



NORTH ISLAND COLLEGE

CARTI

APPLIED RESEARCH TECHNOLOGY INNOVATION

# ANNUAL REPORT

2023-2024





**λυυḿaaʔateʔicuu**  
Nuu-chah-nulth

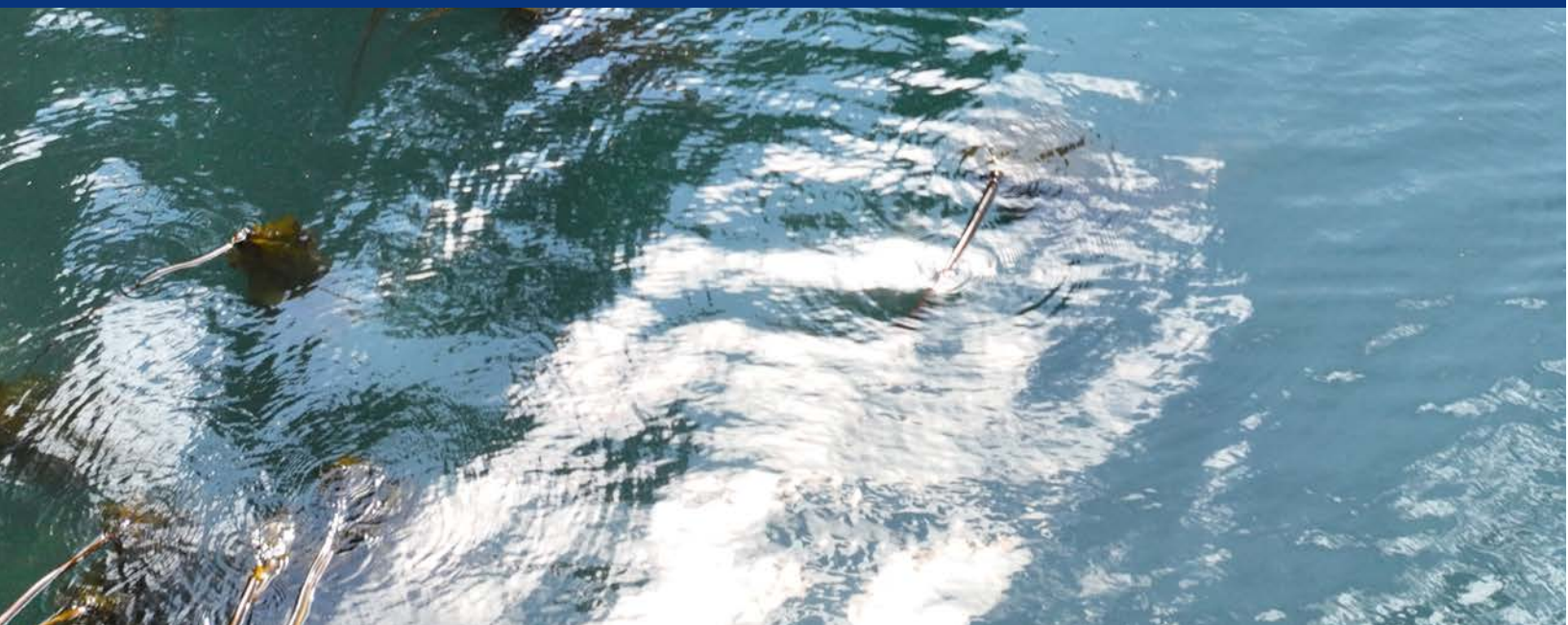
**Ǿəlakasla**  
Liqʼwala

**Ǿilakasʼla**  
Kwakʼwala

**čεčεhaθεč**  
Island Comox

## Welcome

We're honoured to acknowledge the traditional territories of the combined 35 First Nations of the Nuu-chah-nulth, Kwakwakaʼwakw and Coast Salish traditions, on whose traditional and unceded territories the college's campuses are situated



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# ANNUAL HIGHLIGHTS 2023-24

## MESSAGE FROM SENIOR LEADERSHIP TEAM



Over the past twelve years, CARTI has been a key contributor to North Island College's commitment to providing research and learning opportunities that are both relevant and responsive to community needs. This is demonstrated through the variety of research projects successfully developed and delivered across the college region, each designed to address the unique needs of local communities.

