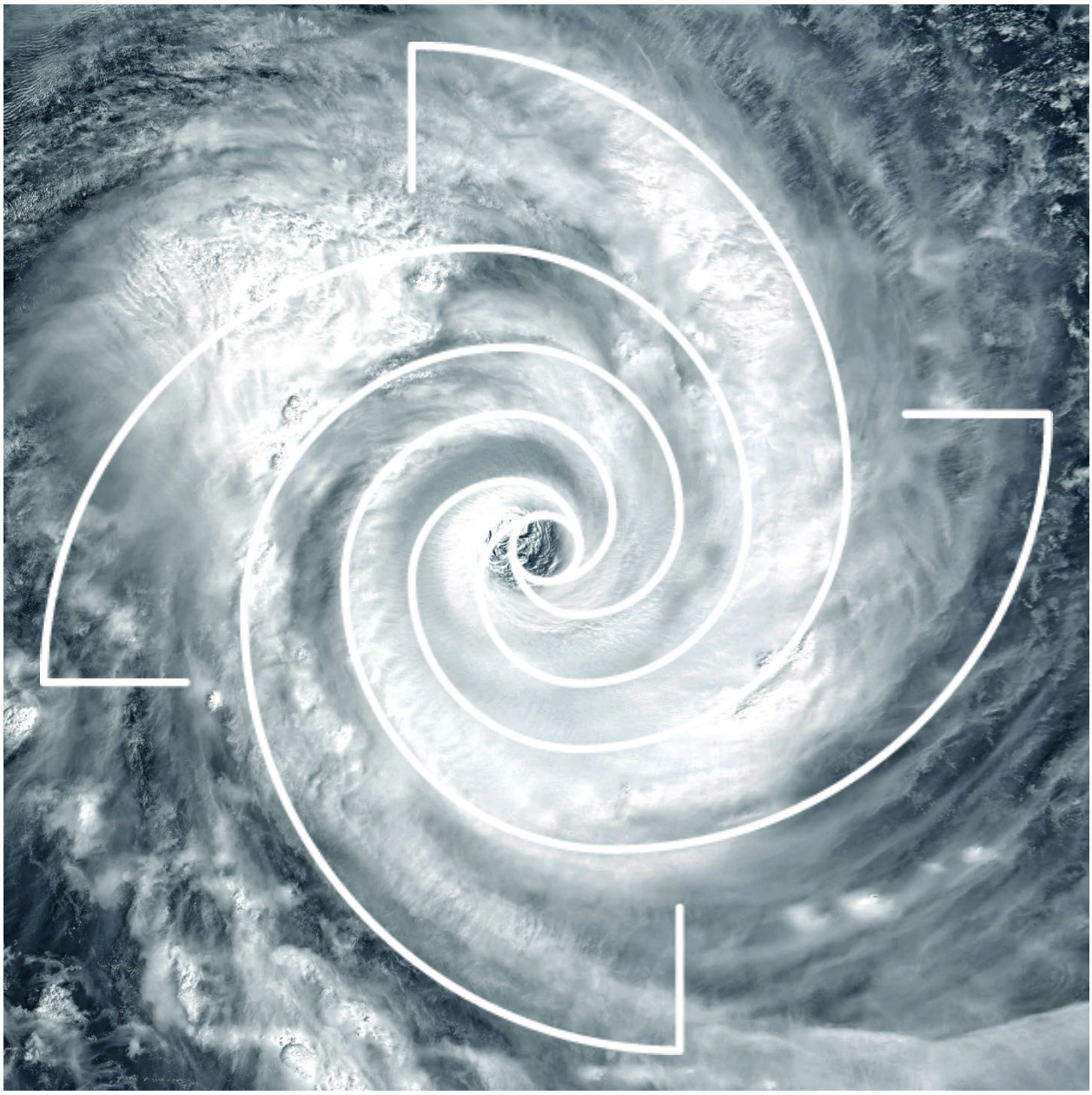


SEMI-ANNUAL REPORT

TO THE MINISTER OF ADVANCED EDUCATION

RESEARCH NOVA SCOTIA

April 2023 - September 2023

TABLE OF CONTENTS

RESEARCH NOVA SCOTIA

01. EXECUTIVE SUMMARY

This semi-annual report covers the activities of the Research Nova Scotia Corporation (RNS) for the period of 1 April to 30 September 2023.

The Research Nova Scotia Corporation Funding Regulations outline the components required in the semi-annual report submitted to the Minister of Advanced Education:

- List of Board of Directors;
- Description of the impacts of the research projects;
- Details on each funding application approved; and
- Financial forecast.

During the reporting period, the Corporation continued to implement its operating plan. The Chief Executive Officer met several times with the Office of Priorities and Planning to give shape to key government priorities.

Significant time and effort was devoted to engaging with provincial deputy ministers and executives to ensure RNS is current regarding the priorities of government for which research can be employed. The CEO had a discussion with DMs at a special session in late June and presented to a regular meeting of executive directors to make them aware that Research Nova Scotia can be a partner in their efforts to support and/or use research to solve the biggest problems facing the province.

In the past six months, RNS bolstered its Intentional Research program, hiring a program-focused manager and a research support officer to oversee the development and funding of projects directly connected to the missions-oriented strategy.

In the period covered by this report, RNS supported 64 research projects including capacity building grants for students and new researchers, intentional initiatives and convened projects, and infrastructure support to match federally funded grants awarded to Nova Scotian institutions.

RESEARCH
NOVA SCOTIA

02. BOARD OF DIRECTORS

The members of the Research Nova Scotia Board of Directors as of 30 September 2023 are:

Kim Brooks – President and Vice-Chancellor, Dalhousie University

Don Bureaux (Chair) – President, Nova Scotia Community College

Joël Dickinson – President and Vice-Chancellor, Mount Saint Vincent University

Andrew Hakin – President and Vice-Chancellor, St. Francis Xavier University

Nancy MacLellan – Deputy Minister, Department of Advanced Education

Nicholas Nickerson – Chief Scientist and Co-Founder, Eosense

Karen Oldfield – President and Chief Executive Officer, Nova Scotia Health

Robert Summerby-Murray – President and Vice-Chancellor, Saint Mary's University

Oliver Technow – Chief Executive Officer, Biovectra

Kathleen Trott – Associate Deputy Minister, Department of Health and Wellness

Annika Voltan – Executive Director, Impact Organizations of NS

RESEARCH
NOVA SCOTIA

03. CONSIDERING OUR IMPACT

CONSIDERING OUR IMPACT

IMPACTING THE RISK OF CANCER FROM ENVIRONMENTAL EXPOSURES

Research Nova Scotia is partnering with the Canadian Foundation for Innovation (CFI) Innovation Fund, the Alberta Cancer Foundation, and the Province of Alberta to support groundbreaking research into the impact of two common environmental risks for cancer.

According to respected international health authorities including the World Health Organization, radon is the leading cause of lung cancer in non-smokers. Radon is a naturally occurring radioactive gas which results when uranium decays in soil in rock. In Nova Scotia, estimates indicate that more than 10% of the province's population lives in homes with higher than acceptable levels of the gas, with numerous areas rated as "high risk", including HRM, Hants County, Digby County, and the highlands of Cape Breton. Health officials believe more than 100 Nova Scotians die each year of radon-caused lung cancer.

Nova Scotians are at risk of cancer from another naturally occurring sources as well. Metallic arsenic is found in groundwater around the province and exposure to arsenic in well water is associated with an increased risk of skin and internal cancers. Well water in much of mainland Nova Scotia has elevated levels

RESEARCH NOVA SCOTIA

of arsenic. Canada's highest rates of bladder and kidney cancer, for example, are found in Nova Scotia.

Dalhousie University's Dr. Graham Dellaire has assembled a team of researchers both in Nova Scotia and western Canada to create the Cancer Risks of Arsenic and Radon Environmental Exposures (CARE) research project to determine the impact of exposure to these two cancer-causing elements at the cellular, individual, and community levels. The aim of CARE is to understand the impact of arsenic and radon exposures on the human body and to reduce the future burden of cancers they cause by informing health policy and encouraging individuals to test for exposures in their homes and communities.

