equitable access to high quality education in the North. A study using the 2012 Aboriginal Peoples Survey has identified gender, language of instruction, school climate, school-family communications, and peer effects as key factors associated with Inuit educational attainment and academic achievement.

HOUSING, HEALTH, AND WELL-BEING ACROSS THE ARCTIC: REGIONAL, LOCAL, AND FAMILY PERSPECTIVES

Project Leaders: Mylène Riva (McGill University) and Christopher Fletcher (Université Laval)

Inadequate housing has fostered a variety of social, ecological, and health problems in Inuit communities. This interdisciplinary project linking Inuit and Western ways of knowing focuses on four inter-related issues: (1) the health and well-being impacts of moving to newly built social housing; (2) the experience of housing transitions on Inuit families; (3) the definition of adequate housing, overcrowding and its influence on health and well-being from Inuit perspectives; and (4) the role of housing conditions in fostering and sustaining healthy aging. The most up-to-date dramatic data indicate that 51% of households in Nunavik, and 65% in Nunavut have seriously overcrowded conditions.

DIARRHEAL ILLNESS AND ENTERIC INFECTIONS AMONG YOUNG CHILDREN IN NUNAVIK AND NUNAVUT

Project Leaders: Cédric Yansouni (McGill University Health Centre – Research Institute) and David Goldfarb (Children's & Women's Health Centre of British Columbia)

The parasite *Cryptosporidium* causes widespread human disease in Nunavik and Nunavut. Infection is linked to long-term problems in childhood development. Researchers are looking for harmful pathogens in the stool (feces) of preschool-age children to measure frequency and identify causes of diarrheal infections, assess impacts on child growth and development, and inform prevention efforts. Results will help develop interventions to stop the spread of infections. Preliminary data have established the dominant role of *Cryptosporidium* among enteric infections in Kuujjuaq and Iqaluit and the research group has led the implementation of rapid molecular platforms to improve cryptosporidiosis diagnosis.

NORTHERN POLICY DEVELOPMENT AND KNOWLEDGE TRANSFORMATION

ArcticNet's research directly supports the development and dissemination of knowledge to formulate adaptation strategies and policies for Inuit, private sector stakeholders (oil and gas, navigation, mining, tourism, hydroelectricity) and all levels of decision-makers and governments, whose mandate it is to manage a changing Arctic. Between 2015-2017, research efforts related to knowledge production focused on international boundary disputes, food security, economics, community engagement and data management.

KEY IMPACTS

In addition to examining the development and implementation of 'Regional Seas Arrangements' for the co-management of the Arctic Ocean, an ArcticNet team revealed that Russia was using the North Water Polynya, between Canada and Greenland, as a disposal site for rocket stages with toxic hydrazine fuel onboard. This exposé drew significant national and international media attention to the issue.

A network of community knowledge centres has been created to monitor marine climate and coastal and landscape hazards combined with digital imagery and mapping data. This network forms the basis of the award-winning 'SmartICE' program which, co-designed with Inuit, is producing critical information on sea-ice conditions; that information is readily available to members of the communities of Nain and Pond Inlet heading out on the ice to enhance travel efficiency and safety.

Food insecurity is a critical public health issue in many northern communities today. Analysis of data obtained through comprehensive surveys indicates that the role of country food harvesting and consumption makes a significant contribution to food security.

With a focus on vegetation, especially berry producing shrubs, a new community-focused information system has been created involving youth in all aspects. As a result, "The Berry Book" was published based on interviews and workshops with elders and youth in Kugluktuk. This was an excellent Inuit youth engagement initiative that matched them with elders and introduced the Innuaqtun language to them in a concrete way.

As a result of an ArcticNet project's efforts to develop a comprehensive knowledge base of beluga status, the Inuvialuit expertise on beluga ecology and health is now formally included in the Fisheries and Oceans Canada (DFO) stock assessment peer review process as of January 2017.

A "REGIONAL SEAS ARRANGEMENT" FOR THE ARCTIC OCEAN

Project Leader: Michael Byers (University of British Columbia)

The Arctic Ocean is a complex marine system in which currents, ice, fish, and marine mammals constantly move across the national boundaries of five coastal states (Canada, Greenland-Denmark, Norway, Russia, and the United States). To enhance the co-management of such systems, the UN Environmental Program (UNEP) has promoted the creation of "Regional Seas Arrangements" (RSAs). Additionally, the project team revealed that Russia has been using the North Water Polynya, between Canada and Greenland, as a disposal site for rocket stages fuelled by highly toxic hydrazine which has drawn significant national and international media attention to the issue.

SUPPORTING UNDERSTANDING, POLICY AND ACTION FOR FOOD SECURITY IN NUNAVIK AND NUNATSIAVUT

Project Leader: Chris Furgal (Trent University)

Food insecurity is a critical public health issue in many northern communities today. Environmental, socio-cultural, economic and political changes threaten northern households' access to healthy, safe and preferred foods on a regular basis. In cooperation with the Nunavik Regional Board of Health and Social Services and the Nunatsiavut Government, household food security surveys are being conducted and existing datasets analysed to identify the causes of food insecurity with the goal of informing policy. The team's research underlines the role of country food harvesting and consumption for food security in the validation of the Household Food Insecurity Access Scale (HFIAS) used for the surveys.

MINING ECONOMICS, MINING FAMILIES: EXTRACTIVE INDUSTRIES AND HUMAN DEVELOPMENT IN THE EASTERN SUBARCTIC

Project Leader: Stephan Schott (Carleton University)

This project aims to establish an economic impact evaluation method to assess the local economic benefits of mines operating in Nunatsiavut and Nunavik. The experiences of Quebec-Labrador Inuit workers and entrepreneurs in relation to economic development and the regions' mining sectors (Voisey's Bay and Raglan mines) are being documented and interpreted. The dynamics between land-based and mining-based economies are being investigated by analyzing household spending to inform the development of sustainable mining policies in the Canadian North. Preliminary results have led to the recognition that the revenue flow from mines to local communities needs to be differentiated according to stage of mining development (exploration, construction, operation).

KNOWLEDGE CO-PRODUCTION FOR THE IDENTIFICATION AND SELECTION OF ECOLOGICAL, SOCIAL, AND ECONOMIC INDICATORS FOR THE BEAUFORT SEA

Project Leader: Lisa Loseto (University of Manitoba, Fisheries and Oceans Canada – Freshwater Institute)

Climate change and natural resource extractive industries have put the Beaufort Sea ecosystem under increasing pressure. A multiple evidence based (MEB) approach is being used to bridge the knowledge systems of Inuit and western science towards the development of indicators to monitor ecosystem changes. In the first phase, indicators to monitor beluga whale health have been developed. In the second phase, the MEB approach will integrate across social, ecological, and economic disciplines. Since January 2017, the Inuvialuit knowledge of beluga ecology and health has been formally included in the Fisheries and Oceans Canada (DFO) stock assessment peer review process.

ENHANCING COMMUNITY-BASED ENVIRONMENTAL MONITORING IN THE CANADIAN ARCTIC FOR LOCAL AND REGIONAL ASSESSMENTS AND ADAPTATION STRATEGIES

Project Leader: Greg Henry (University of British Columbia)

Climate change and increasing development are transforming the Arctic rapidly. Working with community members, traditional ecological knowledge and scientific methods are being used to monitor changes in the environment in each of the four Inuit regions over the past decades, with a focus on vegetation, especially berry producing shrubs. Creation of a new community-focused information system, involving youth in all aspects, will allow communities to record and use their own observations for planning and teaching. Completion of "The Berry Book", based on interviews and workshops with elders and youth in Kugluktuk, has shown that this was a productive avenue for engaging Inuit youth with their elders and exposing them to the Innuaqtun language.

POLAR DATA MANAGEMENT FOR NORTHERN SCIENCE

Project Leader: Ellsworth LeDrew (University of Waterloo)

The Polar Data Catalogue (PDC, www.polardata.ca) at the University of Waterloo is one of Canada's primary sources for data and information on research in the Polar Regions.

The PDC enhances data management support to ArcticNet scientists and students. The project seeks to secure ArcticNet's long-term data legacy by streamlining data submission and access, and by expanding visibility of ArcticNet's data through linkages with northern organizations and the global polar data management community. In 2016, new membership in the International Council for Science World Data System certified that the PDC abides by high standards of data management, security, and ethics.

KNOWLEDGE CO-PRODUCTION FOR SUSTAINABILITY IN CANADIAN ARCTIC COASTAL COMMUNITIES

Project Leaders: Trevor Bell (Memorial University) and Donald Forbes (Natural Resources Canada – Geological Survey of Canada)

This project is developing a network of community knowledge centres to monitor marine climate (winds, waves, sea ice), coastal hazards (breakup and storm surge flooding, shoreline erosion, ice pile-up), and landscape hazards (slope failure, soil active-layer deepening, and thaw consolidation), supported by digital imagery and mapping data. The network informs management of transport, infrastructure, homes, culturally important sites, sea ice travel, and food security in northern coastal communities. The SmartICE program, co-designed with and involving Inuit, is already producing critical information on sea-ice conditions that is readily available to members of the communities of Nain and Pond Inlet heading out on the ice.

SUCCESS STORY

In December 2016, the SmartICE program (Sea-Ice Monitoring and Real-Time Information for Coastal Environments) was awarded the Arctic Inspiration Prize for its capacity to mobilize knowledge into action for benefit of Canada's Arctic peoples and communities. In total, the project received $400K to help expand its service across the Arctic.

"Hopefully, SmartICE will be a catalyst for a different way to do research in the North, a research with communities and by communities."

-Trevor Bell, Professor at Memorial University and SmartICE team leader

EDUCATION AND TRAINING

INSPIRING YOUTH AND CANADA'S NEXT GENERATION OF ARCTIC RESEARCHERS

Through its incredible multidisciplinary graduate student program and ArcticNet Student Association, providing training for 350+ Inuit and Northerners, and its outstanding Annual Conference, ArcticNet has had an extraordinary impact developing future leaders of Arctic research.