Congratulations to the entire CARTI team on twelve outstanding years! Your efforts have secured millions of dollars in research funding to support economic growth in the region and have provided numerous faculty and students with opportunities to engage in meaningful research projects. The future is bright, and we look forward

to CARTI's continued growth, including the expansion of research opportunities, continued contributions to economic development within the college region, and further opportunities for faculty and students to engage in critical research initiatives.

Tony Bellavia

Vice President, Academic



## WELCOME FROM THE DIRECTOR



I'm so pleased to be able to present this summary of highlights from the Centre for Applied Research, Technology and Innovation at North Island College.

Over the past twelve years, the Centre has served the region and our students in ways that we could not have imagined at the start. CARTI has partnered with 85 companies or organizations in that time and has grown into a team of 5 staff and 8 researchers. CARTI has also filled 32 student positions across the projects this year.

In 2023-2024, CARTI's accomplishments demonstrate strong alignment with NIC's BUILD 2026, our strategic plan, and Working Together, our Indigenous Plan. We continue to build relationships across the region and

provide exemplary opportunities for students to be meaningfully engaged in real-world, innovative projects.

As always, our collaborative approach has enabled us to leverage our impact and expand our reach into new research themes and with new partners. Our range of initiatives over the past year have spanned sectors from marine ecosystems, Indigenous culture, health care, engineering and technology. In particular, community interest in our seaweed initiatives continues to drive many of our applied research activities.

We are immensely proud of our team of researchers, support staff and the entire NIC community for their dedication to community engagement and innovation. We are also tremendously grateful to our funding partners who make this impactful work possible. We look forward to building on these successes and we know that there are exciting opportunities for more community impacts in the coming years.

We invite you to reach out with your applied research and innovation ideas and to keep an eye on our website to follow along with our latest projects. [www.nic.bc.ca/research](http://www.nic.bc.ca/research)

Naomi Tabata

Director, Envision North Island

## CARTI OVERVIEW

North Island College's Centre for Applied Research, Technology and Innovation (CARTI) has been leading community-engaged applied research projects since 2012. CARTI connects NIC expert staff and students with local businesses and organizations to develop innovative solutions to current challenges. NIC is committed to fostering applied research and social innovation projects as fundamental experiential learning opportunities where students develop transferable skills while increasing the college's contribution towards the socioeconomic needs of the community.

## WELCOME FROM THE NEW CARTI MANAGER



Since joining the CARTI team in May 2024, I have been so inspired by the innovative collaborative projects that CARTI leads and supports. It's such an honour to be part of this creative and committed team.

CARTI projects respond to diverse challenges, opportunities and questions. They also demonstrate the benefits of bringing the knowledge and experience in community together with NIC experts and learners. For example, the Walk With Me and the Learning Our Way projects have led to important social awareness and transformation. Our seaweed-focused research and innovation has supported new approaches to seaweed farming and kelp restoration and is leading to the creation of a CARTI-led Seaweed Innovation Hub in collaboration

with the Pacific Seaweed Industry Association and other industry and community partners.

I am excited for the year ahead, and proud to be a part of the CARTI team. I look forward to working more with the NIC community and participating in the exceptional social, ecological and economic community initiatives in north Vancouver Island.

Rhianna Nagel

Manager, CARTI

# CARTI FAST FACTS

FISCAL YEAR 2023/24

**32** Community and industry partners

**32** Paid student research assistants

**20** Projects



# CARTI PROJECTS

ALL PROJECTS CAN BE FOUND ONLINE AT

[NIC.BC.CA/RESEARCH.](https://nic.bc.ca/research)

## PROJECT: VIRTUAL REALITY



*NIC researchers and staff prepare to visit the Bamfield/Anacla area for the Virtual Reality Project.*

This project is an exploration into the suitability of using virtual reality (VR) technology to support initiatives of importance to the Huu-ay-aht First Nation (HFN), a remote and rural Indigenous community situated primarily within the Anacla and Bamfield regions on the west coast of Vancouver Island.

**COMMUNITY PARTNER: HUU-AY-AHT FIRST NATION**



## PROJECT: LEARNING OUR WAY



*Nursing students participating in a Field School with Huu-ay-aht for the Learning Our Way project.*

This project builds on long term relationships between NIC's Nursing program and First Nation Communities on Northern Vancouver Island to address systemic racism and promote health equity for Indigenous people and communities on northern Vancouver Island.

This project designs, implements and evaluates transformative reconciliation initiatives in partnership with Indigenous communities, health authorities, and post-secondary institutions.