Research Nova Scotia has committed $1.73 million to the almost $6.6 million project.


Dr. Graham Dellaire

The first goal of the project was to enhance research infrastructure at Dalhousie to enable the investigators to address pivotal research questions about assessing and mitigating cancer risks from radon and arsenic exposure. These enhancements include improvements to biobanking facilities, the addition of high throughput genomic sequencing capability, and the establishment of the Health and Environment Research Centre (HERC). Dr. Dellaire (left) calls the HERC a game changer for the region's research capacity.

While the acquisition and installation of new equipment has progressed, the researchers who are part of the CARE team have been engaged in a number of important projects. They recently attracted one of the largest research grants awarded by the Canadian Cancer Society - $5.2 million – to study lung cancer prevention for non-smokers, focusing primarily on radon and arsenic exposure. In addition, several team members are leading an Atlantic-wide research initiative funded in part by the Terry Fox Research Institute and regional partners, including Research Nova Scotia, to focus on precision cancer medicine, with the triple aims of improving diagnosis, predicting how different people will respond to treatments, and delivering more personalized and effective treatments with fewer side-effects. Dr. Dellaire points to the infrastructure as one of the factors in the team's success in attracting research funding. "Halifax now has the infrastructure to take on large research projects with partners from across the country and around the world."

Recent research undertaken by the CARE investigators has linked local environmental conditions to multiple myeloma, uncovered a link between arsenic and multiple primary cancer sites in single patients, and is developing novel testing regimes to determine the level of environmental carcinogen in bio-specimens (e.g. blood and urine).

RESEARCH NOVA SCOTIA

Interestingly, the infrastructure was employed this past summer to study the impacts of wildfires on health, a timely concern for this region. Dr. Dellaire says that smoke from wildfires has been shown to be "super-inflammatory" and is linked to lung and brain cancers.

The HERC will be fully operational later this year and Dr. Dellaire envisions the infrastructure benefitting not only the CARE team but early-stage life sciences companies which will be able to access world-class equipment to support their product development.

Dr. Dellaire believes the research his team is undertaking will result in discoveries that will inform policy makers about the dangers of radon and arsenic, not to mention other environmental risks for cancer. By working alongside government departments and agencies, healthcare organizations, First Nations and other equity-deserving communities, and citizen groups, the investigators hope to influence legislation and programming to promote testing and mitigation strategies for radon in homes and institutions, and to eliminate arsenic from well water in Nova Scotia.

RESEARCH
NOVA SCOTIA

CONSIDERING OUR IMPACT

IMPACTING THE HEART OF THE MATTER

Research Nova Scotia has partnered with a cardiologist, a liberal arts university, and a publishing company on a project that brings humanities into the clinic to impact the health outcomes of cardiac patients.

Dr. Gabrielle Horne, a cardiologist with Nova Scotia Health, believes in the power of books. A chance discussion with a colleague in her clinic several years ago sparked an idea about improving the hospital experience for patients through providing better access to reading materials.

Dr. Gabrielle Horne

Dr. Horne says patients who have had heart attacks and have post-event depression are much more likely to die in the year or two after the incident than those who do not have depression. She also notes that medication does little to combat depression in these circumstances. Her research team is interested in exploring the psychological effects of hospital admission on people in cardiac inpatient units so health care practitioners can better treat them through a non-pharmacological intervention.

Books by Heart is a robust research program designed to measure the effects of an eBooks and

RESEARCH NOVA SCOTIA

audiobooks community program on depression and long-term wellbeing for people in a cardiac inpatient unit. Working with RNS, the University of King's College, and Atlantic Publishers, Dr. Horne aims to use storytelling to deepen social interaction among the cardiac inpatient community and improve clinical mental health outcomes.

The kind of intervention this team is investigating is called "communal bibliotherapy," a term coined by Dr. Horne to describe "bringing book culture into a clinical setting" to improve patient mental health. Through an online eBook and audiobook distribution platform, Dr. Horne has already administered a trial run of her project to King's students who found community and conversation as a result after an isolating online school experience during the COVID-19 pandemic.

Now, the project is gearing up for the hospital pilot, with students from King's conducting interviews with cardiac inpatients about the kinds of books they want, and Atlantic Publishers accessing titles that will be available on the platform which will be available to all study participants.

Data collection through reading activity informatics and qualitative interviews will be key components to assessing the impact of communal bibliotherapy on mental health. The team has invested significant energy in working out logistical and technical issues in the platform to develop an accessible and user-friendly interface.

In the hospital setting, Dr. Horne is interested in going "beyond the superficial" risk markers for cardiac inpatient depression. She says this project has the potential to go much deeper into risk factors than gender or age, for example. Her team is interested in how risk is associated with feeling protected by institutional structures, or how patients frame their own adversity or future. Patient interviews will allow the researchers to delve into these complex factors and apply their findings to the communal bibliotherapy service delivery.

Communal bibliotherapy and the integration of the humanities into health care captured the interest of Dr. Daniel Brandes at the University of King's College, a co-investigator on the project and humanities professor who has taught health-related courses. Dr. Brandes says the most "immediate and urgent way the humanities could improve the health care system is in helping healthcare professionals to relate to their patients differently." He understands the immense pressures doctors and nurses face daily, pressures that often require them to distance themselves from patients. Still, he stresses the importance of meeting patients' social and emotional needs.

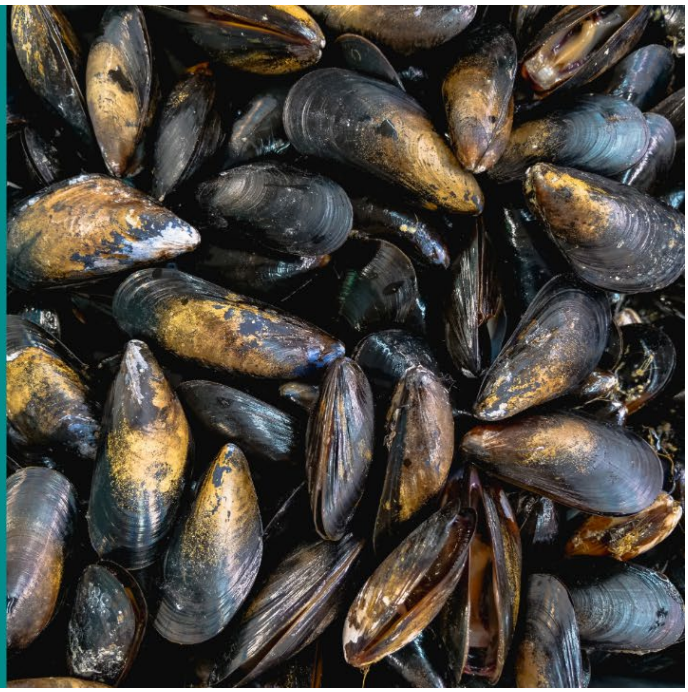
Dr. Horne also understands that loneliness is a major risk factor for poor health outcomes and an important goal of Books By Heart is to empower isolated patients by giving them opportunities to choose how they want to engage in reading and storytelling. Taking control of how they spend their time in

hospital and being part of a community of readers may impact how patients frame their challenges, which may in turn lead to more positive outcomes for their mental health and quality of life.

Research Nova Scotia has committed $195,469 for the project through its Intentional Research program and has provided Scotia Scholars Awards to several of the students who have undertaken the research to enable Dr. Horne to create the Books by Heart program.

CONSIDERING OUR IMPACT

IMPACTING MUSSELS TO WEATHER WARMING WATER



Small investments in research projects can have big results. For example, in early 2022, Research Nova Scotia partnered with Genome Atlantic to create the Small Scale Climate Change Fund to advance the use of genomic tools to combat climate change. Less than $20,000 was awarded to Dr. Ramon Filgueira, a Dalhousie University researcher, and Atlantic Aquafarms, a PEI-based mussel aquaculture company with sites in Nova Scotia, to undertake foundational research on mussel temperature tolerance that could be crucial for the future of the Atlantic mussel industry.

