

OCEAN TO PLATE

LOBSTER INDUSTRY RESEARCH EXPERTISE MAP

NEW BRUNSWICK COMMUNITY COLLEGE

- AUTOMATION PRODUCTIVITY
- VALUE ADD

ST. THOMAS UNIVERSITY

- SOCIAL AND RURAL SCIENCES

UNIVERSITÉ DE MONCTON

- MARINE BIOLOGY
- AUTOMATION PRODUCTIVITY
- IRZC / VALORÉS - AQUACULTURE, FISHERY & MARINE BYPRODUCTS

UNIVERSITY OF NEW BRUNSWICK

- AUTOMATION PRODUCTIVITY
- LOBSTER BIOLOGY
- SOCIAL SCIENCES
- BIG DATA / DATA MINING LOT
- ECONOMICS

HOMARUS INC.

- LOBSTER RESEARCH INSTITUTE

HUNTSMAN MARINE SCIENCE CENTRE

- MARINE SCIENCE RESEARCH

COLLEGE OF THE NORTH ATLANTIC

- AUTOMATION PRODUCTIVITY

MEMORIAL UNIVERSITY & MARINE INSTITUTE

- LOBSTER BIOLOGY
- CONSERVATION
- WASTE WATER TREATMENT
- MARINE INSTITUTE - MARINE RESEARCH

ACADIA UNIVERSITY

- FISHERIES BIOLOGY
- LOBSTER GENETICS
- SOCIAL AND RURAL SCIENCES
- ECONOMICS
- VALUE ADD
- BIG DATA / DATA MODELING

CAPE BRETON UNIVERSITY

- WASTE MANAGEMENT
- LOBSTER BIOLOGY
- VALUE ADD

DALHOUSIE UNIVERSITY

- LOBSTER BIOLOGY
- VALUE ADD
- POLICY
- OCEAN MAPPING
- BIG DATA / DATA MANAGING
- AUTOMATION / PRODUCTIVITY
- SOCIAL SCIENCES

MOUNT SAINT VINCENT UNIVERSITY

- VALUE ADD

NOVA SCOTIA COMMUNITY COLLEGE

- OCEAN MAPPING
- FISHERIES BIOLOGY

SAINT FRANCIS XAVIER UNIVERSITY

- VALUE ADD
- AUTOMATION
- LOBSTER BIOLOGY
- BAIT

ST. MARY'S UNIVERSITY

- VALUE ADD
- BIG DATA / DATA MANAGING
- FISHERIES BIOLOGY
- LOBSTER GENETICS

UNIVERSITÉ SAINTE ANNE

- LIVE LOBSTER QUALITY

FISHERMEN AND SCIENTISTS RESEARCH SOCIETY OF NOVA SCOTIA

HOLLAND COLLEGE

- VALUE-ADD

UNIVERSITY OF PRINCE EDWARD ISLAND

- BIG DATA
- IOT
- DATA TRACKING
- AUTOMATION
- ECONOMICS
- LOBSTER GENETICS

AFRED DATABASE

(ATLANTIC FACILITIES AND RESEARCH EQUIPMENT DATABASE)



Atlantic Canada Opportunities Agency

Agence de promotion économique du Canada atlantique



Lobster Research Ecosystem

During consultations with industries in the food sector, which commenced in the fall of 2018, the initial input ACOA received was that only a small amount of research was being done that supported the food sector, and that there was duplication with little relevance.

ACOA therefore partnered with Springboard Atlantic to identify the capacity and ongoing work being led by university researchers.

This Lobster Research Expertise Map is the direct outcome of this work, with the following key points:

- A lot of work is under way, as the expertise map shows.
- There is little evidence of duplication or work that is not relevant in current research.
- At the same time, considering the importance of the sector, research support to the industry is limited and there are fundamental knowledge gaps related to behaviour, physiology and population. There is also a greater need for research to support innovation and competitiveness – technology and value-adding. This work is required to both support and sustain the industry and to increase its overall value.

Going beyond the Lobster Research Expertise Map, ACOA and Springboard further identified that the federal and provincial governments, lobster fishing associations and individual companies also conduct substantive lobster research as outlined below.

The Research Environment for Lobster

The **Federal Government** leads work related to lobster science through the Department of Fisheries and Oceans (DFO). Federal scientists are actively engaged in science to better understand population dynamics and how the changing environment may impact, or is impacting, the fishery. Scientists in other federal organizations such as the National Science and Engineering Research Council or Environment and Climate Change Canada are also conducting work directly or indirectly linked to lobster. DFO science research is often conducted in partnership with the Provinces, with industry and with academic researchers. For example, there are several longer-term data collection projects with fisheries associations that have been conducted in partnership between DFO science and the associations.