**COMMUNITY PARTNERS: THOMPSON RIVERS UNIVERSITY | KDC HEALTH  
UNIVERSITY OF VICTORIA | HUU-AY-AHT FIRST NATIONS | KA:'YU:'K'T'H'  
/ CHE:K'TLES7ET'H' FIRST NATIONS | WUIKINUXV NATION**

## PROJECT: WALK WITH ME

The Walk With Me project is a research and systems/community change initiative designed to reduce harm and address stigma associated with the toxic drug poisoning crisis. The team conducts various forms of community-engaged research; hosts 'story walks', in which groups of participants are guided on curated outdoor audio walking journeys through which they listen to stories of the drug poisoning crisis gifted to the project from People With Lived Experience, family members and front-line workers; and facilitates talking circles.

**COMMUNITY PARTNERS: THOMPSON RIVERS UNIVERSITY | KWESA PLACE | SPARC BC | VANCOUVER FOUNDATION | CAMPBELL RIVER ART GALLERY | VANCOUVER ISLAND HEALTH AUTHORITY | COMOX VALLEY COMMUNITY HEALTH NETWORK | VANCOUVER ISLAND UNIVERSITY | SIMON FRASER UNIVERSITY | CAMPBELL RIVER COMMUNITY ACTION TEAM | COMOX VALLEY ART GALLERY | AVI HEALTH AND COMMUNITY SERVICES**

## PROJECT: CENTRAL COAST GEODUCK

This project assesses geoduck aquaculture potential in the BC Central Coast, in partnership with the Central Coast Commercial Fisheries Association (CCCFA) - a business alliance of four First Nations: Heiltsuk, Kitasoo/Xai'Xais, Nuxalk and Wuikinuxv. The project will focus on comparing biophysical conditions at potential geoduck aquaculture sites and will compare juvenile geoduck performance (growth and survival) between sites. Geoduck aquaculture may be an economic development opportunity for coastal communities.

**COMMUNITY PARTNERS: MARINE PLAN PARTNERSHIP FOR THE NORTH PACIFIC COAST (MAPP) | FISHERIES AND OCEANS CANADA | PROVINCE OF BC | CENTRAL COAST COMMERCIAL FISHERIES ASSOCIATION | HEILTSUK NATION | KITASOO XAI'XAIS NATION**

## PROJECT: KELP HABITAT BANKING



*CARTI Researcher Allison Byrne collects eDNA samples in Loughborough Inlet while West Coast Kelp researcher Tom Campbell observes.*

This project seeks to fill in knowledge gaps regarding kelp as a habitat banking tool for the forestry sector. The growth and quality of kelp was compared at several marine sites used for log handling/storage. In addition to kelp measurements, water quality was monitored and qualitative observations from underwater photos/video were recorded at each site. The results will help project partners, and potentially other companies, make informed decisions about future marine habitat banks by examining what site conditions and kelp cultivation techniques were or were not successful during this project.

**COMMUNITY PARTNERS: BC TIMBER SALES | M.C. WRIGHT AND ASSOCIATES LTD. | WEI WAI KUM FIRST NATION**

## PROJECT: OCEAN SENSOR TECHNOLOGIES

The project aims to engage Canadian aquaculture operators and develop low-cost sensors capable of real-time data output. NIC and the University of Calgary are deploying an ocean acidification sensor package that combines high-quality, established sensor technology with new lower-cost sensors. This will assess the relative performance of lower-cost options and determine their effectiveness for use by stakeholders in BC .

**COMMUNITY PARTNERS: UNIVERSITY OF CALGARY**

## PROJECT: FROM MIO

The project has digitized archived records describing the lives of Japanese immigrant fisher families on Vancouver Island, including several lectures that have been integrated into new curriculum. Additionally, a field school travelled to Japan to explore both urban and rural Japanese towns and cities and historic museums while receiving hands-on learning about local fishing practices within Japan's indigenous community, and Canada's deep-rooted connection to the town of Mio.

**COMMUNITY PARTNER: MUSEUM AT CAMPBELL RIVER**

## PROJECT: ALTERNATIVE KELP CULTIVATION

CARTI researchers, students, and the Naas team designed new kelp cultivation structures that are made of metal and jute with minimal plastics. The first prototypes were installed at the farm in March 2023 and were seeded with bull kelp at two different densities. Researchers monitored both the kelp growth/yield, and the durability of the structures themselves.