The results of this investigation led the researcher to once again partner with Atlantic Aqua Farms to develop a larger project to investigate the use of triploid mussels to combat the effects of rising water temperatures on productivity. Research Nova Scotia committed $197,750 to the $3.4 million project which is also funded by Genome Canada, Genome Quebec, the industry partner, and other Atlantic region collaborators.

Triploid mussels have an extra set of chromosomes and therefore do not spawn (reproduce), enabling the bivalve to invest more energy in growth and strength while allowing them to adhere more tightly to the substrate on which they are growing. In addition, the original Small Scale Climate Change Fund project demonstrated that triploid mussels appear to be able to cope better with warmer water temperatures than the diploid mussels currently used in the region's aquaculture industry.

RESEARCH NOVA SCOTIA

This early research also identified differences in performance at the genomics level, which formed the foundation for the new project, in which Dr. Filgueira and Atlantic Aquafarm's Dr. Tiago Hori are collaborating. Dr. Filgueira says the original partnership was their first opportunity to work on a team to "bring together physiology and genomics and explore the potential of both," and they wanted to see what additional work could accomplish.

This ambitious project could radically transform the aquaculture industry for the better, Dr. Hori says. The researchers are accounting for challenging factors presented by climate change, such as reductions in water oxygen levels and increasing water temperatures. They hope to selectively breed triploid mussels that are resilient to environmental stressors in Atlantic Canada, including hurricanes.

The research team is also exploring ways to sustainably scale-up their triploid breeding program without significantly increasing the ecological footprint of Atlantic Canada's mussel industry. Harvesting mussels already has a relatively small footprint, and shellfish are "by far the most sustainable protein source that is produced in the world right now," according to Dr. Hori. Both researchers say that these factors make the mussel industry the ideal candidate for moving forward with sustainable aquaculture in Atlantic Canada.

Dr. Filgueira and Dr. Hori intend to test different factors to optimize minimal water use and increase efficiency per acre of water overall. Their findings could put the program in a good position to become one of the fastest growing sustainable food production industries in the region.

RNS is committed to advancing research that contributes to increasing efficiency and innovation across sectors that sustain the bioeconomy of the province. Research that improves the sustainability of aquaculture will enhance resilience in the Nova Scotian and Atlantic Canadian industries, helping them prepare for and adapt to the future impacts of climate change.

RESEARCH
NOVA SCOTIA

CONSIDERING OUR IMPACT

IMPACTING THE FUTURE OF FARMING

Dr. Yunfei Jiang has always been surrounded by farming. Growing up on Langqi Island in China, she was exposed to the agriculture industry from an early age and throughout her graduate studies in Canada, her interest has grown. Now, as an early career researcher at Dalhousie University, she's engaged in work to help farmers in this province increase profits and become more resilient as Nova Scotia's climate changes.

Recently, Dr. Jiang *(left)* received $190,000 from Research Nova Scotia to match a John Evans Leadership Fund (JELF) award from the Canadian Foundation for Innovation to investigate the potential for enhancing precision agriculture in the province. The total value of the project is almost $491,000.

Dr. Yunfei Jiang

Precision agriculture "…is a method of farming that uses technological innovations…to help farmers make informed decisions about their crops, based ion the unique nature of their fields," according to Crop Life Canada. Dr. Jiang's research into site-specific agrochemical use, for example, promises more sustainability for future pesticide and fertilizer spraying than what current mainstream industry practices offer. Using drone imaging and remote sensing, Dr. Jiang and her team will create digital crop maps to identify conditions of concern to growers (such as drought stress, nutrient deficiency, disease, and pests) and use an actuation drone to deliver a site-

RESEARCH NOVA SCOTIA

specific solution to the problem. Using a “see and spray” methodology, the drone can detect, for example, a Colorado potato beetle infesting potato crops and use the visual information to learn how to recognize and categorize the pest for the future. Then, thanks to the drone’s capacity for machine learning, it can administer the right pesticide in the right amount whenever it recognizes the pest it is targeting.

Site-specific spraying of pesticides and fertilizers improves crop health and yield while also mitigating some of the harmful environmental effects of area spraying, such as leaching and greenhouse gas pollution. Managing nutrient intake by site could help reduce the overall use of fertilizer containing nitrogen, which causes harmful nitrogen dioxide emissions.

Another important phase of Dr. Jiang’s project will assess seed yield and quality using an advanced near-infrared (NIR) spectroscopy analyzer and a plot combine that can measure seed weight and moisture in real time. Tracking seed quality and yield is essential for monitoring crop health and supporting advancements in crop diversification.

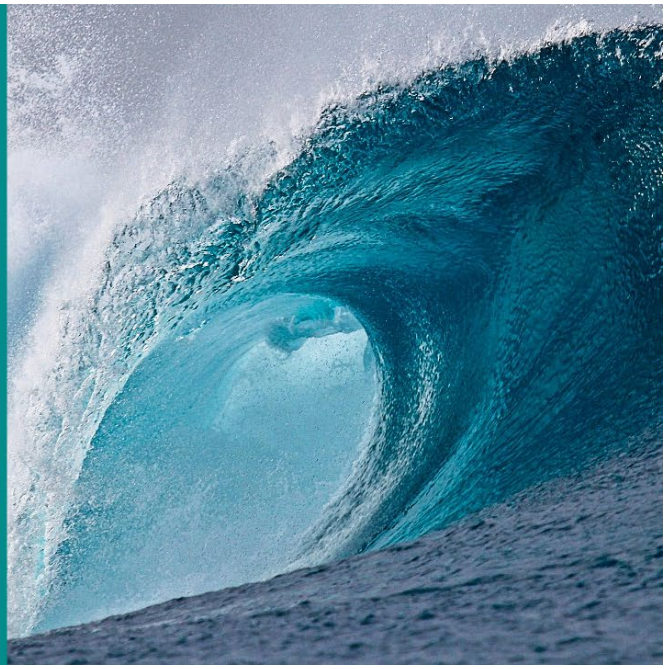
Diversifying crops and reducing overall agrichemical input through site-specific spraying could have economic benefits for growers, too. Dr. Jiang says that by directing the fertilizers and pesticide sprays solely to sites of concern, farmers can save up to 90% of their agrochemical spray, improving their profit margins while also mitigating chemical drift. Introducing high-value crops into the cropping system has the potential to open new markets for growers.

Dr. Jiang is excited that the new drone infrastructure will open doors for her team and her students at the Dalhousie Agricultural Campus. Her and her colleagues are “very eager to deliver the most advanced technology to the students.” She says that fellow researchers are producing crucial research about crop disease detection and prevention that will overlap with and inform her own projects. Students participating in the school’s precision agriculture research program will now have the opportunity to go to “drone school” to learn more about harnessing this innovative technology to improve industry efficiency and strengthen Nova Scotia’s agricultural sector.

Drone sensing and imaging is a “hot topic” in Dr. Jiang’s field, she notes. But research and knowledge gaps are also prevalent, and her project aims to address some of the missing pieces. She is committed to understanding challenges surrounding climate change adaptation and the economy while conducting research that will have a lasting impact on Nova Scotia’s farmers.

CONSIDERING OUR IMPACT

COMMUNICATING OUR IMPACT



Research Nova Scotia supports researchers, academic institutions, and organizations by sharing their work with a broad audience. These communications efforts continue to establish new contacts, partnerships, and increase overall awareness of research that is intentionally working to solve Nova Scotia's biggest challenges and its impact on the lives of Nova Scotians. This overview of activities covers the period from April 1 to September 30, 2023.

RESEARCH OVER COFFEE

For the last two years Research Nova Scotia has been working in partnership with Dalhousie University on Research Over Coffee, to bring relevant research expertise to government and political decision makers. Research Over Coffee aims to draw an audience of MPs, MLAs, municipal councillors, NS Senators, and senior civil servants with the intent of sharing cutting edge expertise, profiling leading researchers, spurring conversations on topical issues, and encouraging network building between researchers, legislators, and policymakers.

The series launched in June 2020 and since then has featured six researchers per year from universities across Nova Scotia and continues to see strong attendance and positive feedback. The webinars continue to attract an audience from all levels of government and have recently resulted in follow-up conversations and meetings with provincial and federal cabinet ministers.