KEY IMPACTS

ARCTICNET STUDENT ASSOCIATION

Whether at sea, on the Arctic tundra, across glaciers and ice shelves, in Inuit communities, or attending international schools and meetings, ArcticNet's young researchers are working, discussing and debating with the best Canadian and foreign experts in the natural, health and social Arctic sciences. They have formed the remarkably active ArcticNet Student Association (ASA), which hosts Student Day during the Annual Scientific Meeting as well as regional workshops to discuss how to adapt student research to meet the Network objectives.

Over 70 undergraduate students, 325 graduate students and post-doctoral fellows, and 510 research associates and technical staff are currently completing their training or working within ArcticNet's unique multidisciplinary, trans-sectoral and international Network.

ArcticNet's Training Fund has supported the participation of dozens of Network students in international Arctic field schools, courses and learning programs. The accomplishments of these hundreds of young ArcticNet researchers provide a positive direction for future Arctic research and the management and stewardship of a rapidly changing Arctic world.

SCHOOLS ON BOARD

ArcticNet's award-winning Schools on Board program has introduced 150+ high school students and teachers, of which 30% are Northerners, to science in Canada's remote Arctic as participants in *Amundsen* expeditions.

For more than a decade, Schools on Board has been delivering unique national outreach programs that focus on bridging Arctic system science and high school education.

In addition to the field-based program on board the CCGS *Amundsen,* Schools on Board continues to broaden its reach through the development of strategic partnerships and the expansion of its programming.

STUDENTS ON ICE

ArcticNet has partnered with Students on Ice (SOI) - an award-winning program to educate the world's youth about the importance of the Polar Regions to participate in and deliver workshops during the ArcticNet Annual Scientific Meeting Student Day.

ArcticNet is building a new partnership with the Students on Ice Foundation to increase the participation of Inuit youth in their annual expeditions to the Arctic beginning in 2017.

ARCTICNET STUDENT ASSOCIATION

Representing over 380 students and postdoctoral fellows, the ArcticNet Student Association (ASA) promotes student learning, leadership, research and networking opportunities between students, academics, government partners, and Northerners. In 2015-2017, the ASA Executive Committee, composed of nine highly motivated graduate students from diverse disciplines, organized regional and national meetings, continued their collaboration with the Association of Polar Early Career Scientists (APECS), provided support to the Schools on Board program and built new outreach opportunities for ArcticNet students through a collaboration with Let's Talk Science.

2015 and 2016 Student Days

The ASA hosted their annual Student Day events as part of the ArcticNet Annual Scientific Meetings in 2015 in Vancouver and 2016 in Winnipeg. Workshops, presentations and networking events focused on personal and professional development for early career researchers and achieving success while maintaining a work-life balance. Between the two meetings, over 620 participants took part in Student Day activities, providing an excellent opportunity for student training and the sharing of knowledge across disciplines and sectors.

Regional Training and Outreach Events

Through a collaboration with Schools on Board and Let's Talk Science, ArcticNet students were involved in outreach activities at several universities across Canada. This initiative included participation in the online outreach program CurioCity, as well as the development of climate outreach kits aimed at informing youth about climate change in the Arctic. The ASA supported Schools on Board in hosting the Arctic Climate Change Youth Forum in Winnipeg in December 2016 and helped with the organization and execution of the very successful Arctic Science Day held in Winnipeg in 2015 and 2016.

STUDENT TRAINING FUND

110+

graduate students have benefited from ArcticNet's training fund since 2004

Well established within the Network since 2005, the ArcticNet Training Fund encourages ArcticNet students to take part in international field schools covering different aspects of Arctic research. The field courses provide students with an opportunity to interact with world-renowned scientists and fellow students to share expert insight and technical training in fields ranging from glaciology and climate to remote sensing and microbial ecology. Over 110 ArcticNet graduate students have taken advantage of the training fund since its inception. In 2015-2017, 28 students were granted a total of over $75,000 to attend high-level national and international training offered by leading Arctic researchers in British Columbia, France, Germany, Greenland, Manitoba, New Brunswick, Norway, Scotland, Switzerland, the United States and Yukon.

"It was a very inspiring and stimulating experience to be surrounded by other students who were excited, motivated and passionate about the work they are doing."

Jill Rajewicz, Carleton University – University Center in Svalbard
Masters Course in Glaciology, Svalbard, Norway

"This course has given me a better understanding and greater appreciation of just how the Arctic marine environment functions. I have learnt very valuable information and sampling techniques that are directly related to my research goals."

Laura Dalman, University of Manitoba – Greenland Institute for Natural Resources *Snow-covered Sea Ice Course*, Nuuk, Greenland

"As a master's student, being able to connect with PhD students during this course had tremendous value for my future career through conversations about research, about my current projects, and for my future aspirations. More and more, I am learning the value of connections and networking within the Arctic research field."

Ellyn Davidson, University of Manitoba – University Centre in Svalbard
Ecosystems in Ice Covered Waters, Svalbard, Norway

FIELDWORK SAFETY TRAINING FUND

ArcticNet is committed to achieving health and safety excellence in all activities and operations conducted as part of its funded projects. The ArcticNet Fieldwork Safety Training Fund was created in 2014-2015 to help support Network Investigators and their graduate students, post-doctoral fellows and staff participate in safety courses pertaining to fieldwork carried out as part of their ArcticNet funded projects. The fund covers 75% of the total cost of an individual's participation in a course, including course fees, travel and accommodations. Over the past years, the fund has helped close to 100 ArcticNet members gain valuable safety training in preparation for fieldwork conducted on land and at sea.

SCHOOLS ON BOARD

The annual field program welcomed high school students and teachers from across Canada's North and South on board the CCGS *Amundsen* both in the fall of 2015 and 2016. Participants had the unique opportunity to work with ArcticNet research teams during sampling operations and in the labs and were also engaged through workshops and lectures aimed at increasing their knowledge of Arctic system science. Build Films, a Winnipeg-based film company, participated in the 2016 expedition to document the Schools on Board program and ArcticNet's research activities studying climate change in the Arctic.

"During my experience in Pond Inlet, I was inspired to contribute on improving environmental and social issues for the Inuit. This is why I will try my best to share the knowledge I acquired in Pond Inlet to my school and my community. It also taught me to keep a critical eye on the media and to keep an open mind. I was inspired by how the scientists are committed to their work and how they support each other to reach a common goal."

Schools on Board participant

In December 2016, the biennial Arctic Climate Change Youth Forum (ACCYF) was held in conjunction with ArcticNet's annual meeting in Winnipeg. Over 150 high school students attended, participating in workshops designed by members of the ArcticNet Student Association to increase awareness of the issues surrounding climate change, Arctic system science and research, and policy development.

Arctic Science Day, a highly successful partnership between Schools on Board, FortWhyte Alive and graduate students, continues to draw in well over 180 middle and high school students in late February/early March to try their hand at sampling activities and learn about Arctic research. Other activities in 2015-2017 included co-leading a session at the Environmental Education and Communication (EECOM) workshop, presenting at the Canadian Network for Ocean Educators (CaNOE) conference and continuation of a partnership with Let's Talk Science to further expand outreach activities in classrooms across Canada. Schools on Board is currently working with the Frontier School Division and the Town of Churchill on an initiative that will turn Churchill's high school into a science education hub with links to current research being conducted in the area.

Moving forward, Schools on Board is piloting a Northern Youth Mentorship Field Program targeting northern youth ages 19-29 who have an interest in the environmental sciences. Taking place in July 2017, the program will host youth from Baker Lake, Chesterfield Inlet, Churchill, and Kimmirut, as well a program instructor from the Arctic College in Iqaluit.

RECOGNITION OF EXCELLENCE FOR ARCTICNET STUDENTS AND POSTDOCTORAL FELLOWS

In addition to the numerous ArcticNet students and postdoctoral fellows who were awarded highly competitive scholarships from national and provincial granting councils, ArcticNet is proud to have a number of its current and former graduate students among the recipients of the prestigious 2015-2017 academic awards for student and postdoctoral research in Northern Canada.

Vanier Canada Graduate Scholarships

The Vanier Canada Graduate Scholarships program was launched by the Government of Canada to strengthen Canada's ability to attract and retain world-class doctoral students, and establish Canada as a global centre of excellence in research and higher learning. Up to 167 scholarships are awarded annually, each valued at $50,000 per year for three years.

- Justin Roy, Biology, Université du Québec à Rimouski
- Kyra St-Pierre, Ecology, University of Alberta

W. Garfield Weston Awards

The W. Garfield Weston Awards for Northern Research enable leading scientists to pursue rigorous research in Canada's sensitive northern regions. Awards at the Masters, Doctoral, and Postdoctoral level are presented to outstanding students and researchers, whose work spans Canada's great North during each field season.