**COMMUNITY PARTNER: NAAS FOODS**

## PROJECT: OYSTER POUCH FLIPPER



*Oyster farm showing labour required to manually flip a long length of oyster pouches.*

NIC researchers and students designed, constructed and tested a new method of flipping oyster pouches at commercial shellfish tenures off the coast of Vancouver Island. Results of this project have helped the partner company overcome an important labour challenge and increase their capacity for oyster production.

**COMMUNITY PARTNERS: RITCHIE HOLDINGS LTD.**

## PROJECT: KELP RESEARCH WITH KWIAKAH FIRST NATION



*Student research assistants Melissa Roberts and Abby Walker assist in a kelp assessment with Kwiakah First Nation.*

CARTI completed wild kelp bed surveys with Kwiakah First Nation to assess changes in kelp abundance over time. Apart from aerial imagery with drones, this kelp survey also featured a SCUBA component to provide accurate data on kelp density and biomass, as well as sub-surface observational data.

### **COMMUNITY PARTNER: KWIAKAH FIRST NATION**

## PROJECT: DEVELOPING VALUE-ADDED FOOD PRODUCTS FROM BC KELP

Seaweed can be enjoyed as a dried, pickled, or fermented snack, but little is documented about turning Canadian seaweed species into valuable products such as pastas or noodles. This project established the equipment and processing procedures required to create these products in a systematic and commercially viable way.

**COMMUNITY PARTNER: SEA FOREST**

## PROJECT: NEW OYSTER GROW OUT TECHNOLOGY

In the first phase of the project, Natural Sciences and Engineering Research Council of Canada (NSERC) supported North Island College and Rising Tide Shellfish (RTS) in the construction and field testing of an oyster prototype grow out system. The initial prototype testing showed promising results with regards to lower mortality and improved oyster quality. However, several challenges were identified with the practical implementation of the first prototype.

To attempt to address these challenges a second phase of work, supported by NSERC, was undertaken in conjunction with RTS. The updated system was designed to hold a larger number of oysters and to be easier to load, unload and remove from the water.

**COMMUNITY PARTNERS: RISING TIDE SHELLFISH CO.**

## PROJECT: OYSTER SORTER

Throughout the oyster growing season, oysters need to be periodically removed from the water, sorted by size and then restocked in the grow-out trays or pouches. Dead oysters need to be removed by hand during this sorting and grading process. Equipment designed to automate the separation process for oysters is not currently commercially available. This project built a prototype to automate separating live and dead oysters based on density using forced air or water flow.

**COMMUNITY PARTNER: NOVA HARVEST**

## PROJECT: FORAGE FISH POPULATIONS

Led by Comox Valley Project Watershed Society (Project Watershed) and in collaboration with the K'ómoks First Nation (KFN), and Fisheries and Oceans Canada (DFO), this project investigates populations and preferred habitats of forage fish species populations that salmon depend upon.

To identify forage fish habitat the project is validating three forage fish habitat models 1) a Pacific a Pacific sand lance subtidal burying habitat model that has been recently developed by the Ecosystem Sciences Division (DFO) and Environment and Climate Change Canada (ECCC); 2) an intertidal spawning model for sand lance and surf smelt and; 3) a foraging habitat model for pelagic feeding forage fish. Results include maps of benthic spawning, burrowing and pelagic foraging habitats of key forage fish species in the intertidal to shallow subtidal (-30m) zones.

**COMMUNITY PARTNERS: PROJECT WATERSHED | K'ÓMOKS FIRST NATION | FISHERIES AND OCEANS CANADA (DFO)**

## PROJECT: SEAWEED SERIES

Hosted by CARTI's Logan Zeinert, the Seaweed Series highlights innovative work in the seaweed industry by local and international growers, processors, regulators, researchers, and business development professionals.

CARTI invites special guests from the seaweed industry to talk about their work. The online series consists of 15 to 30 minute talks from speakers, followed by 15 minutes of questions and discussions on their work.