RESEARCH NOVA SCOTIA

During this reporting period, RNS hosted two webinars.

Managing the Grid: The Future of Renewable Energy Storage

Presenter: Dr. Wayne Groszko, Nova Scotia Community College (NSCC)
Date: April 20, 2023

Webinar Recording

Understanding How Primary Care is Changing in Canada

Presenter: Dr. Ruth Lavergne, Dalhousie University
Date: May 11, 2023

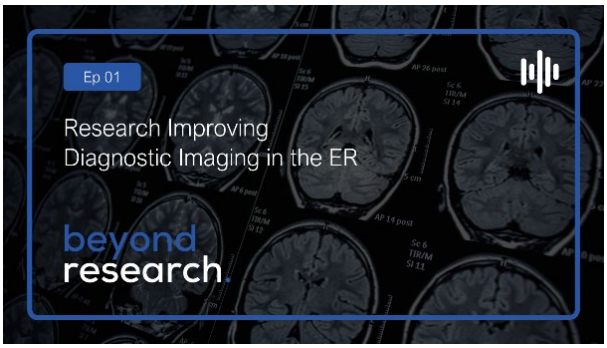
Webinar Recording

BEYOND RESEARCH PODCAST

On the Beyond Research Podcast, RNS speaks with researchers who are working to solve our province's biggest challenges. During this reporting period, Research Nova Scotia started production of Season 3.

Season 3, Episode 1

Research Improving Diagnostic Imaging in the ER



There are many challenges impacting a healthier population in Nova Scotia. Some of these include physician recruitment; access to primary care; an aging population; infrastructure, equipment, and facilities renewal; and increased costs for health care research and delivery. In this episode, Dr. Steven Beyea and Dr. Adela Cora discuss their research in local emergency departments to help address some of these challenges.

Dr. Steven Beyea is Innovation Strategy Advisor and Research Scientist at the IWK Health Centre and Professor in the Department of Diagnostic Radiology at Dalhousie University. Dr. Adela Cora is Undergraduate Medical Education Director for Diagnostic Radiology, and a practicing physician in the Neuroradiology section of the QEII Health Sciences Centre.

Season 3, Episode 2

Restorative Justice: Strengthening Communities Through Collaborative Research

Nova Scotians face a variety of harms and challenges at interpersonal, institutional, systemic, and societal level. Systemic racism, sexual harassment, institutional abuse, and accessibility are just some examples. Nova Scotians deserve and demand justice when they experience harm or when things go wrong in their communities. In this episode, we hear from a researcher of restorative justice and two community members who have established restorative justice practices to build safe, healthy, and inclusive communities.

Richard Derible is the former principal at Ecole St. Catherine's Elementary School and current Executive Director of Restorative Initiatives at the Executive Council Office; Jennifer Llewellyn is Professor at Dalhousie University's Schulich School of Law, Chair in Restorative Justice, and Director of the Restorative Research, Innovation, and Education Lab; and Jake MacIsaac is Assistant Director of Security Services at Dalhousie University.

RESEARCH
NOVA SCOTIA

IN THE NEWS

The following media announcements were issued this period:

April 4, 2023
Research Nova Scotia Announcing Additional Support for Early-Career Health Researchers
April 12, 2023
Research Nova Scotia Announces $186,000 for Student Health Researchers

May 9, 2023
Dalhousie Forestry Research Team Receives $1.57 Million to Study Nova Scotian Forests

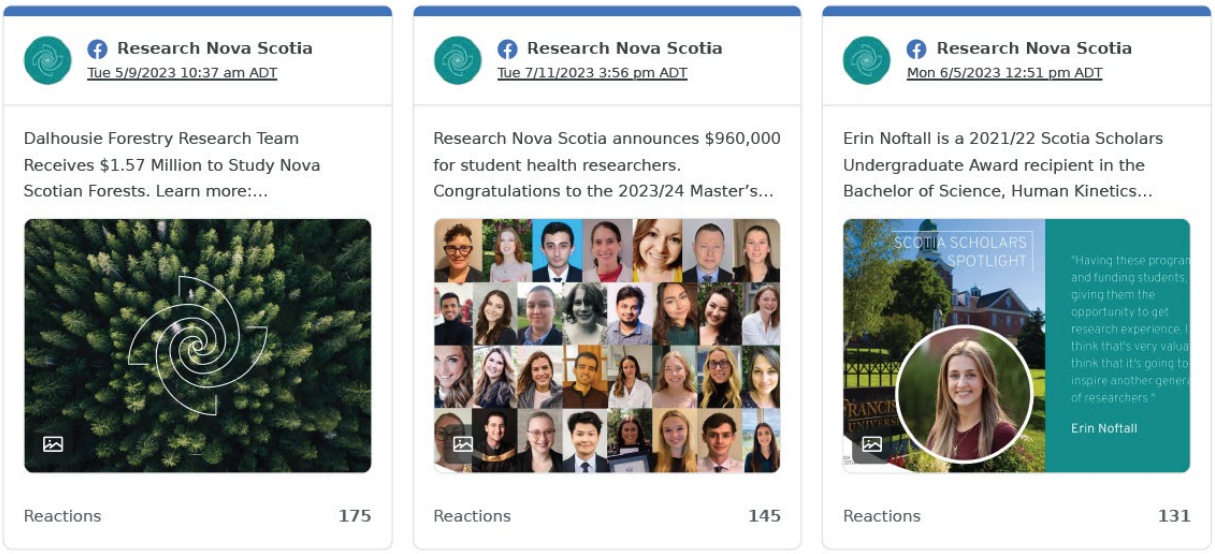
June 7, 2023
Research Nova Scotia Investing an Additional $1.1 Million in Infection Control Research in Long-Term Care Facilities

June 19, 2023
Research Nova Scotia Invests $250K in Dalhousie University Research Team for Emerging Poxvirus Surveillance

July 11, 2023
Research Nova Scotia Announces $960,000 for Student Health Researchers

September 5, 2023
Research Nova Scotia and CANSSI Atlantic Announcing Over $273,000 in Climate Change Funding

RESEARCH NOVA SCOTIA



WEB + SOCIAL STORIES

RNS continues to use its website and social media channels to share research stories and amplify relevant content for researchers, partners, and stakeholders. For example, every researcher funded by Research Nova Scotia is recognized across our social channels. This content helps researchers promote their work and increase our overall audience and engagement. This practice has resulted in new researcher and partner connections, as well as media attention. It also helps RNS communicate the intentional and impactful research it funds.

Below are a few social and story highlights from this period.

Impressions	Engagements	Post Link Clicks
431,139 ↗72%	**19,703** ↗128.9%	**2,222** ↗46.6%

Engagement Rate (per Impression)
4.6% ↗33.2%

RESEARCH NOVA SCOTIA

April 3, 2023
Mobilizing Research That Makes a Difference: Our Three-Year Operating Plan

April 5, 2023
New Research to Improve Access to Pulmonary Rehabilitation for Women with COPD

April 25, 2023
NSCAD Professor Jennifer Green's Flaxmobile Project Receives Support from Research Nova Scotia

June 1, 2023
Scotia Scholars Spotlight: Erin Noftall

June 14, 2023
Celebrating Student Research Accomplishments

June 21, 2023
Removing Guess Work for Clinicians to Enable More Efficient and Effective Care for Patients: There's an App for That

June 21, 2023
Ukrainian Researcher Spotlight: Yaryna Tylchak

July 31, 2023
We Are Leading, We Are Not Alone, and We Have the Potential

August 1, 2023
Ukrainian Researcher Spotlight: Bodhana Bila

August 28, 2023
SMU Professor Examines Virus Spread in Nova Scotia

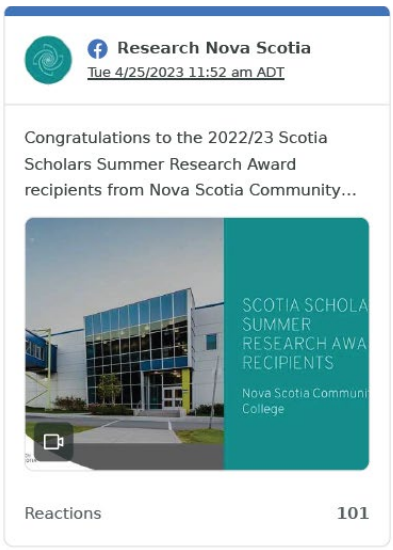
August 28, 2023
Ukrainian Researcher Spotlight: Dmytro Tymoshenko