Postdoctoral Fellowships ($50,000)

- Marie-Andrée Giroux, Ecology, Université du Québec à Rimouski
- Sonja Ostertag, Biology, University of Manitoba
- Corinne Pomerleau, Biology, University of Manitoba
- Jennifer Provencher, Biology, Acadia University
- Laura Thomson, Earth Sciences, Simon Fraser University
- David Yurkowski, Biological Sciences, University of Manitoba

Doctoral Scholarships ($50,000)

- Anna Crawford, Geography, Carleton University
- Ashley Dubnick, Earth Sciences, University of Alberta
- Sarah Fortune, Zoology, University of British Columbia
- Julie Malenfant-Lepage, Geography, Université Laval
- Michel Rapinski, Biological Sciences, Université de Montréal
- Adrienne White, Geography, University of Ottawa

Masters Scholarships ($15,000)

- Katherine Black, Integrative Biology, Wilfrid Laurier University
- Chanda Brietzke, Social Sciences, University of Victoria
- Nicholas Brown, Physical Geography, Carleton University
- Maha Ghazal, Environment and Geography, University of Manitoba
- Pierre-Luc Grondin, Biology, Université Laval
- Michael Hackett, Geography, University of Ottawa
- Florence Lapierre Poulin, Biology, Université du Québec à Rimouski
- Katriina O'Kane, Geography, University of British Columbia
- Jill Rajewicz, Geography, Carleton University
- Mathieu Tétreault, Wildlife Management, Université du Québec à Rimouski
- Elizabeth Wrona, Geography, University of Guelph

Northern Resident Scholarship ($10,000)

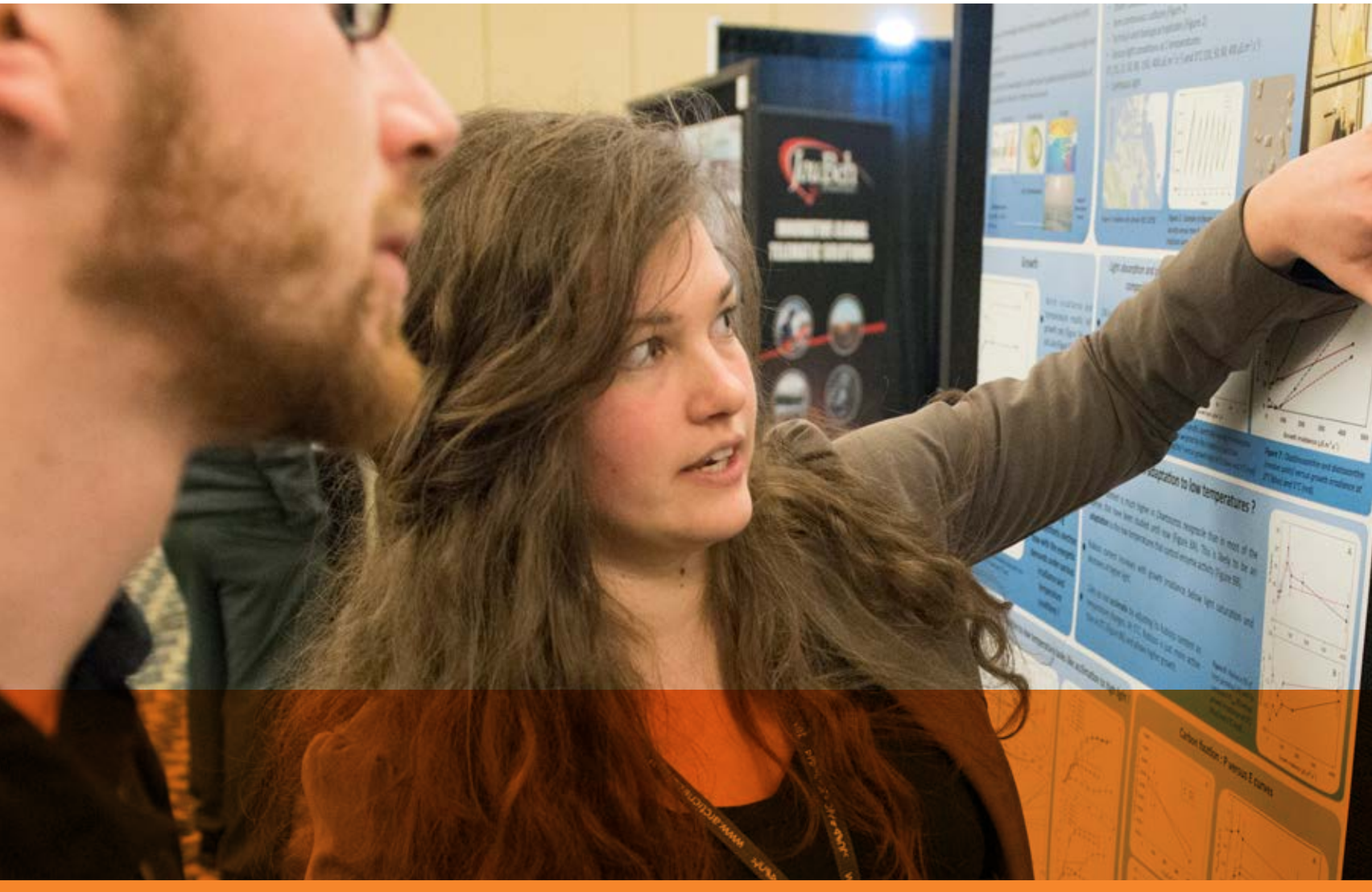
The Northern Resident Scholarship is awarded to graduate students from the North whose circumpolar research is making a contribution to the Canadian North.

- Merran Smith, Geography, Memorial University of Newfoundland

Polar Knowledge Canada Scholarship ($10,000)

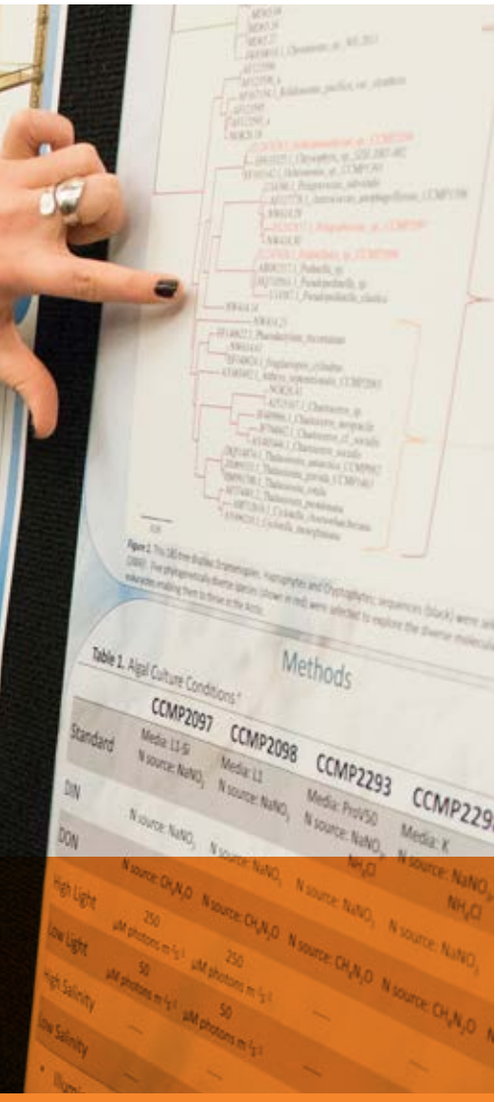
Polar Knowledge Canada offers one scholarship annually for candidates who (a) engage in research culminating in a thesis or other such document, (b) have an interdisciplinary emphasis to their research, (c) demonstrate excellence in Polar studies, and (d) are willing to communicate results at a major national or northern forum.

- Jennifer Provencher, Biology, Carleton University



SHARING KNOWLEDGE

Innovation in disseminating the findings and the results of our research is a key component of ArcticNet's mission. The Network shares its knowledge with an increasing number of stakeholders, from decision-makers to fellow scientists and the general public. Published research results also spur new and more innovative projects, and widen the possibilities for collaborations. At the community level, access to results enables individuals to make informed decisions about their environment. It also helps decision-makers in addressing the issues that Northerners deal with on a daily basis.



MODERNIZING THE IRIS FRAMEWORK

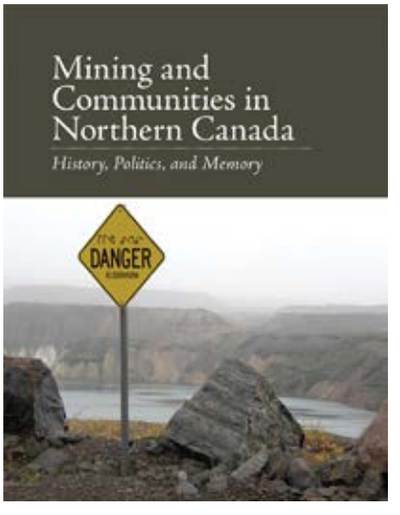
Since its inception in 2004, the ArcticNet NCE has developed the Integrated Regional Impact Study (IRIS) mechanism to mobilize scientific knowledge and northern expertise to inform decisions in and about the North in each of the four regions of the Canadian maritime Arctic (Western/Central Arctic, Eastern High Arctic, Nunavik/Nunatsiavut, Hudson Bay). The first editions of two of ArcticNet's four IRISes have been published in book and pdf format and were very well received by stakeholders. During the final year of the Network's NCE funding, the further two IRISes will be published as well as a re-edition of the Nunavik/Nunatsiavut IRIS. In 2016-2017, the Arctic Council launched its Adaptation Actions for a Changing Arctic (AACA) Reports based on the ArcticNet IRIS process and downscaled circum-arctic assessments to regional needs. Despite these successes, the IRIS framework remains a time-consuming process that requires years between updates. The Arctic, however, is changing rapidly and lengthy intervals between re-editions is too long for timely decision-making. In 2016-2017, ArcticNet undertook a transformation of this process through the **IRIS Portal** project which will: (1) modernize the ArcticNet regional assessments to better address the needs of end users for easily discoverable and accessible information; (2) develop a dynamic approach to provide results and recommendations in a timely fashion; and (3) evaluate the potential for the provision of specific science-based arctic assessment services, with the goal of becoming partially self-sustaining.