The **Provincial Governments** in Atlantic Canada have their own fisheries scientists working with industry and conducting research. Much of the provincial focus, especially in Nova Scotia and Prince Edward Island, has focused on lobster quality across the value chain. Provincial governments have also supported projects with companies and with fishing associations.

Many **Lobster Fishing Associations, whether individually or through the Lobster Node**, across the region have long been engaged in research, independently and in partnership. Historically the practical expertise of the harvesters themselves was sometimes overlooked when thinking about “research” and “experts.” In an era where significant change is occurring, this practical expertise is now being recognized as essential – they see and react to change in real time.

Individual companies have also conducted research. Understandably, much of the work is proprietary and is focused on specific needs. There has been significant work focused on handling and storage, as well as automation and integration of advanced technology.

Collaboration

While there is capacity and expertise, historically there has been significant fragmentation in the sector. Through the work of the original Lobster Node, the Lobster Council of Canada, individual processing and harvesting associations and government, there is a much greater spirit of co-operation in the industry.

Nonetheless, considering the potential speed of change due to the climate and the need to solve industry-wide issues such as labour, traceability and automation, collaboration is required now more than ever.

Lobster Research / Service Expertise prepared by Springboard Atlantic Inc. and Atlantic Canada Opportunities Agency

Recherche sur le homard / Expertise de service préparée par Springboard Atlantic et l'Agence de promotion économique du Canada atlantique

Province: New Brunswick Nouveau-Brunswick

| Collège communautaire du Nouveau-Brunswick (CCNB) | | | | |
|--|--|---|--|---|
| Contact: Alain Doucet (Industrial Liaison Officer): 506-547-2190 email: alain.doucet@gnb.ca | | | | |
| Professor/Instructor/Technician - Professeur/Instructeur/Technicien | Department | Field(s) of Research / Service provided/ Service to be provided - Domaine(s) de recherche / Service fourni / Service à fournir | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects - Travaux pertinents pour l'industrie du homard / Projet en cours avec l'industrie du homard / Projets antérieurs | Links / Liens |
| Raphael Roy | Advanced Manufacturing & Welding | Electrical Engineering & Automation / Génie électrique et automatisation | Automation & Process management / Automatisation et gestion des processus | https://ccnb.ca/entrepreneurship-et-innovation/research-and-industrial-services/centres-and-specialized-services/mittc.aspx |
| Reno Albert | Advanced Manufacturing & Welding | Mechanical Engineering & Process / Génie mécanique et processus | Shrimp & Bycatch separator / Séparateur de crevettes et prises accessoires | |
| Youssef Boulahsen | Advanced Manufacturing & Welding | Instrumentation Technology / Technologie d'instrumentation | Automation / Automatisation | |
| André Vienneau | Advanced Manufacturing & Welding | Aquaculture & Tool & Dye / Aquaculture & outil & colorant | Oyster Washing Machine / Machine à laver pour les huîtres | |
| Patrick Hachey | Advanced Manufacturing & Welding | Tool & Dye & CNC machining / Outil & colorant & usage CNC | Oyster Bag Washing Machine / Machine à laver pour les sacs à huîtres | |
| Laurie Duguay | Advanced Manufacturing & Welding | Tool & Dye & Fabrication / Outil & colorant & Fabrication | Tooling development / Développement d'outillage | |
| Frank Feng | Advanced Manufacturing & Welding | Mechanical Engineering & Welding / Fabrication avancée & soudage | Advance welding methods / Méthodes de soudage avancées | |
| Satya Gajapati | Advanced Manufacturing & Welding | Mechanical Engineering & Welding / Fabrication avancée & soudage | Advance Welding methods / Méthodes de soudage avancées | |

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| Roderigue McGrath | Advanced Manufacturing & Welding | Fabrication | Advance manufacturing methods / Méthodes de fabrication avancées |
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| New Brunswick Community College (NBCC) | | | | |
| Contact | | Joni Leger (Applied Research Development Officer): (506) 869-6767 joni.leger@nbcc.ca | | Scott Henwood (Applied Research Development Officer): (506) 453-2101 Scott.Henwood@nbcc.ca |

| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
|---------------------------------|---------------|---|---|---|
| Darren Dorcas Dave Irvin | Culinary Arts | Value Added Food / Recipe Development | Partnered with Longshore Fisheries, a lobster & seafood processing facility, to develop new products from ingredients that previously had gone to waste | http://nbcc.ca/applied-research/research-projects/value-added-food-product-development |