Previous seminar topics included but are not limited to seaweed for food security; seaweed mobile micro-biorefineries; seaweed as salmon food; blue carbon for kelp restoration and selective kelp breeding. Previous seminar topics and recordings are available at [www.nic.bc.ca/about-us/research/carti/projects/seaweed-series](http://www.nic.bc.ca/about-us/research/carti/projects/seaweed-series)



# SANYAKOLA PROJECT:

## BEING CREATIVE TOGETHER – INDIGENOUS LANGUAGE REVITALIZATION

This Indigenous language revitalization project consists of four sub-projects that together have the potential to significantly support the revitalization of Kwak'wala: the language of the Kwakwaka'wakw Nations. Exploring the vital link between Indigenous holistic wellness and language revitalization is a central theme of the project. The four sub-projects include: development of a multi-year strategic language revitalization plan, exploration of Kwakwaka'wakw pedagogy rooted in land-based settings, exploration of how immersive technologies can support the reclamation and resurgence of Indigenous, pedagogy and worldview encoded in language, and the exploration of how youth leadership and language fluency building programs are enhanced by the resurgence and infusion of Kwakwaka'wakw worldview and pedagogy.



*This photo depicts the Sanyakola Research Project. U'mista in our language means taking back or bringing something back that was wrongfully taken. Our research is reconciliation or indeed reconciliACTION. It is lifelong, intergenerational, healing and supporting our efforts to: **U'mista xan's gwigila'as. Taking back our ways that were wrongfully taken.***

**PROJECT PARTNER:  
SANYAKOLA FOUNDATION**

# STUDENT SPOTLIGHT

## WILLIAM BADZIO-GEORGE



William has been working on the ocean sensors project. He worked on writing code for the datalogger that will communicate with and control the sensors, and testing sensors to make sure they are functioning properly. This has involved extensive troubleshooting, testing under various conditions, and optimizing performance.

William's work with CARTI will be beneficial to him in his career as he will have gained valuable experience in research as well as industry-related experience.

William likes working at CARTI because it offers him the flexibility to work while taking classes and it's a great way to apply his learning.

## CARTI AND EQUITY, DIVERSITY AND INCLUSION

Over the past few years, CARTI has been working to develop a departmental approach to further our understanding and implementation of equity, diversity and inclusion principles and tools. With little budget, CARTI had to focus on EDI strategies that were economical and sustainable. Thus, the monthly EDI video series was born for the department. Each month, all CARTI researchers, students and staff, receive a quick EDI video and either a corresponding article on that month's topic or an additional short video. Videos have focused on topics such as pronouns, inclusive language, stereotypes, and many others.

CARTI also requires all students, staff and researchers to take cultural training through the San'yas Anti-Racism Indigenous Cultural Safety Training Program. Participants focus on uprooting anti Indigenous racism and promoting cultural safety for Indigenous people.

# CARTI RESEARCHERS

## ALLISON BYRNE, RESEARCHER



Allison Byrne (Allie) is a researcher in NIC's Centre for Applied Research, Technology and Innovation, where her focus is applied aquaculture research. Most of her work involves field-based seaweed and shellfish research projects that engage local industry partners and NIC students. Allie has an MSc in Geography from the University of Victoria.

## SARA CHILD, RESEARCHER



Sara carries the name Tłakwama'ogwa, she is of Kwakwaka'wakw, Mowachat, Tlingit, English, and Scottish ancestry and is a member of the Kwakiutl Nation. Sara is a language revitalization enthusiast, instructor, researcher, curriculum developer and founder of the Hase' and Sanyakola Societies. Sara holds a Master's of Education, Indigenous Language Revitalization and has been working in education for most of her life. She is passionate about Indigenous language revitalization and believes that it is central to restoring wellness and the calls to action of TRC.

## LISA DOMAE, RESEARCHER



Lisa Domae has worked at North Island College since 2000 and currently holds the role of President and Chief Operating Officer. She holds a bachelor's degree from University of British Columbia, a post-baccalaureate diploma from Simon Fraser University as well as a master's from Queen's University and a PhD from University of Victoria. She is also a Registered Professional Planner and member of the Canadian Institute of Planners. Lisa has been NIC's lead researcher on the From Mio project since 2020.

# CARTI RESEARCHERS

## **JOANNA FRASER, RESEARCHER**



Joanna was a nurse educator at NIC for 21 years. Her focus was curriculum reconciliation through inclusion of Indigenous people and ways of knowing. Her research interests include the use of indigenous and relational methodologies in understanding the healing and transformational possibilities of relational, land based and experiential learning.

## **KATHLEEN HAGGITH, RESEARCHER**



Kathleen is the Associate Vice-President, College Experience and has been involved as a member of the Walk With Me Leadership Team since inception in 2019. Kathleen has held a variety of instructional and administrative roles within both colleges and universities in British Columbia's post-secondary sector. Kathleen also worked in community for a number of years in both the human services and educational fields.