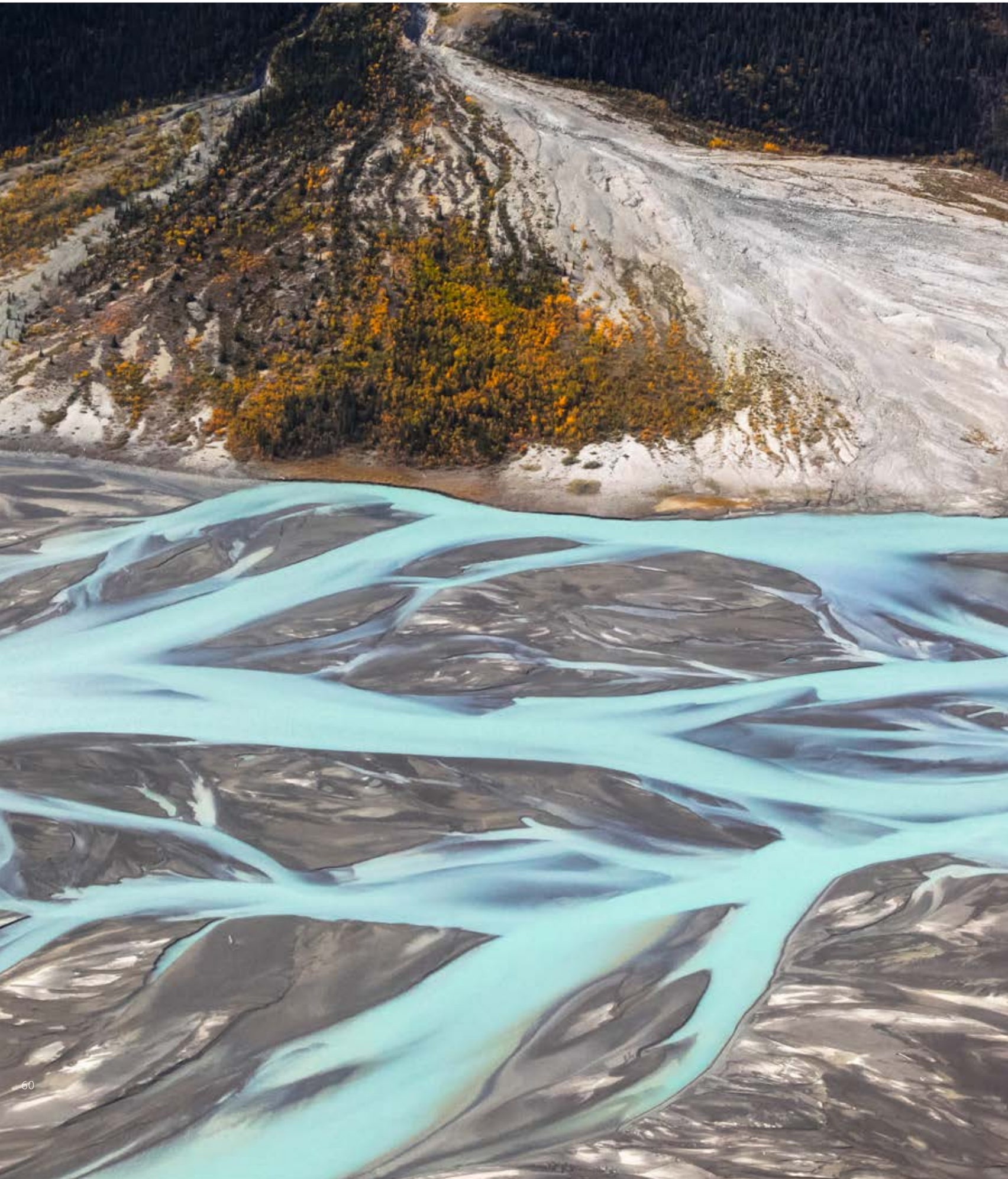
MINING IMPACTS ON INDIGENOUS COMMUNITIES

Research conducted through ArcticNet during Phase 3 substantially contributed to the publication of the book *Mining and Communities in Northern Canada: History, Politics, and Memory* in 2015 by Arn Keeling and John Sandlos, Associate Professors in the Department of Geography and History, respectively, at Memorial University of Newfoundland. This 456-page book examines social, economic, and environmental impacts of mining on Indigenous communities in Northern Canada and exemplifies ArcticNet's significant contribution to social science research in the Arctic.

NEW PEER-REVIEWED JOURNAL 'ARCTIC SCIENCE'

The first issue of the new quarterly open access journal Arctic Science, from Canadian Science Publishing, was released in September 2015. Edited by Network Investigator Greg Henry, Professor in the Department of Geography at the University of British Columbia, this interdisciplinary journal publishes peer-reviewed research from all areas of natural and applied sciences and engineering related to the Arctic.





ARCTICNET SCIENTIFIC PUBLICATIONS

www.aina.ucalgary.ca/arcticnet

2,000+

Scientific publications by ArcticNet researchers in 2015-2017

3,600+

Publications in the ArcticNet Publications Database

The number of ArcticNet scientific publications continues to grow every year, reflecting the successful implementation of ArcticNet's research plan and the breadth of activities undertaken by the Network's researchers. In the past two years, ArcticNet members delivered over 2,000 scientific publications, including more than 670 in refereed books and journals.

The ArcticNet Publications Database now lists a total of over 3,600 publications including over 2,300 refereed publications. The online database is updated annually and is maintained by the Arctic Science and Technology Information System (ASTIS), a project of the Arctic Institute of North America at the University of Calgary.

POLAR DATA CATALOGUE

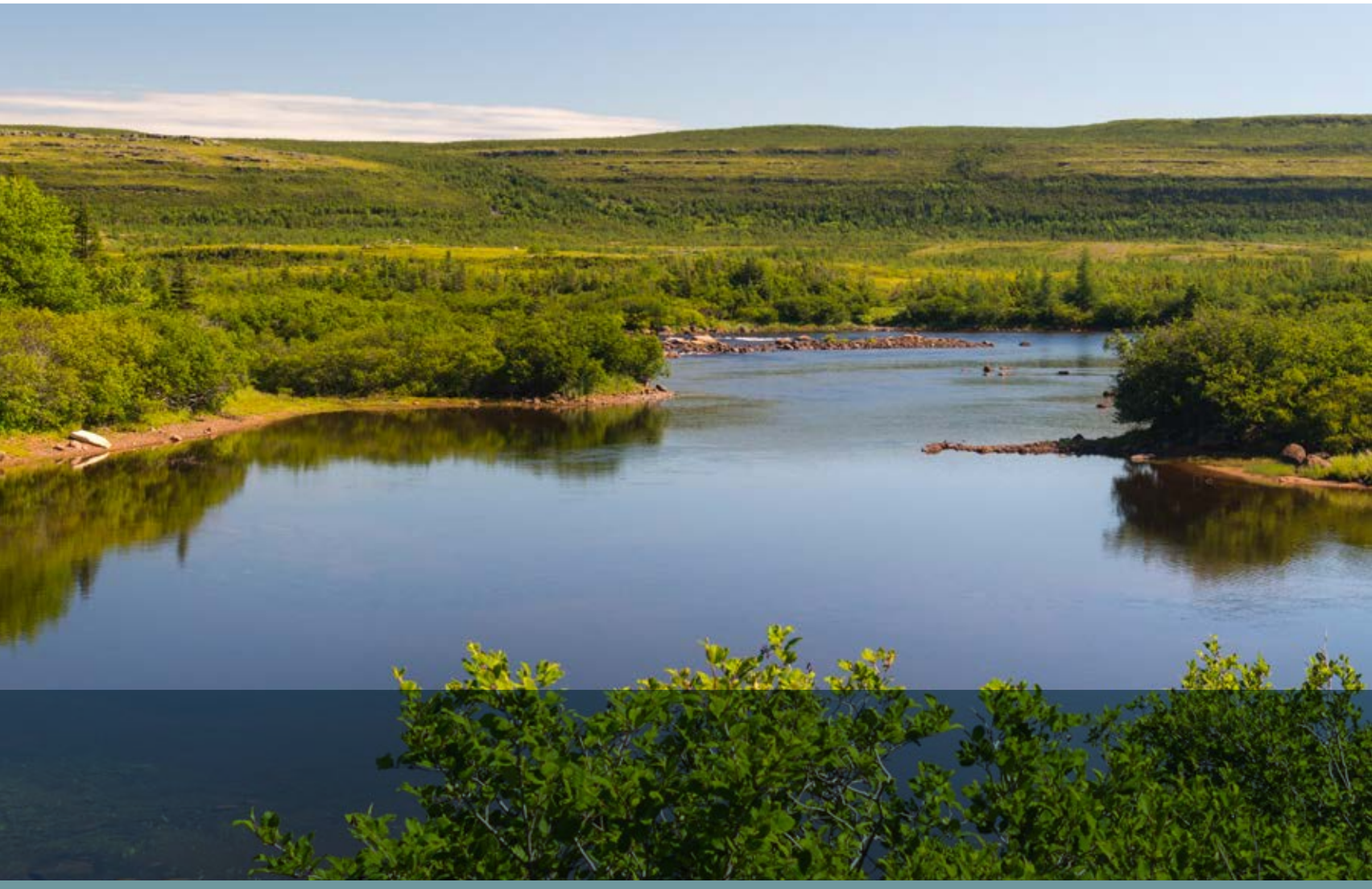
www.polardata.ca

ArcticNet recognizes the importance of managing the wealth of knowledge and data generated by polar research to optimize exchange and accessibility of relevant data and leave a lasting legacy. The Polar Data Catalogue (PDC) is the public metadata and data repository for ArcticNet and a growing number of Canadian and international research programs, including the Northern Contaminants Program (NCP) and the Nunavut General Monitoring Plan (NGMP) of Indigenous and Northern Affairs Canada, the Circumpolar Biodiversity Monitoring Program, the Canadian International Polar Year program, and the Canadian High Arctic Research Station of Polar Knowledge Canada (POLAR).