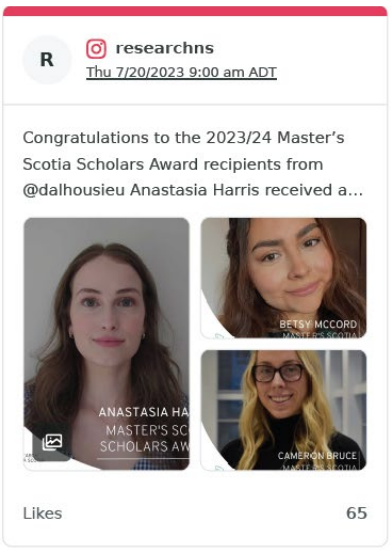
August 29, 2023
Advancing Research - StFX Chemistry Professors Awarded Close to $600,000 in Funding from Canada

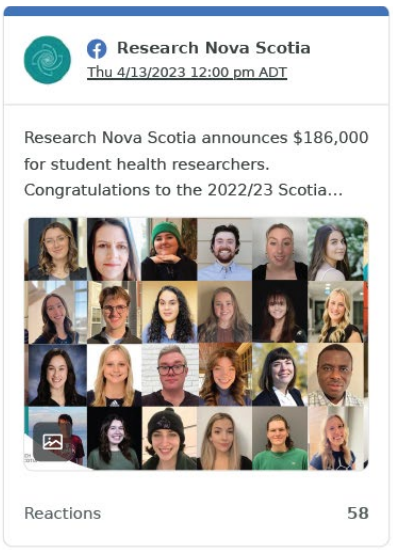
[Foundation for Innovation, Research Nova Scotia]

September 5, 2023

[Research Nova Scotia at the 2023 Northern Hardwood Conference]







04. PROJECTS APPROVED BY THE CORPORATION

Over the last six months, RNS supported 64 research projects through its Research Opportunities Fund and the Scotia Scholars Award Program.

From 1 April 2023 to 30 September 2023, the following commitments were made:

RNS COMMITMENTS

PROGRAM	TYPE	# FUNDED	TOTAL INVESTMENT
Research Opportunities Fund	Matching Funds	15	$3,054,361
Research Opportunities Fund	Convened	1	$114,425
Intentional Initiatives	Convened	3	$388,970
Ukrainian Emergency Research Support	Capacity Building	5	$97,060
Atlantic Climate Research Collaboration	Convened	2	$18,000
Scotia Scholars (Master's)	Capacity Building	25	$360,000
Scotia Scholars (Doctoral)	Capacity Building	13	$600,000
			$4,859,788

As part of the funds awarded during this period, RNS invested in building research capacity in 38 students through its Scotia Scholars Awards program for Master's and doctoral student programs. Scotia Scholars supports trainees at the undergraduate, Masters and PhD levels to work on specific research projects with faculty mentors. Award stipends were increased by 25% this year and allowed for a maximum award of $25,000 for Master's level students and $75,000 for Doctoral level students.

The newest Scotia Scholars are enrolled at Acadia University, Dalhousie University, Mount Saint Vincent University, Nova Scotia College of Art and Design, and Saint Mary's University.

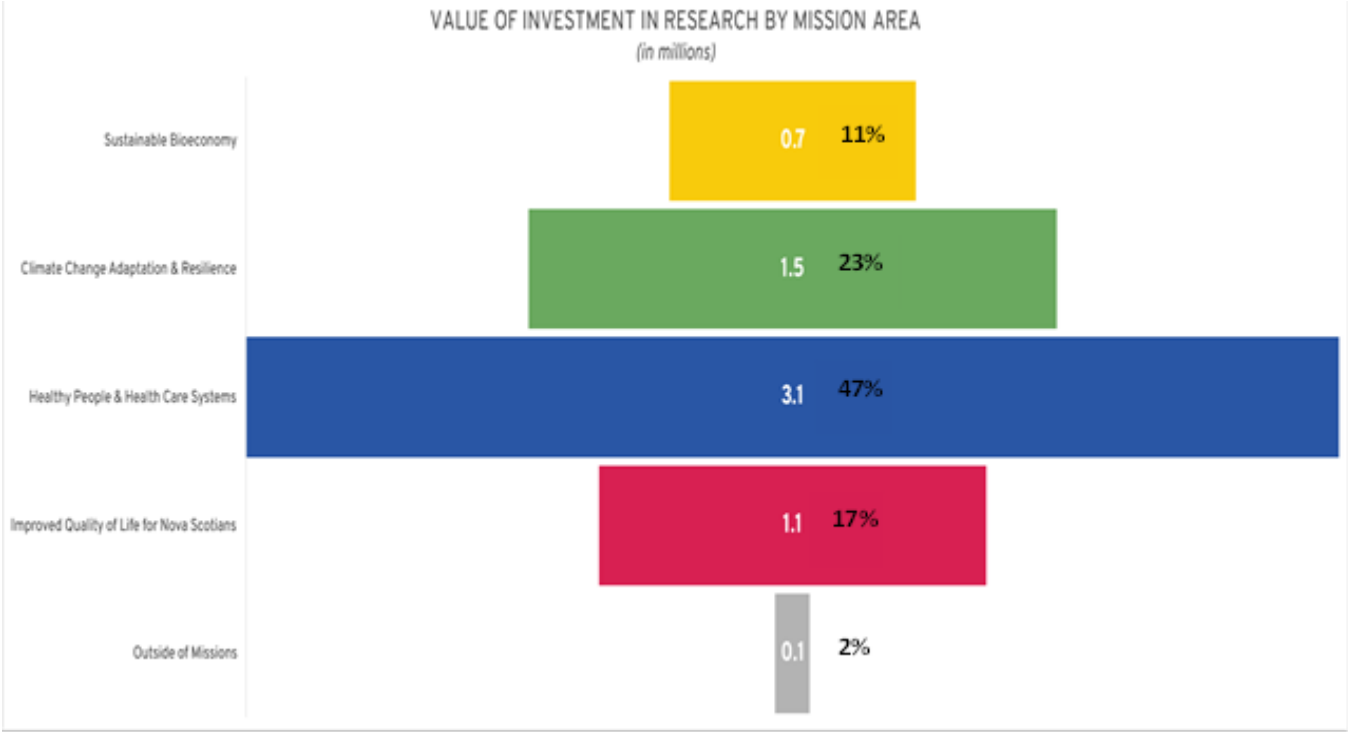
The competition for undergraduate students will be completed by the end of March 2024.

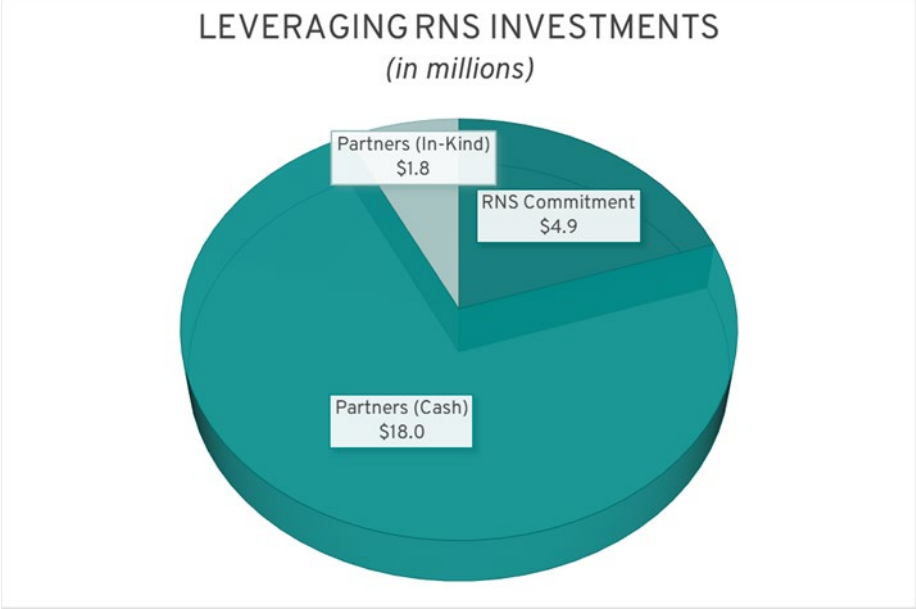
Research Nova Scotia partnered with the Canadian Statistical Sciences Institute (CANSSI) last winter to create the Atlantic Climate Research Collaboration. The goal of this initiative is to tackle complex problems related to climate change and its impacts on coastal communities. Two projects were funded in the period covered in this report.