## **GEORGIE HARRISON, RESEARCHER**



Georgie Harrison taught biology courses at North Island College from 2006-2024. Prior to joining NIC, Georgie taught at Vancouver Island University and the University of British Columbia. Georgie has an MSc from the University of Northern British Columbia, where she studied the ecology of mountain goats in north-west Alberta. Her academic training and practical experience is in wildlife ecology and the ecosystems that support wildlife populations.

# CARTI RESEARCHERS

## SCOTT MCGREGOR, RESEARCHER



Scott is a professional physicist with a background in physics, mathematics and environmental engineering. A lifelong love of teaching led Scott to return to instructing physics at North Island College in 2019. For the previous 15 years, Scott worked as an environmental scientist in the field of environmental engineering. During this time, he conducted and managed environmental investigations, remediation planning and hydrogeological investigations.

## AMBER STROEDER, RESEARCHER



Amber is a biology instructor and marine biologist. She has worked as a consultant, an academic researcher, and a marine educator. She has a background in aquaculture and has previously done field and lab work measuring and sorting algal species, bivalves, and crustaceans. Amber worked at the Vancouver Aquarium as a curriculum coordinator and the Monterey Bay Aquarium as an aquarist doing animal husbandry. She has worked in partnership with the Xwémalhkwa (Homalco) First Nation and the Kwiakah, Lekwala speaking peoples, developing educational material.

## TONY TRUDEL, RESEARCHER



Tony is an accredited Virtual Reality (VR) educator and small-business owner with expertise in the use of emergent technologies. He recently graduated from UBC's Master of Educational Technology program. Tony is well-prepared and eager to share what he's learned in Augmented Reality (AR), Mixed Reality (MR), and Artificial Intelligence. Tony has been teaching at NIC for well over a decade, first English then math, and was previously an assistant language teacher in Okinawa, Japan and a teacher on call for the Sooke and Comox Valley school districts.

# CARTI RESEARCHERS

## **EVELYN VOYAGEUR, RESEARCHER**



Evelyn is of the Kwakwaka'wakw Nation, of the Dzawadainox tribe. She speaks Kwak'wala fluently. She has worked in hospitals and communities in Alberta and BC, as well as taught and developed nursing curricula at the University of Victoria and NIC. Evelyn counsels survivors for the Indian Residential School Society. She has received many awards for her contribution to Indigenous nursing, including becoming one of Health Canada's First Nation and Inuit Branch's first recipients of the Award of Excellence in Nursing.

## **LOGAN ZEINERT, RESEARCHER AND SENIOR RESEARCH TECHNICIAN**



Logan hails from New Zealand and completed his master's degree at Memorial University in Newfoundland and Labrador. Logan has extensive marine surveying and aquaculture research experience and is an accomplished diver. Logan's work on kelp has involved permitting sites, determining yields and biomass, planning hatcheries, and processing.

# CARTI SUPPORT TEAM

## **NAOMI TABATA, DIRECTOR**



Naomi Tabata has over 20 years of project management expertise overseeing project finances, communications, and reporting. She has experience managing many simultaneous projects with complex funding, partnerships, timelines, and resources.

Naomi has been leading NIC's Centre for Applied Research, Technology and Innovation for over 10 years and is responsible for engaging with stakeholders to develop innovative research projects, grant and proposal preparation, needs assessments, and partnership and funder development.

## **RHIANNA NAGEL, MANAGER**



Rhianna Nagel has led collaborative research and innovation teams and projects since 2014, as a Research and Programs Coordinator and then Manager of Community-Engaged Learning at UVic, and now in her role with NIC. Before working in academia, Rhianna ran social and environmental justice programs with the Environmental Youth Alliance in Vancouver and spent time living between Canada and Uruguay farming and working with community groups on a range of initiatives from collaborative waste management to responsible business development in small tourism-based towns.

# CARTI SUPPORT TEAM

## **APRIL WHALEN,** ADMINISTRATIVE SUPPORT ASSISTANT



For the past eight years, April Whalen has assisted with various projects by lending administrative support through budget tracking and monitoring, budget reporting and various other administrative duties.

Previously, she was Executive Director of the Northwest Territories Chamber of Commerce where she worked with First Nation Businesses, planned AGM's and promoted the Chamber.