Among many milestones from 2015 to 2017:

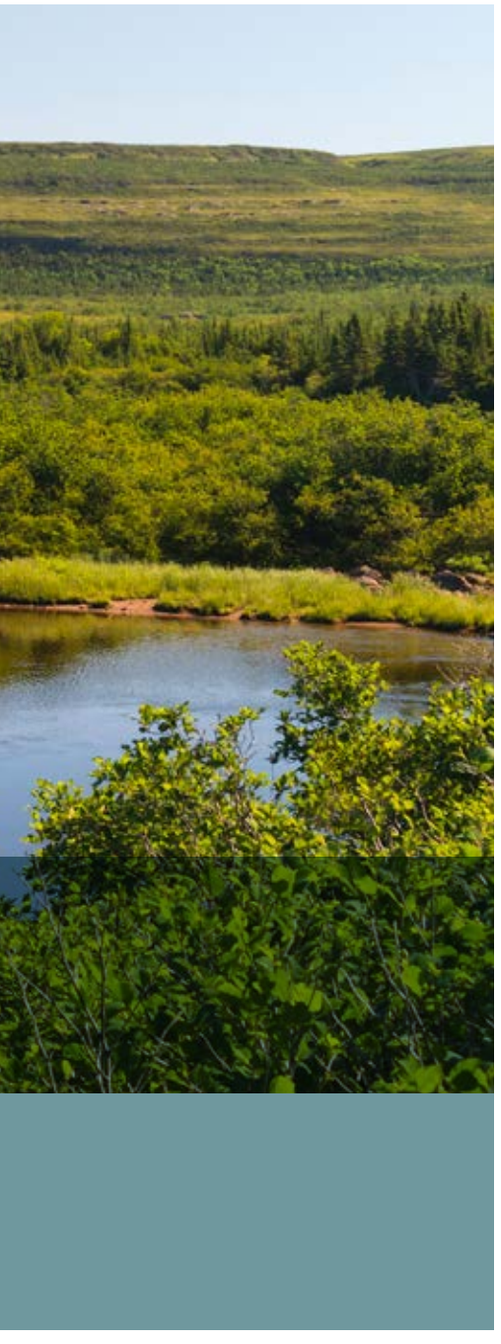
- CCIN/PDC hosted the second Canadian Polar Data Workshop in Ottawa in May 2017 to coordinate and work toward a formal governance structure for the polar data community in Canada.
- CCIN has supported partners to produce Data Management Principles and Guidelines for Polar Research and Monitoring in Canada (http://bit.ly/2rVhsYA) which will guide data-related activities for NCP, NGMP, POLAR, and other interested programs.
- In response to user feedback, a new PDC Metadata and Data Input online application has been released, with a simplified and more modern design available in both English and French.

As of summer 2017, the PDC contains over 940 metadata records from ArcticNet and more than 2.4 million data files, with additional datasets from the CCGS *Amundsen* currently under review for posting online.



INFORMING AND INSPIRING POLICY

ArcticNet research in northern policy and knowledge transfer has led to significant contributions to policy and decision-making. In 2012, ArcticNet funded "Lake Melville: Our Environment, Our Health", a project led by Dr. Trevor Bell, Memorial University, to establish baseline ecosystem conditions to enable monitoring the impacts of industrial activity on Arctic estuaries and coastal Inuit communities prior to hydroelectric development. Fast forward to October 2016, when the research results unequivocally demonstrated that the flooding plan would result in methylmercury contamination of the watershed. This work prompted Newfoundland and Labrador Premier Dwight Ball, in the midst of the Muskrat Falls project protest controversy, to revise the government's stance and commit to making all future decisions "using a science-based approach" by creating a Committee of scientists to explore ways to reduce methylmercury contamination.



Reported by Sheena Goodyear, CBC News, 26 October 2016

A WIN FOR SCIENCE

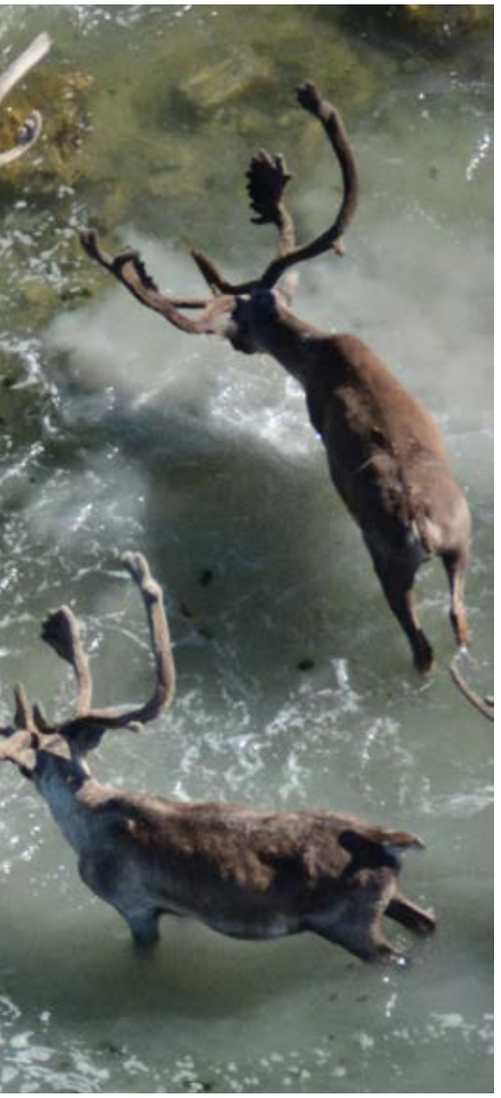
'Agreement between N.L. and Inuit leaders a victory for 'evidence-based decision-making,' geographer says. Studies led by Bell and conducted in conjunction with the University of Manitoba and scientists from Harvard University found the flooding could elevate methylmercury in Lake Melville far beyond what naturally occurs. Armed with this knowledge, protesters began occupying the reservoir last week to block the flooding. On Wednesday, the province and Indigenous leaders reached an agreement that will create a special committee of scientists to explore ways to reduce methylmercury contamination, and open the door to possibly clearing the reservoir. Bell said it's a win for grassroots democracy and science-based policy. "The agreement is important for Labradorians and for Muskrat Falls, but has an impact beyond Labrador and nationwide on hydroelectric developments and evidence-base decision-making," Bell said.

ARCTICNET IN THE NEWS

1,200+
media articles and broadcasts featuring ArcticNet research in 2015-2017

350+
articles and news stories generated from 2015 and 2016 conferences

With ArcticNet's high level of knowledge and expertise, the Network's managers and researchers are often called upon by the media for interviews regarding issues of critical importance to Canada's North, its People and the Arctic in general. Many projects led by ArcticNet Network Investigators received significant national and international media coverage throughout 2015-2017, bringing Arctic research to the attention of many viewers and readers worldwide.



KEY IMPACTS

In January 2017, the announcement of $18.2M in funding for the CCGS *Amundsen* by the Honourable, Kirsty Duncan, Minister of Science, received extensive national media coverage. Allocated as a result of the Major Science Initiatives (MSI) Special Competition of the Canada Foundation for Innovation (CFI), this amount aims to ensure ongoing operations and maintenance of the research platform until 2022. Media coverage of the Government of Canada's commitment to the CCGS *Amundsen* highlighted the positive pledge to Arctic science and climate change research.

The biology and ecology of large Arctic mammals were hot topics in December 2016. Network Investigators Andrew Derocher, Susan Kutz and Steven Ferguson communicated to the media about the decreasing population size of polar bears, the effects of climate change on Muskox health and the population dynamics of top predators in Hudson Bay, respectively.

Throughout 2015-2017, new partnerships with industry and academia were highlighted nationally and internationally. In April 2015, the announcement of a collaboration between ArcticNet, Statoil Canada, RDC and Husky Energy received wide media coverage and in May, Dr. David Barber was interviewed extensively about BaySys, a research collaboration between Manitoba Hydro and several Canadian universities examining the Hudson Bay system. Coverage remained high in 2016 with the announcement of BBOS, an international partnership aimed at conducting large scale marine monitoring in Baffin Bay.

ArcticNet's Scientific Director, Louis Fortier, frequently participated in interviews and was featured in national and international media discussing the Network's multidisciplinary research program, climate change, international collaborations, the annual conferences, and the CCGS *Amundsen* program.

Through interviews and articles in numerous media outlets, including The Globe and Mail, MacLean's, Radio-Canada International and the National Post, Network Investigator Michael Byers continued to inform the public about Arctic development, global politics and international law. Throughout 2015-2017, some of the hot topics included Arctic security and boundary disputes, international claims to the North Pole, commercial and industrial exploitation of Arctic resources, and the first luxury cruise ship to navigate through the Northwest Passage.

PARTNERSHIPS AND NETWORKING

ArcticNet projects are undertaken in collaboration with Inuit partners and communities and Inuit are represented at all levels of the Network. Additionally, ArcticNet, together with the Nasivvik Centre for Inuit Health and Changing Environments and the Northern Contaminants Program, support a regional Inuit Research Advisor (IRA) position in each of the four Inuit Land Claim regions of the Canadian Arctic. The Inuit Research Advisors can help facilitate research in Inuit regions for these programs on contaminants, climate change and environmental health, and engage Inuit in undertaking research activities of importance to their communities. The Inuit Advisory Committee (IAC) provides guidance and recommendations related to needs and priorities of Inuit with regards to strategic planning, research needs/gaps, input of traditional knowledge, community involvement, participation, training and education.

KEY IMPACTS

ArcticNet, in partnership with Inuit Tapiriit Kanatami, sponsors Travel Awards for Inuit to attend the ArcticNet Scientific Meeting. In 2015 and 2016, 17 travel grants were awarded to Inuit from 13 different communities from throughout the Inuit Nunangat.