Fifteen infrastructure projects ranging from a new lab for inclusive movement and health, to supporting climate-focused innovation, to the Health Aging and Frailty Hub were supported in the past six months.

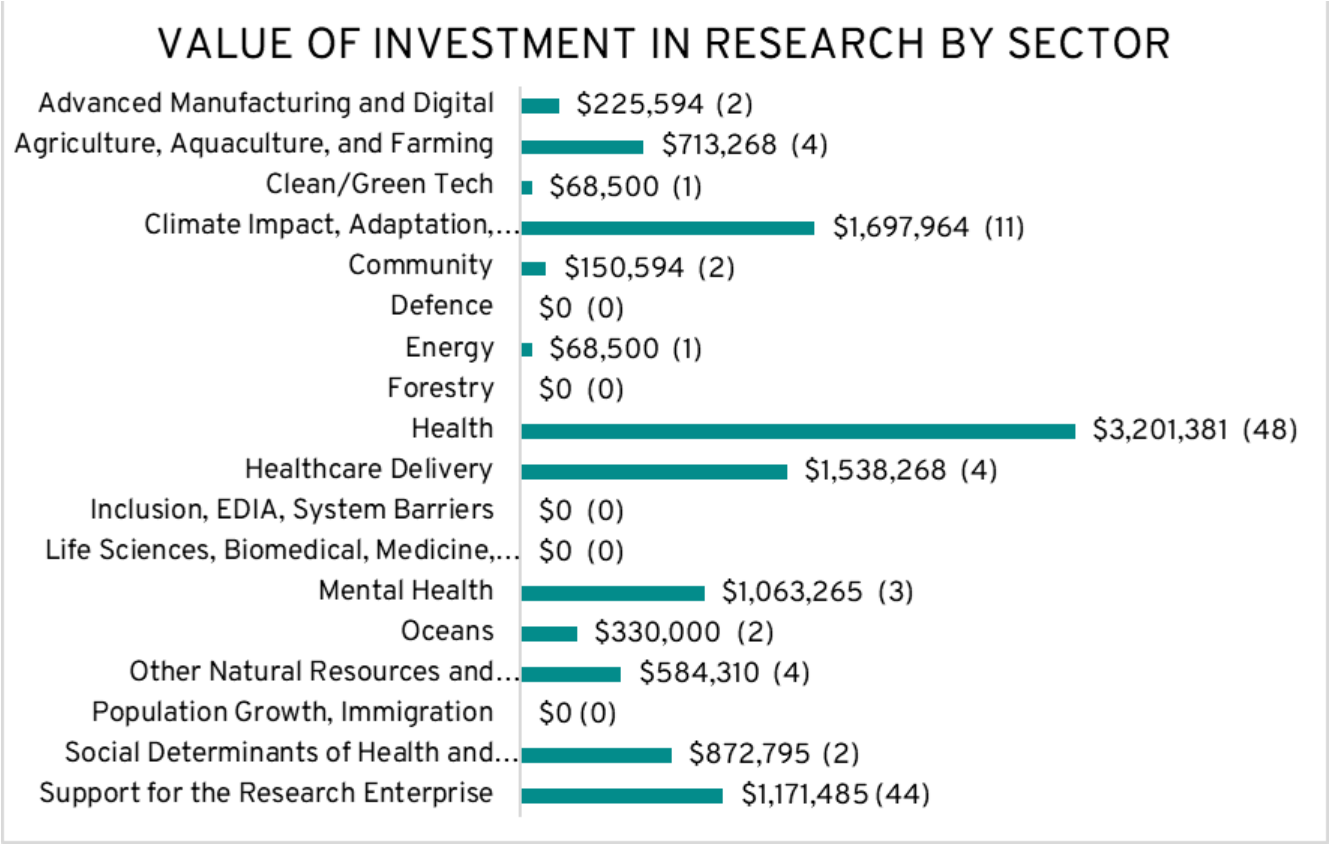
RNS also funded a project to undertake the consultations and research required to draft an Open Science Policy for Nova Scotia. Open Science is part of RNS's strategy to support the province's research ecosystem and encourage better connections between researchers and those who make use of it.

For the six months in this reporting period, RNS was active across all four mission areas:





RNS supported research across sectors important to the province.



05. FINANCIAL FORECAST

The following table includes:

1. The current balance in the Research Opportunities Fund and the amount anticipated to be paid from the Fund over the next six months.

2. The amount spent on operations from April to September 2023, and the amount anticipated to be spent on operations over the next six months.

3. The proposed Research Opportunities Fund and Operations budget for the 01 April 2024 to 31 March 2025.

	SPENT (APR-SEP 23)	BALANCE (30 SEP 23)	FORCAST (OCT 23-MAR 24)	PROPOSED (24/25)
Research Opportunities Fund (ROF)	$4.85 M[1]	$61.50 M[2]	$18.75 M[3]	$46.20 M[1.4]
Operations	$0.89 M[5]	N/A	$0.89M[5]	$2.24 M[5.6]

Notes to the financial table:

1. This figure includes both paid and committed (through a research project agreement) for new projects approved in the reporting period. It excludes funds paid in the reporting period for projects approved and committed in previous years.
2. This is the total ROF amount that remains uncommitted at the end of the period. It includes an expected $5 million from Advanced Education for health research ($3M) and general ROF ($2M) contribution for 23/24.
3. Includes expected CFI, partner, and convened projects to be approved from October 23 through March 2024.This amount exceeds the original budget passed for 23/24 by $5.22 M due to the success of NS led and partnered projects approved by CFI in the Innovation Fund competition, the results of which were not known until June 2023.
4. Estimate based on anticipated demand for matching funds, including the Canadian Biomedical Research Fund/Biosciences Research Infrastructure Fund, planned convened projects, targeted

health research (in consultation with Department of Health and Wellness), student awards (Scotia Scholars) and Focused Research Initiatives which will be introduced in FY 25. The budget includes a small contingency for opportunities expected but as yet unannounced.

5. Excludes operations costs associated with the forestry research, which is paid for through a contribution agreement with the Forestry Innovation Transition Trust. RNS receives $150 k per year to cover one FTE and their operating costs.
6. The proposed budget estimates a 3% increase to both wage/benefit and administrative costs, based on anticipated increases in the cost of living. The current transfer from DAE for operations is $1.796 M, which is less than the estimates. If no additional funding is provided, operations costs will have to be trimmed to stay within the available budget.