## **SARVIN ERGIN,** ADMINISTRATIVE OFFICER, PROJECTS AND BUDGETS



Sarvin Ergin joined the CARTI team in 2023, where she is responsible for budget administration and reporting, in addition to various other administrative tasks.

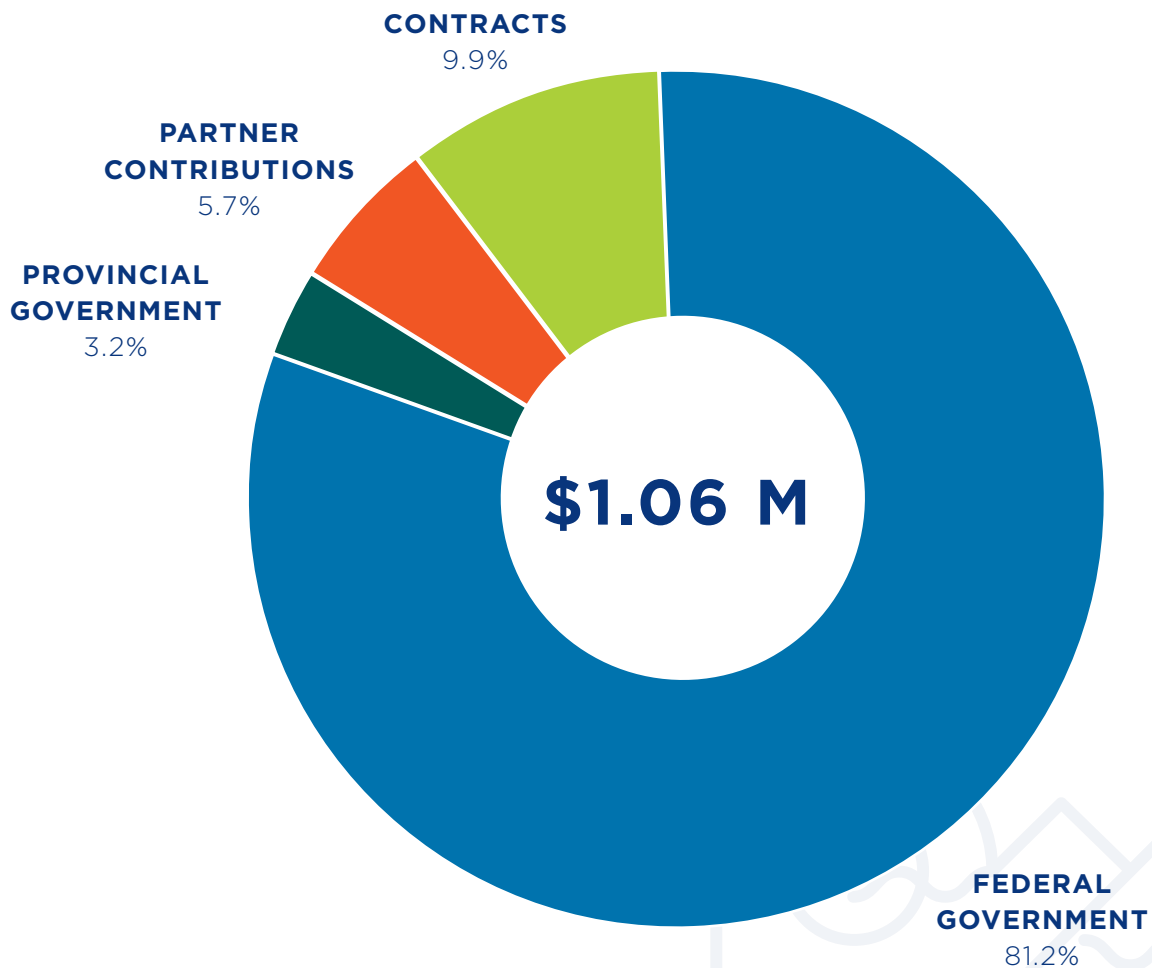
Holding a Master of Science from the University of British Columbia (UBC), she feels most at home in higher-education and research-oriented environments. Previously, she has served as a Research Grant Officer with the Research Accounting Team at Simon Fraser University and has worked as a Divisional Administrative Assistant to the Dean of Law at Thompson Rivers University.