Inuit Research Legacy Workshop - ArcticNet supported a two-day facilitated workshop in Ottawa on 2-3 November 2016. The workshop was led by the Inuit Advisory Committee with the ArcticNet senior management invited to attend. An initial vision and framing of an Inuit research legacy focused on empowerment of Inuit and ensuring positive long-lasting research benefits for Inuit. The challenge of reconciling metrics for Western Knowledge with the integration of Inuit Traditional Knowledge was identified as well as the need to capture and carry forward the positive impacts of ArcticNet while working to improve the existing gaps and identify lessons learned for future research intitiatives. The Workshop led to the creation of a Vision Statement for an Inuit Research Legacy: *To establish an Inuit-led research and innovation network generating and mobilizing knowledge to improve long-term Inuit health and well-being.*

ARCTICNET, STATOIL CANADA, RDC AND HUSKY ENERGY COLLABORATE ON RESEARCH AND TECHNOLOGY EXPEDITION

In April 2015, ArcticNet partnered with Statoil Canada, the Research & Development Corporation of Newfoundland and Labrador (RDC), and Husky Energy on a new research and technology development program on board the CCGS *Amundsen* offshore Newfoundland and Labrador. This collaboration brought together the best expertise in academia and industry to study meteorological, sea ice, iceberg and environmental conditions and assessed new data collection technologies. This unique project helped improve health, safety and environmental practices related to ice hazard mitigation.

NEW PARTNERSHIPS TO SHOWCASE CANADA ON THE WORLD STAGE

The Kitikmeot Marine Ecosystems Study, a new ArcticNet-Parks Canada collaboration was established and funded to the level of $1.1M by The **W. Garfield Weston Foundation** to describe the pelagic and benthic ecosystems of the marine region where the Franklin's ships *Terror* and *Erebus* were recently discovered. Our international teams have been working on developing two other multi-national research endeavours with major support from philanthropy, including The W. Garfield Weston Foundation. The **Greenland Circumnavigation Expedition**, a Canada-Switzerland-Denmark-Russia collaboration, will provide a unique opportunity to study some of the least accessible areas of the marine Arctic that are also key components of the system that regulates Earth's climate. Among many scientific premières, escort by a Russian nuclear icebreaker will enable the scientific team to reach the unexplored Lincoln Sea where the last remaining multi-year sea-ice on the planet is concentrated. The **International North Water Winter Expedition** aims to document the poorly-known winter ecosystem of the North Water polynya, perhaps the most biologically productive region north of the Arctic circle. Led by Canada, Denmark and the USA with the participation of many other countries, this multi-national effort will inform the creation of the Pikialasorsuaq international marine protected area.

NATIONAL AND INTERNATIONAL NETWORKING

ARCTIC CIRCLE ASSEMBLY

In October 2015, ArcticNet Executive Director Martin Fortier joined more than 2,000 participants from 50 countries in Reykjavik, Iceland, to attend the 2015 Arctic Circle Assembly, the world's largest venue to discuss the Arctic issues. Hosted by Mr. Ólafur Ragnar Grímsson, President of Iceland, this gathering aimed at supporting a dynamic dialogue and a constructive international cooperation regarding the future of the Arctic.

In addition to the annual October Assemblies in Iceland, the Arctic Circle convenes smaller and more specialized forums in other countries. Together with the Government of Québec, the Arctic Circle convened its fourth forum in Québec City on December 11-13, 2016. ArcticNet played a significant role in this conference with a keynote address by Dr. Louis Fortier.

ANNUAL MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

In February 2016, Louis Fortier participated in a panel on Arctic research, organized by Universities Canada and the Canada Foundation for Innovation during the AAAS meeting in Washington. Led by Governor General David Johnston, the roundtable discussion was oriented towards barriers, opportunities and ideas around international collaboration in research and innovation. Twenty research agency leaders from Canada, the USA and Europe took part in the two-hour discussion.

A DINNER WITH THE *AMUNDSEN* AT THE MUSEUM OF CIVILISATION

ArcticNet researchers Louis Fortier and Guillaume Massé participated in a dinner-talk hosted by the journalist Diane Martin at the 'Decoding the World' event in March 2016. Under the theme Nordicity, the event organized by the Museum of Civilisation aimed at demystifying research and explore mutations, issues or perspectives related to winter or the North. In the company of the Commanding and Chief Officers of the *Amundsen*, the two scientists shared dinner with about sixty people wishing to learn more about science in the Arctic and life on board an icebreaker.

OCEANOLOGY INTERNATIONAL CONFERENCE AND EXHIBITION

In March 2016, two members of the Amundsen Science team participated in the Oceanology International Conference and Exhibition, a world-leading marine science and ocean technology exhibition and trade show, held in London, UK. Amundsen Science held a booth within the Canada Pavilion with the main goal of increasing the visibility of the *Amundsen*, its scientific capabilities and research to the European and international communities, to open up to new potential user communities and present the opportunities offered by the Facility for Arctic research and technology development in cold environments. This event allowed to showcase the icebreaker and its scientific capacity to the conference participants, and to establish or renew contacts with researchers and suppliers.

UK - CANADA ARCTIC PARTNERSHIP WORKSHOP

In October 2016, Leah Braithwaite was invited to participate in the UK Arctic Program Conference *Understanding the Arctic: science, technology and international co-operation* in London, England. In addition, she attended the UK-Canada Workshop with various Canadian (POLAR Knowledge and Global Affairs Canada) and British participants (inlcuding Natural Environmental Research Council, British Antarctic Survey) to discuss common Arctic research aims and identify tangible activities to develop a collaborative program between UK and Canadian Arctic researchers. A key initiative that resulted was the creation of the NERC-sponsored UK-Canada Busaries Programme. ArcticNet participated by working with NERC and Network Investigators to identify possible research collaborations. The Bursaries were awarded on a competitive basis and multiple ArcticNet projects benefited from this partnering with UK scientists. This collaboration also allowed enhanced access to BAS Antarctic Facilities and logistics support.

NORWAY-CANADA AND CANADA-SWISS POLAR SYMPOSIA

ArcticNet was well-represented at two workshops which took place in Ottawa in November 2016 and which celebrated the already strong partnership between Canadian Arctic science and Norway and explored the growing partnership between Canadian northern researchers and the Swiss Polar Institute.

TRANSATLANTIC OCEAN RESEARCH ALLIANCE WORKSHOP

ArcticNet Executive Director Leah Braithwaite presented ArcticNet initiatives at the Arctic Workshop of the Transatlantic Ocean Research Alliance organized by the European Commission in Brussels in March 2017. ArcticNet monitoring activities were part of a session to showcase projects and initiatives taking place in Canada, Europe and the United States relevant to the development of an integrated Arctic Observing System.

ANNUAL SCIENTIFIC MEETING

1,400+
Conference participants from 23 countries

500+
Oral presentations

375+
Scientific posters

60+
Workshops and side events

ArcticNet's Annual Scientific Meeting has grown into one of Canada's largest conferences for Arctic researchers, post-doctoral fellows, graduate students, northern community representatives, government and industry to discuss the numerous challenges and opportunities emerging from climate change and modernization in the Arctic. ArcticNet hosted two highly successful meetings in Vancouver in 2015 and in Winnipeg in 2016. Between the two conferences, over 1,400 participants from 23 countries attended the presentations, workshops and networking events. More than 500 oral presentations and 375 scientific posters from diverse disciplines of Arctic research were presented, and over 60 workshops and side events were held in conjunction with the conferences.

With growing youth leadership in Arctic research, the ArcticNet Student Day continues to be an integral part of the conference for students as well as researchers and Network partners. Over 620 graduate students, post-doctoral fellows, researchers and stakeholders attended the tenth and eleventh annual Student Days, with 20 students receiving prizes for the excellence of their posters and research in Vancouver and Winnipeg.

ArcticNet was pleased to welcome The W. Garfield Weston Foundation to present the annual Weston Family Prize for Lifetime Achievement in Northern Research to Dr. Ian Stirling in 2015 and to Dr. John England in 2016. In addition, the Inuit Recognition Award was presented to Doug Esagok in 2015 and to Inez Shiwak in 2016 for their contribution to Arctic research. Dr. Christopher Furgal and Joel McAlister received the APECS Canada-ASA Mentor Award in 2015 and 2016 respectively, in acknowledgment of their dedication to early career polar researchers.

ARCTIC INSPIRATION PRIZE

www.arcticinspirationprize.ca

ARCTIC INSPIRATION PRIZE PRIX INSPIRATION ARCTIQUE

The Arctic Inspiration Prize is awarded annually to recognize and promote the extraordinary contribution made by teams in the gathering of Arctic knowledge and their plans to implement this knowledge into real world applications for the benefit of the Canadian Arctic, Arctic Peoples and therefore Canada as a whole. ArcticNet is proud to have managed the Arctic Inspiration Prize from 2012 to 2015. The Prize is directly aligned with the Network's vision of a future where knowledge exchange, monitoring, modeling and capacity building will have enabled scientists, Northerners and decision-makers to jointly attenuate the negative impacts and maximize the positive outcomes of the transformation of the Canadian Arctic.

The fourth Arctic Inspiration Prize Awards Ceremony was held on 7 January 2016 at the Shaw Centre in Ottawa in conjunction with the Northern Lights 2016 conference and the fifth awards ceremony was held in December 2016 as part of ArcticNet's Annual Scientific Meeting in Winnipeg. In both 2015 and 2016, a total prize of $1.5 million CAD was shared amongst three teams tackling a vast array of issues ranging from hearing loss in youth to the disappearance of northern performing arts and the hazards of sea ice travel in a changing climate. In 2015 the laureates were: Better Hearing in Education for Northern Youth (BHENY), Qaggiq: Nurturing the Arctic Performing Arts, and the Tri-Territorial Recreation Training (TRT) project; and in 2016: The Qarmaapik House, te(a)ch, and SmartICE.