Appendix A

Funded Projects
April 1 – September 30, 2023

RESEARCH NOVA SCOTIA

PROJECT TITLE	RESEARCHER	INSTITUTION	RNS FUNDING	SECTOR	# JOBS CREATED (FTE)	# OF TRAINING OPPS	PARTNERS	CASH		IN-KIND	
RESEARCH OPPORTUNITIES FUND - CFI JOHN R. EVANS LEADERS FUND (JELF)											
Nanopore Genomics for Microbiome Discovery Research	John Archibald	Dalhousie University	$201,886.00	Climate Impact, Adaptation, Mitigation, Resilience; Health	20.00	25.00	Canada Foundation for Innovation; Dalhousie University; Industry Partners	CFI Dalhousie	$201,886.00 $1,026.00	Industry	$101,550.00
Acadia University Inclusive Movement & Health Lab	Emily Bremer	Acadia University	$458,390.00	Health; Healthcare Delivery; Mental Health; Social Determinants of Health and Wellbeing	0.00	35.00	Acadia University; Canada Foundation for Innovation; Industry Partners	CFI Acadia	$458,390.00 $161,404.00	Industry	$67,791.00
Functional Materials for Sustainable Pollutant Remediation: Synthesis, Characterization and Applications	Erwan Bertin	St. Francis Xavier University	$219,338.00	Climate Impact, Adaptation, Mitigation, Resilience; Other Natural Resources and Biodiversity	60.00	75.00	Canada Foundation for Innovation; Industry Partners	CFI	$219,337.00	Industry	$109,668.00
Cognition and Organizations Research Group (CORG) accessible remote work research facility	Colin Conrad	Dalhousie University	$55,000.00	Community	2.50	50.00	Canada Foundation for Innovation; Dalhousie University; Industry Partners	CFI Dalhousie	$55,000.00 $23,908.00	Industry	$18,993.00
Biomolecular Characterization of Allergen-Lipid Interactions	Alex Foo	St. Francis Xavier University	$74,377.00	Health	6.00	6.00	Canada Foundation for Innovation; Industry Partners	CFI	$74,376.00	Industry	$37,189.00
Expansion of Evo-Devo Laboratory	Tamara Franz-Odendaal	Mount Saint Vincent University	$127,100.00	Health	1.50	3.80	Canada Foundation for Innovation; Mount Saint Vincent University; Industry Partners	CFI MSVU	$127,100.00 $17,609.00	Industry	$45,941.00
Laser-Scanning Confocal microscopy to study muscles in Drosophila	Nicanor Gonzalez-Morales	Dalhousie University	$100,000.00	Health	2.00	4.00	Canada Foundation for Innovation; Industry Partners	CFI	$100,000.00	Industry	$50,412.00

Climate-focused innovations with cosmic ray produced isotopes	John Gosse	Dalhousie University	$120,000.00	Climate Impact, Adaptation, Mitigation, Resilience; Other Natural Resources and Biodiversity	5.00	5.50	Canada Foundation for Innovation; Dalhousie University; NWMO-Canada; Industry Partners	CFI Dalhousie NWMO-Canada	$120,000.00 $34,000.00 $10,000.00	Industry	$16,000.00
Enabling Technology for Polar and Radical Main Group Catalysis Development	Alex Speed	Dalhousie University	$120,000.00	Agriculture and Farming; Climate Impact, Adaptation, Mitigation, Resilience; Health	0.00	11.25	Canada Foundation for Innovation; Dalhousie University; Industry Partners	CFI Dalhousie	$120,000.00 $2,505.00	Industry	$60,587.00
Healthy Aging and Frailty Hub	Olga Theou	Dalhousie University	$475,003.00	Health; Healthcare Delivery	3.50	6.25	Canada Foundation for Innovation; Dalhousie University; Industry Partners	CFI Dalhousie	$475,003.00 $2,310,325.00	Industry	$227,892.00
Data Analytics Centre for Sustainability, Equity and Resilience	Michael Zhang	Saint Mary's University	$95,594.00	Advanced Manufacturing and Digital; Community	1.00	150.00	Canada Foundation for Innovation; Industry Partners	CFI	$95,594.00	Industry	$50,581.00
Sustainable Materials and Functional Surfaces Laboratory (SMFSL) for Environmental Nanotechnology and Waste Valorization	Xu Zhang	Cape Breton University	$200,000.00	Agriculture, Aquaculture, and Farming; Climate Impact, Adaptation, Mitigation, Resilience; Oceans	6.00	30.00	Canada Foundation for Innovation; Cape Breton University; Industry Partners	CFI CBU	$200,000.00 $25,000.00	Industry	$75,000.00
RESEARCH OPPORTUNITIES FUND - GENOME CANADA											
The Social Implications of Agri-Genomics: Ensuring a Just Transition to Climate-Resilient Agricultural and Food Systems in Canada	Claver Diallo	Dalhousie University	$195,518.00	Agriculture and Farming; Climate Impact, Adaptation, Mitigation, Resilience	0.00	8.00	Genome Canada; Genome British Columbia; Ministry of Colleges and Universities; Mitacs; Trent University; University of the Fraser Valley; Industry Partners	Genome Canada Genome BC MCU Mitacs	$1,424,290.00 $653,176.00 $331,019.00 $185,000.00	Trent U UFV Industry	$247,481.00 $280,000.00 $105,545.00
3Anne (3N): Triploid mussel genomics program	Ramon Filgueira	Dalhousie University	$197,750.00	Agriculture, Aquaculture, and Farming; Climate Impact, Adaptation, Mitigation, Resilience	38.55	30.00	Genome Canada; Atlantic Aqua Farms Ltd.; Genome Quebec; Mitacs; Province of Prince Edward Island; University of New Brunswick; University of Quebec a Rimouski	Genome Canada Atlantic Aqua Farms Ltd Genome Quebec Mitacs Province of PEI	$1,113,869.00 $437,996.00 $367,798.00 $307,999.00 $50,000.00	UNB U Quebec a Rimouski	$76,220.00 $195,000.00

RESEARCH OPPORTUNITIES FUND - CANADIAN INSTITUTES OF HEALTH RESEARCH											
An Underrepresented, Undervalued Workforce: Understanding and Supporting Quality of Work Life in Long Term Care	Janice Keefe	Mount Saint Vincent University	$414,405.00	Health; Healthcare Delivery; Mental Health; Social Determinants of Health and Wellbeing	26.00	9.00	Canadian Institutes of Health Research; Health PEI; Newfoundland & Labrador Centre for Applied Health Research; Nova Scotia Health	CIHR Health PEI NLCAHR NSH	$2,103,752.00 $10,000.00 $100,000.00 $10,000.00	N/A	$0.00
RESEARCH OPPORTUNITIES FUND – OPEN SCIENCE											
Designing and implementing an Open Science Framework in Nova Scotia	Maria Pawlowska	Research Held Funding	$114,425	Support for the Research Enterprise	0.00	0.00	N/A	N/A	$0.00	N/A	$0.00
RESEARCH OPPORTUNITIES FUND - INTENTIONAL INITIATIVES											
Photovoltaic Windows Research Project	Wayne Groszko	Nova Scotia Community College	$68,500.00	Clean/Green Tech; Climate Impact, Adaptation, Mitigation, Resilience; Energy	1.00	1.00	Mitacs; Nova Scotia Community College	Mitacs Industry	$15,000.00 $15,000.00	NSCC Industry	$2,000.00 $9,500.00
Books By Heart: Can communal bibliotherapy on a cardiac inpatient unit reduce adverse outcomes at one year by bolstering patients' self-efficacy and reducing anxiety and depression?	Gabrielle Horne	University of King's College	$190,470.00	Health; Healthcare Delivery; Mental Health	3.09	3.09	Department of Canadian Heritage; Government of Nova Scotia; Nova Scotia Health; University of King's College	DCH NS Gov NSH RNS Scotia Scholars Program U King's College	$50,000.00 $5,000.00 $50,000.00 $16,000.00 $37,796.00	NSH	$4,500.00
Crowdsourced Marine Weather for Gulf Stream & Climate Change Adaptation in Nova Scotia	Craig Summers	SailTimer Inc.	$130,000.00	Advanced Manufacturing and Digital; Climate Impact, Adaptation, Mitigation, Resilience; Oceans	2.00	2.00	Atlantic Canada Opportunities Agency; Community Business Development Corporations; National Research Council of Canada; Sustainable Development Technology Canada	ACOA (TRL 7) CBDC NRC IRAP SDTC	$150,000.00 $75,000.00 $30,000.00 $5,600,431.00	N/A	$0.00