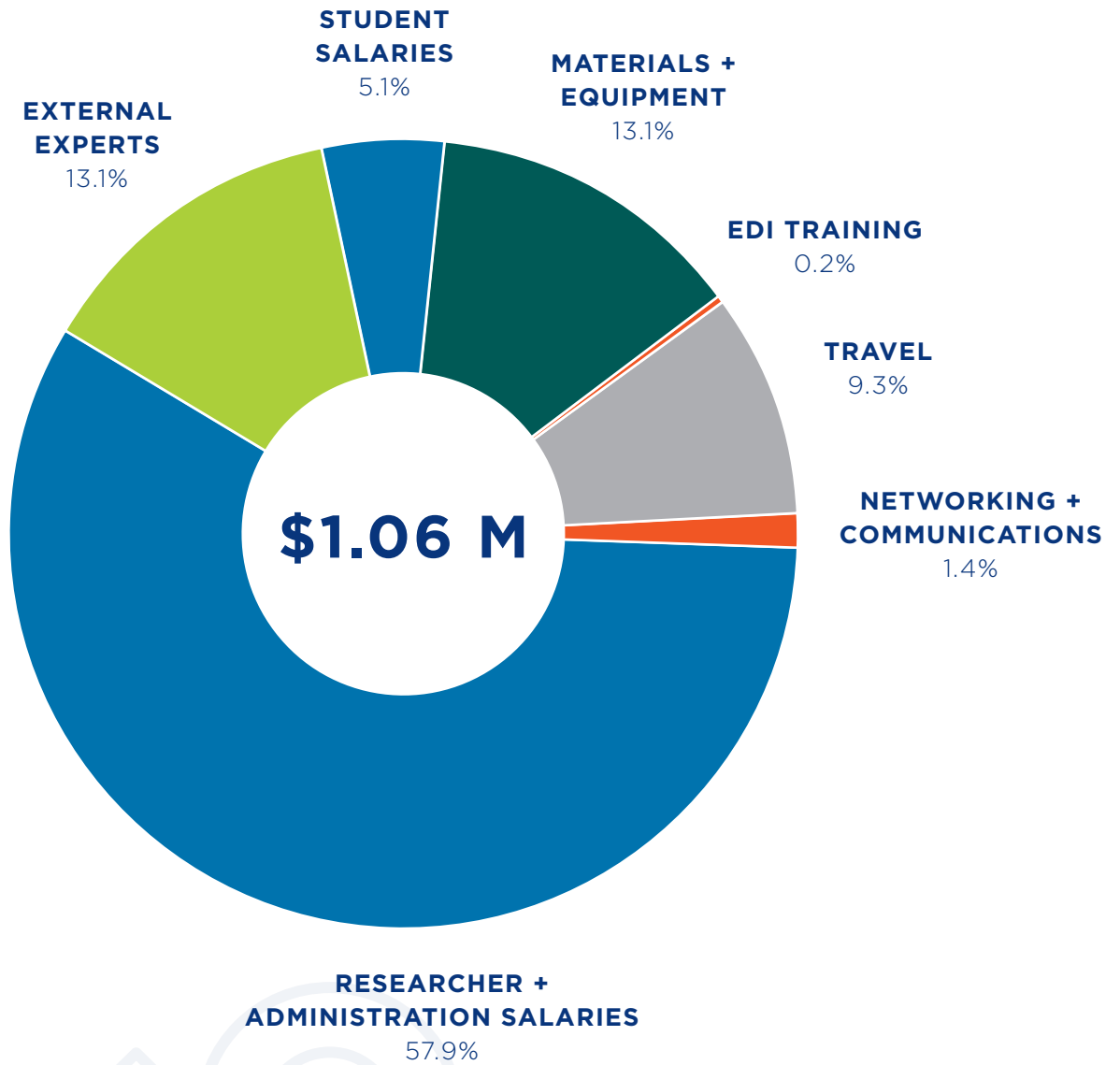
# CARTI AT A GLANCE

For the fiscal year ending in 2024, CARTI generated over one million dollars in revenue through federal and provincial government grants, partnerships, and contracts. Of this amount, over half was allocated to salaries for researchers, students, and the CARTI team. The remaining funds were utilized to cover expenses for external experts, research materials and equipment, travel for knowledge dissemination and research development, network building activities, and equity, diversity, and inclusion (EDI) training.

## REVENUE



# EXPENSES



# THANKS TO OUR 2023/24 FUNDERS



Supported by the Province of British Columbia



Fisheries and Oceans Canada



Supported by the Province of British Columbia





**NORTH ISLAND COLLEGE**

**CARTI**

**APPLIED RESEARCH TECHNOLOGY INNOVATION**

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