Photo credit: Sgt Ronald Duchesne, Rideau Hall © OSGG-BSGG, 2015

Photo credit: ©Matt Zambonin/Canadian Geographic

AWARDS AND RECOGNITIONS

MICHEL ALLARD - GOVERNOR GENERAL'S NEW POLAR MEDAL

Network Investigator Michel Allard received in July 2015 the newly created Polar Medal from Canada's Governor General, His Excellency the Right Honourable David Johnston, for his extraordinary services in the polar regions and in Canada's North. Dr. Allard's research aim at exploring the impact of melting permafrost on the natural environment and infrastructures in the North. The inaugural presentation ceremony of the new award was held at the MacBride Museum of Yukon History in Whitehorse, Yukon.

LOUIS FORTIER – 2015 NORTHERN SCIENCE AWARD

ArcticNet's Scientific Director, Dr. Louis Fortier, was awarded the 2015 Northern Science Award by Polar Knowledge Canada in November 2015 for his distinguished contribution to the advancement of northern knowledge.

"I would like to offer my sincere congratulations to Dr. Fortier on receiving the 2015 Northern Science Award. His contributions to knowledge and understanding of the North, especially as Scientific Director of ArcticNet, have been significant to people and communities across northern Canada."

Carolyn Bennett, Minister of Indigenous and Northern Affairs Canada

WARWICK VINCENT – 2016 POLAR MEDAL AND MARTIN BERGMANN MEDAL

Warwick Vincent, long-time ArcticNet researcher, professor of biology at Université Laval and Canada Research Chair in Aquatic Ecosystem Studies, was awarded the 2016 Polar Medal for his research contribution in aquatic microbial ecology and ecosystem responses to climate change in Arctic and Antarctic waters. This award also recognized his leadership as the Scientific Director at le Centre d'études nordiques. Dr. Vincent received his award during a ceremony held at the Residence of the Governor General at the Citadelle of Québec, on 5 October.

In November 2016, Dr. Vincent was awarded the Martin Bergmann Medal by The Royal Canadian Geographical Society for Excellence in Arctic Leadership and Science. He received his award during a ceremony prior to the Annual College of Fellows Dinner at the Canadian War Museum in Ottawa.

JOHN SMOL – 2016 NORTHERN SCIENCE AWARD

Network Investigator John Smol was awarded the 2016 Northern Science Award by Polar Knowledge Canada in November 2016 for his contribution to the advancement of research in limnology. The award was presented at a ceremony prior to the Annual Dinner of the Fellows of the Royal Canadian Geographical Society in Ottawa.

"Dr. Smol has made an exceptional contribution to the advancement of research in freshwater techniques and has become the go-to person to understand changes in the Arctic ecosystem."

Dr. David J. Scott, President, Polar Knowledge Canada

DAVID BARBER – ORDER OF CANADA AND 2016 FELLOW OF THE ROYAL SOCIETY OF CANADA

In December 2016, Network Investigator and Canada Research Chair in Arctic system science at University of Manitoba, David Barber, was appointed to Officer of the Order of Canada in recognition of his leadership in environmental science and his work in the Arctic sea ice processes.

Dr. Barber was also elected in 2016 to the Royal Society of Canada (RSC), the country's most esteemed association of scholars and scientists.

ARCTICNET MEMBER INSTITUTIONS AND CANADIAN PARTNER ORGANIZATIONS
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Yukon

Canadian Northern Economic Development Agency
Geo Cardinal Services Corp.
Yukon College
Yukon Government

Northwest Territories

Environment and Climate Change Canada
    Canadian Wildlife Service - Northern Conservation Division
Government of the Northwest Territories
Northwest Territories Literacy Council
NWT Cumulative Impacts Monitoring Program

Inuvialuit

Aurora Research Institute
Fisheries Joint Management Committee
Inuvialuit Cultural Resource Centre
Inuvialuit Regional Corporation
Paulatuk Hunter and Trappers Committee

Nunavut

Agnico-Eagle Mines
Arctic Infrastructure Partners
Arviat Wellness Centre/ Youth Climate Monitors
Arviat Young Hunters Program
Canadian Northern Economic Development Agency
Canada-Nunavut Geoscience Office
City of Iqaluit
Coalition of Nunavut District Education Authorities
Department of Health and Social Services
Environment and Climate Change Canada
    Canadian Wildlife Service
Government of Nunavut
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Nunavut Wildlife Management Board
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British Columbia

Canadian Scientific Submersible Facility
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University of Northern British Columbia
University of Victoria
Vancouver Aquarium

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Imperial Oil Resources Ventures Limited
MacEwan University
Statoil Canada Ltd.
University of Alberta
University of Calgary

Saskatchewan

University of Saskatchewan

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Calm Air
Fisheries and Oceans Canada
- Freshwater Institute
- Species at Risk Act

Government of Manitoba
Manitoba Hydro
Oceans North Canada
Polar Bears International
University of Manitoba
- Centre for Earth Observation Science

University of Winnipeg

Ontario

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Agriculture
Arctic Research Foundation
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BD - Canada
C-CORE
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Canadian Food Inspection Agency
Canadian Museum of Nature
Carleton University
CICan Clean Tech Internship
Department of Foreign Affairs and International Trade
Environment and Climate Change Canada
- Canada Centre for Inland Waters
- Canadian Ice Service
- Meteorological Service of Canada

Environmental Studies Research Fund
First Air
Fisheries and Oceans Canada
- Canadian Coast Guard
- Canadian Hydrographic Service
- Central & Arctic Region
- Integrated Science Data Management

Global Affairs Canada
Health Canada
- First Nations and Inuit Health Branch

Indigenous and Northern Affairs Canada - New Paths for Education
International Development Research Centre
Inuit Circumpolar Council (Canada)
Inuit Tapiriit Kanatami
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Lakehead University
LGL Limited - Environmental Research Associates
LookNorth
McMaster University
Meteorological Service of Canada
- Climate Research Branch

Natural Resources Canada
- Geological Survey of Canada
- Geomatics Canada
- Polar Continental Shelf Program

Ontario Ministry of Advanced Education and Skills Development
Ontario Ministry of Agriculture, Food and Rural Affairs
Ontario Ministry of Natural Resources
Ontario Ministry of Research, Innovation and Science

POLAR Knowledge Canada
Public Health Agency of Canada
Queen's University
Rideau Hall Foundation
Ryerson University
Saudi Arabian Cultural Bureau
The Kenneth M Molson Foundation
The W. Garfield Weston Foundation
Transport Canada
Trent University
University of Guelph
  Ontario Veterinary College
University of Ottawa
University of Toronto
University of Waterloo
University of Windsor
Uqausiit Communication Services
Wilfrid Laurier University
World Wildlife Fund Canada
York University

Nunavik

Kativik Municipal Housing Bureau
Kativik Regional Government
Kativik School Board
Makivik Corporation
Nunavik Hunting Fishing and Trapping Association of Tasiujaq
Nunavik Landholding Corporations Association
Nunavik Marine Region Wildlife Board
Nunavik Regional Board of Health and Social Services
Nunavik Research Centre
Nunavimmi Umajulivijiit Katujiqatigininga

Quebec

Air Creebec
Air Inuit
Avataa Explorations & Logistics
Azimut Exploration inc.
Canada North Outfitting
Canadian Space Agency
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Cree Trapper & Association
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  Canadian Wildlife Service - Quebec Region
  Science and Technology Branch
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  Northern Scientific Training Program
Institut des sciences de la mer de Rimouski
Institut national de la recherche scientifique - Eau, Terre et Environnement
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Ministère de la Sécurité publique
Ministère des Forêts, de la Faune et des Parcs
Ministère de l'Énergie et des Ressources naturelles
Ministère de la Santé et des Services sociaux

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- Nasivvik Centre for Inuit Health and Changing Environments
- Québec-Océan

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New Brunswick Innovation Foundation
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- Bedford Institute of Oceanography
- Canadian Hydrographic Service

Natural Resources Canada
- Geological Survey of Canada (Atlantic)

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Nunatsiavut Department of Lands and Natural Resources
Nunatsiavut Government
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SmartICE

Newfoundland and Labrador

C-CORE
Choices for Youth
EMSAT Corporation
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- Northwest Atlantic Fisheries Centre

Food Security Network of Newfoundland and Labrador
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Stantec
Torngat Secretariat

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Luc Michaud, Scientific Equipment Manager

Simon Morisset, Ocean Instrumentation Professional

Sylvain Tougas, Website Developer

Juergen Zier, Ocean Instrumentation Professional

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Mickaël Lemay, IRIS Lead Coordinator & IRIS 4 - Eastern Subarctic

Tanya Brown, IRIS 2 - Eastern High Arctic

Lauren Candlish, IRIS 3 - Hudson Bay (until January 2017)

Ashley Gaden, IRIS 1 - Western and Central Arctic

Michelle Kamula, IRIS 3 - Hudson Bay (since January 2017)

INUIT RESEARCH ADVISORS
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Romani Makkik, Nunavut (until March 2016)

Shannon O'Hara, Inuvialuit

Betsy Palliser, Nunavik (until April 2016)

Carla Pamak, Nunatsiavut

Robert Watt, Nunavik (since March 2017)

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MINISTÈRES ET ORGANISMES FÉDÉRAUX

- Agriculture and Agri-Food Canada
- Canadian Food Inspection Agency
- Canadian Museum of Nature
- Canadian Northern Economic Development Agency
- Canadian Space Agency
- Environment and Climate Change Canada
  - Canadian Ice Service
  - Canadian Wildlife Service
  - Science and Technology Branch
- Fisheries and Oceans Canada
  - Bedford Institute of Oceanography
  - Canadian Coast Guard
  - Canadian Hydrographic Service
  - Freshwater Institute
  - Institute of Ocean Sciences
  - Maurice Lamontagne Institute
  - Species At Risk Act
- Health Canada
  - First Nations and Inuit Health Branch
- Indigenous and Northern Affairs Canada
  - Environmental Studies Research Funds
  - Northern Contaminants Program
  - Northern Scientific Training Program
- Natural Resources Canada
  - Geological Survey of Canada
  - Polar Continental Shelf Program
- Parks Canada
- Polar Knowledge Canada
- Public Health Agency of Canada
- Royal Canadian Mounted Police
- Transport Canada