ATLANTIC CLIMATE RESEARCH COLLABORATION											
Advancing methodologies to understand the effects of climate change on lung health	Sanja Stanojevic	Dalhousie University	$79,750.00	Climate Impact, Adaptation, Mitigation, Resilience; Health; Other Natural Resources and Biodiversity	1.20	1.20	Canadian Statistical Sciences Institute (CANSSI)	CANSII	$28,250	N/A	$0.00
Coastal Vulnerability along the Northumberland Strait, Cumberland County and Statistical Methods and Data Sources to Calculate Return Periods of Water Levels	Tim Webster & Orla Murphy	Nova Scotia Community College	$165,222.00	Climate Impact, Adaptation, Mitigation, Resilience; Other Natural Resources and Biodiversity	1.00	5.00	Industry Partners	N/A	$0.00	Industry	$18,000.00
UKRAINIAN EMERGENCY RESEARCH SUPPORT AWARDS											
Nanopore DNA sequencing for microbial diversity genomics	John Archibald (Student: Tymoshenko)	Dalhousie University	$35,000.00	Support for the Research Enterprise	1.00	0.00	N/A	N/A	$0.00	N/A	$0.00
Understanding the role of adipose tissue hypoxia in ovarian cancer growth and chemoresistance using an in vitro T-SLICE model	Brendan Leung (Student: Y Komburlei)	Dalhousie University	$20,000.00	Support for the Research Enterprise	1.00	0.00	N/A	N/A	$0.00	N/A	$0.00
Establishing a center of excellence on light-curing research at Dalhousie University	Richard Price (Student: B. Bila)	Dalhousie University	$10,000.00	Support for the Research Enterprise	1.00	0.00	N/A	N/A	N/A	N/A	N/A
The globalization of border control: legal and policy implications	Ruben Zaiotti (Student: R. Hrabovskyi)	Dalhousie University	$20,260.00	Support for the Research Enterprise	0.5	0.00	Dalhousie University	Dalhousie	$2,000.00	N/A	$0.00
The globalization of border control: legal and policy implications	Ruben Zaiotti (Student: K. Korpalo)	Dalhousie University	$11,800.00	Support for the Research Enterprise	0.38	0.00	Dalhousie University	Dalhousie	$2,000.00	N/A	$0.00

SCOTIA SCHOLARS AWARD - MASTER'S											
Non-invasive Localization of Epileptic Seizure Onset Zone using Blood-Brain Barrier Imaging in Drug-Resistant Epilepsy: A Promising Diagnostic Approach	Laith Alhadeed	Dalhousie University	$20,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Does Income Modify the Association Between Excess Gestational Weight Gain and Key Perinatal Outcomes? A Population-Based Retrospective Cohort Study of Pregnant Individuals in Nova Scotia	Cameron Bruce	Dalhousie University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Intolerance of uncertainty as a moderator of relationship uncertainty and conflict	Tessa Cosman	Acadia University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Establishing a Spatio-Temporal Baseline of Gene Expression After Traumatic Spinal Cord Injury	Laura Dauphinee	Dalhousie University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alternative Imagery as a Frame of Repair	Fanny Desroches	Nova Scotia College of Art and Design	$5,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compassionate care for the mind and body: An empirical evaluation of a brief self-compassion intervention for improving sexual functioning after treatments for breast cancer	Kaylee Dyall	Acadia University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Does cannabidiol impact acute stress and anxiety responses in individuals with posttraumatic stress disorder and trauma-exposed healthy adults when presented trauma-related cues	Mikaela Ethier-Gagnon	Dalhousie University	$22,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Virtual Reality (VR) Rehabilitation With Community Stroke Patients: A Pilot Study	Summer Fox	Acadia University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Social-Emotional Learning in Canadian Elementary Curricula: An Assessment of its Alignment to Psychological Evidence	Julia Hall	Mount Saint Vincent University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Examining outcomes for individual and group based Cognitive Behaviour Therapy - Ten (CBT-T) for eating disorders	Anastasia Harris	Dalhousie University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Speech production and hearing loss in older adults: Somatosensory feedback as a clinical tool for more accurate speech in hearing loss	Lindsay Heyland	Acadia University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Experiences of Sexual Fluidity and Associated Health Outcomes: Towards a New Model of Understanding	Meaghan Hymers	Acadia University	$5,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
An Exploration of Nova Scotian School Psychologists' Learning Disability Diagnostic Practices	Ashley Kennedy	Mount Saint Vincent University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Characterizing Neurological Damage and Cognitive Impairments in Long COVID Patients: An Integrated Approach using Neuroimaging and Neurocognitive Assessment	Betsabe McCord	Dalhousie University	$25,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Psychological Barriers that Women with Substance Use Issues Experience During Reintegration After Incarceration	Jordyn Monaghan	Saint Mary's University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Formulating salt premix co-fortified with thiamine and iodine	Jessica O'Flaherty	Mount Saint Vincent University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Utilitarian Processing: A Strengths-Based Approach to Examining Ways that Autistic Persons Understand the World Around Them	Emily Pico	Acadia University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
The Intergenerational Impacts of Military Service Related Moral Injury	Kathryn Reeves	Mount Saint Vincent University	$25,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Social Choreography Lab	Lauren Runions	Nova Scotia College of Art and Design	$10,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Targets for Cancer: KRAS and YAP Require Phosphatidylserine Trafficking	David Sapp	Dalhousie University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
A Novel Network-Based Algorithm for Predicting Drug-Drug Interactions	Naeem Shirmohammady	Saint Mary's University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Testing the Interactive Associations of Cannabis Potency and Cannabis Use Regimen on Cannabis Consumption and Dependence Levels in Trauma-Exposed Individuals	Thomas Snooks	Dalhousie University	$12,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
The Impact of Cannabinoids on Heart Development in Zebrafish	Katharine Yeo	Dalhousie University	$25,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Perceived barriers to Mental Health Services among Canadians with perceived mental health needs	S M Kawser Zafor Prince	Dalhousie University	$25,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Marine Data Sonification and Visualization as Educational Public Art	Eruige (Brigitta) Zhao	Nova Scotia College of Art and Design	$10,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SCOTIA SCHOLARS AWARD - DOCTORAL											
Investigating the imbedded nature of turnover in nursing: Who quits, why, and what can be done about it	Gregory Anderson	Saint Mary's University	$18,750.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Optical Engineering through Novel Micro/ Nanoscale Structures for Blood Biosensing	Arslan Asim	Dalhousie University	$37,500.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Electrocortical Markers of Auditory Change Detection Mechanisms in High-Risk Psychosis Populations	Jenna Bissonnette	Dalhousie University	$56,250.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Investigating the mechanisms of long non-coding RNA in cancer, with a specific focus on NRAD1 in triple-negative breast cancer	Hannah Cahill	Dalhousie University	$75,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

The Effect of Environmental Factors on Mental Health Outcomes in Nova Scotia	Alexandra Del Favero-Campbell	Dalhousie University	$75,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Fabric-based Wearable Sensors for Early Detection of Post-Traumatic Stress Disorder (PTSD)	Mal Hedrick	Saint Mary's University	$18,750.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Caring for the Instrument: Fine Tuning Teacher Wellness in Nova Scotia	Erika Kirk	Acadia University	$18,750.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improving ROP Screening Pain in Premature Infants with Intranasal Fentanyl	Helen McCord	Dalhousie University	$75,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Defining the role of peroxisome-derived lipid during neurogenesis in a Peroxisome Biogenesis Disorder fruit fly model	Yizhu Mu	Dalhousie University	$18,750.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Investigating the role for a natural killer cell-based immunotherapy for high-grade serous carcinoma within an engineered tumor microenvironment	Morgan Pugh-Toole	Dalhousie University	$75,000.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Influence of Frailty on Cardiac Rehabilitation: A Harmonized Analysis of Five Cardiac Rehabilitation Databases in Canada and Europe	Hoang Quach	Dalhousie University	$56,250.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stress and Safety Outcomes Among Healthcare Workers: The Moderating Effect of S.A.F.E.R Leadership	Diana Serban	Saint Mary's University	$18,750.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Development and Evaluation of an e-Learning Module for Healthcare Providers on Sleep in Young Children	Emily Wildeboer	Dalhousie University	$56,250.00	Health; Support for the Research Enterprise	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		TOTAL	$4,859,788		183.34	461.09			$18,003,839		$1,799,850