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- Fonds de recherche du Québec - Nature et technologies
- Fonds de recherche du Québec - Santé
- Government of Alberta
- Government of Manitoba
- Government of Newfoundland and Labrador
- Government of Nunavut
- Government of the Northwest Territories
- Institut national de santé publique du Québec
- Ministère de la Santé et des Services sociaux
- Ministère de la Sécurité publique
- Ministère des Affaires municipales et de l'Occupation du territoire
- Ministère des Forêts, de la Faune et des Parcs
- Ministère des Transports, de la Mobilité durable et de l'Électrification des transports
- Ontario Ministry of Advanced Education and Skills Development
- Ontario Ministry of Agriculture, Food and Rural Affairs
- Ontario Ministry of Research, Innovation and Science
- Research & Development Corporation of Newfoundland and Labrador
- Yukon Government

NATIONAL AND INTERNATIONAL INUIT ORGANIZATIONS
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ORGANISATIONS INUITES NATIONALES ET INTERNATIONALES

Inuit Circumpolar Council (Canada)

Inuit Tapiriit Kanatami

REGIONAL ORGANIZATIONS, AGENCIES AND GOVERNMENTS
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GOUVERNEMENTS, AGENCES ET ORGANISATIONS RÉGIONALES

Inuvialuit Settlement Region
- Inuvialuit Regional Corporation
- Fisheries Joint Management Committee

Nunatsiavut
- Nunatsiavut Government

Nunavik
- Kativik Regional Government
- Kativik School Board
- Makivik Corporation
- Nunavik Landholding Corporations Association
- Nunavik Marine Region Wildlife Board
- Nunavik Regional Board of Health and Social Services

Nunavut
- Canada-Nunavut Geoscience Office
- Coalition of Nunavut District Education Authorities
- Nunavut Food Security Coalition
- Nunavut Research Institute
- Nunavut Teachers' Association
- Nunavut Tunngavik Incorporated
- Nunavut Wildlife Management Board

NORTHERN COMMUNITIES
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COMMUNAUTÉS NORDIQUES

Akulivik, QC
Aklavik, NT
Arviat, NU
Aupaluk, QC
Avvajja, NU
Chisasibi, QC
Happy Valley-Goose Bay, NL
Hopedale, NL
Ikaahuk (Sachs Harbour), NT
Ikaluktutiak (Cambridge Bay), NU
Inukjuak, QC
Inuvik, NT
Iqaluit, NU
Ivujivik, QC
Kangiqliniq (Rankin Inlet), NU
Kangiqsualujjuaq (George River), BC
Kangiqsujuaq , QC
Kangiqtugaapik (Clyde River), NU
Kangirsuk, QC
Kawawachikamach, QC
Kugluktuk, NU
Kuujjuaq, QC
Kuujjuarapik, QC
Labrador City, NL
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Uqsuqtuuq (Gjoa Haven), NU
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Yellowknife, NT

INDUSTRY
ᑮᓇᐅᔾᔭᒃᓴᖅᑐᓕᕆᔨᑦ
INDUSTRIES

- Agnico-Eagle Mines
- Air Creebec
- Air Inuit
- Arctic Infrastructure Partners
- Azimut Exploration inc.
- Baffinland Iron Mines Corporation
- BD - Canada
- bioMérieux Marcy l'Étoile
- Calm Air
- Canada North Outfitting
- Coastal Frontiers Corporation
- EMSAT Corporation
- Exploration Osisko Baie James
- First Air
- Hydro-Québec
- Imperial Oil Resources Ventures Limited
- International Association of Oil & Gas Producers
- JF Boucher Consulting Ltd
- Manitoba Hydro
- MDA Corporation
- Mine Raglan
- PH & N Investment Counsel
- SonTek
- Statoil Canada Ltd.
- Tata Steel Minerals Canada Limited
- The Axys Group

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UNIVERSITÉS ET INSTITUTS DE RECHERCHE

- Aarhus University
- Alfred Wegener Institute
- Aurora Research Institute
- Cape Breton University
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- Centre de recherche du Centre hospitalier de l'Université Laval
- Centre for Earth Observation Science
- Centre national de la recherche scientifique
- Dalhousie University
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- Groupe international vétérinaire
- Institut de recherche en biologie végétale
- Institut national de la recherche scientifique
- Institut polaire français Paul-Emile Victor
- Marine Research Institute of Iceland
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AUTRES

A.D. Latornell Endowment Fund

Agence nationale de la recherche

Alaska Institute for Justice

Arctic Research Foundation

Banrock Station Wetlands Foundation Canada

BBPolar

C-CORE

Canadian Cryospheric Information Network

Canadian Scientific Submersible Facility

Chantier Arctique Français

China Scholarship Council

Choices for Youth

CICan Clean Tech Internship

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Western Alaska Landscape Conservation Cooperative

World Wildlife Fund Canada

FINANCIAL SUMMARY
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SOMMAIRE FINANCIER

ArcticNet was audited in June 2016 and June 2017 in accordance with generally accepted Canadian auditing standards. The following figures and financial summary are prepared from the unqualified financial statements.

ArcticNet a été vérifié en juin 2016 et en juin 2017 selon les normes de vérification généralement reconnues au Canada. Les données financières suivantes sont extraites des rapports financiers produits sans restriction.

REVENUES, EXPENSES AND NET ASSETS / REVENUS, DÉPENSES ET ACTIF NET

For the fiscal year ending March 31 / Pour l'année fiscale se terminant le 31 mars.

Revenues / Revenus		**2017**	**2016**
Networks of Centres of Excellence Grant (NCE) / Subvention des Réseaux de Centres d'Excellence (RCE)	$	9,665,000	9,641,000
Network partner contributions (Non-NCE) / Contributions des partenaires du réseau (Non-RCE)	$	4,097,563	5,274,154
Arctic Inspiration Prize / Prix Inspiration Arctique	$		1,560,714
Others / Autres	$	356,267	344,823
Total revenues / Revenus totaux	**$**	**14,118,830**	**16,820,691**
Expenses / Dépenses			
Research Projects (NCE) / Projets de recherche (RCE)	$	5,091,714	5,012,096
Research Projects (Non-NCE) / Projets de recherche (Non-RCE)	$	195,385	320,774
Core infrastructure (NCE) / Infrastructure majeure (RCE)	$	3,524,008	3,284,916
Core infrastructure (Non-NCE) / Infrastructure majeure (Non-RCE)	$	3,147,258	3,059,028
Amortization of equipment / Amortissement équipement	$	386,267	386,401
Arctic Inspiration Prize / Prix Inspiration Arctique	$	35,000	1,595,714
Administrative Centre / Centre administratif	$	2,342,995	2,423,655
Total expenses / Dépenses totales	**$**	**14,722,627**	**16,082,584**
Excess (deficiency) of revenues over expenses / Excédent (déficit) des revenus sur les dépenses	$	**-603,797**	**738,107**
Net assets, beginning of year / Actif net, début de l'exercice	$	5,027,542	4,289,435
Net assets, end of year / Actif net, fin de l'exercice	**$**	**4,423,745**	**5,027,542**

BALANCE SHEET / BILAN

	2017	**2016**
ASSETS / ACTIF		
Cash / Encaisse	4,736,466	6,505,037
Accounts receivable / Comptes à recevoir	214,607	217,038
Prepaid expenses / Frais payés d'avance	561,094	161,800
	5,512,167	**6,883,875**
Capital assets / Immobilisations	388,764	771,984
	5,900,931	**7,655,859**
LIABILITIES / PASSIF		
Accounts payable and accrued liabilities / Comptes à payer et frais courus	486,523	965,419
Deferred grant / Apports reportés	990,663	1,662,897
	1,477,186	**2,628,316**
NET ASSETS / ACTIF NET		
Invested in capital assets / Investi en immobilisations	34,090	31,846
Unrestricted Assets / Actif non affecté	4,389,655	4,995,697
	5,900,931	**7,655,859**

STATEMENT OF CASH AND IN-KIND CONTRIBUTIONS
SOMMAIRE DES CONTRIBUTIONS EN ESPÈCES ET EN NATURE

	Cash / En espèces		In-kind / En nature	
	2016-2017	2015-2016	2016-2017	2015-2016
NCE / RCE	**9,665,000**	**9,641,000**	**0**	**0**
Non-NCE / Non-RCE[1]				
Provincial / Provinciales	430,080	658,333	1,098,428	1,112,100
Federal / Fédérales[2]	4,766,521	4,022,073	4,844,625	6,310,596
University / Universitaires	1,474,139	887,414	9,835,544	9,475,875
Industry / Industrielles	772,705	3,020,725	701,800	431,100
Other / Autres	3,453,050	4,175,120	832,033	1,443,285
Non-NCE / Non-RCE	**10,896,495**	**12,763,665**	**17,312,430**	**18,772,956**
Total NCE and non-NCE / Total RCE et non-RCE	**20,561,495**	**22,404,665**	**17,312,430**	**18,772,956**

[1] Certain funds contributed by Network Partners to support research projects are forwarded directly to researchers and are not managed by the ArcticNet Administrative Centre. / Certaines contributions des partenaires du réseau aux projets de recherche parviennent directement aux chercheurs et ne sont pas gérées par le centre administratif d'ArcticNet.

[2] These federal contributions do not include contributions received from the Federal granting councils, the Canada Foundation for Innovation and Genome Canada. / Ces contributions fédérales n'incluent pas les contributions des conseils de recherche, de la Fondation canadienne pour l'innovation et de Génôme Canada.

This report is available in English, French and Inuktitut
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