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| St. Thomas University (STU) | | | | |
| Contact: Lauren Eagle ph: (506) 452-0621 email: research@stu.ca | | | | |

| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
|---------------------------------|------------|---|---|-------|
| Dr. Susan Machum | Sociology | Rural Issues: social justice, sustainability, agriculture, economics, Conservation Council of NB, value of locally produced goods, production-consumption cycle | Grass-root initiatives promoting sustainability & socially-just economic practices; established partnerships with community leaders & activists. 5-year CRC on instilling public confidence in the value of local food production, ensuring women's contributions to rural life are recognized & fostering interest in rural-urban collaboration. Studied how underlying social processes & food agricultural policies & practices affect rural NB. Studies how local populations have responded to global economic & political processes, how agricultural policy helps/hinders family farming, examine the roots of current agricultural policy directions, study rural activism. | |

Université de Moncton (UdeM)

Contact

Valérie Bonnardel-Vacqué, Directrice - Bureau de Soutien à l'Innovation: (506) 858-4454 valerie.bonnardel@umoncton.ca

Pauline Roy Directrice - Centre Assomption de recherche et de développement en entrepreneuriat (CARDE) (506) 874.6767 pauline.roy@umoncton.ca

| Professor/Instructor/Technician - Professeur/Instructeur/Technicien | Department | Field(s) of Research / Service provided/ Service to be provided - Domaine(s) de recherche / Service fourni / Service à fournir | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects - Travaux pertinents pour l'industrie du homard / Projet en cours avec l'industrie du homard / Projets antérieurs | Links / Liens |
|--|--|--|---|---|
| Chiasson, Alyre G. | Biologie / Biology | | | http://professeur.umoncton.ca/umcm-chiasson_alyre/ |
| Lamarre, Simon | Biologie / Biology | | collabore presentement dans une recherche sur le crabe / is currently collaborating in crab research | http://professeur.umoncton.ca/umcm-lamarre_simon/ |
| Miron, Gilles | Biologie / Biology | | | http://professeur.umoncton.ca/umcm-miron_gilles/ |
| Surette, Céline | Chimie et biochimie / Chemistry & Biochemistry | | | http://professeure.umoncton.ca/umcm-surette_celine/ |
| Yassine Bouslimani | Génie électrique / Engineering | l'automatisation de processus pour des usines de transformation des produits de la mer / process automation for seafood processing plants | la robotique, l'automatisation, la vision, le contrôle, l'intelligence artificielle des usine a travers l'expertise en électronique et systèmes intelligents / robotics, automation, vision, control, artificial intelligence of factories through expertise in electronics and intelligent systems | https://www.umoncton.ca/umcm-ingenierie-electrique/ |
| Mohsen Ghribi | Génie électrique / Engineering | l'automatisation de processus pour des usines de transformation des produits de la mer / process automation for seafood processing plants | la robotique, l'automatisation, la vision, le contrôle, l'intelligence artificielle des usine a travers l'expertise en électronique et systèmes intelligents / robotics, automation, vision, control, artificial intelligence of factories through expertise in electronics and intelligent systems | http://professeur.umoncton.ca/umcm-ghribi_mohsen/ |
| Élise Mayrand | Biologie / Biology | Invertébrés marins; Réponses physiologiques à des stress d'origine anthropique et naturelle, dans le contexte de l'aquaculture des bivalves; Alimentation des bivalves; Physiologie hivernale; Développement durable / | | http://professeure.umoncton.ca/umcs-mayrand_elise/ |

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| Surette, Marc | Chimie et biochimie / Chemistry & Biochemistry | | | |
| IRZC / Valorès | partenaire avec UdeM / Paartner with UdeM | Multidisciplinary approach, research focused on aquaculture, fishery & marine byproducts, peat and peatlands. 4th research area relating to sustainable development of coastal zones underway. These research areas are supported by laboratory analysis & environmental services / Marine invertebrates; Physiological responses to stresses of anthropogenic and natural origin, in the context of bivalve aquaculture; Feeding of the bivalves; Winter physiology; Sustainable development | | http://www.irzc.umcs.ca/ |

| University of New Brunswick | | | | |
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| Contact: Matt Douglass (Knowledge Transfer Officer) 506-292-1135 m.douglass@unb.ca | | | | |
| Professor/Instructor/Technician | Department | to be provided | with the lobster industry/ past projects | Links |
| Remy Rochette | Biological Sciences (UNBSJ) | Ecology, Micro-Evolution and Conservation of Coastal Marine Invertebrates | Extensive lobster research experience | http://www.unb.ca/saintjohn/ase/research/rochettelab/index.html |
| Ian Church | Geodesy and Geomatics | Ocean Mapping | GIS ocean seabed mapping, particularly Canadian arctic. One of his current primary research interests are in integrating hydrodynamic numerical modelling with marine habitat mapping, among other areas. | http://www.omg.unb.ca/ |
| Herb Emery | Economics | Researches the development of the Canadian economy and the persistence of long-standing regional disparities. | Aside from understanding the economic fundamentals of growth in a small open economy, his work incorporates political, historical, cultural and other institutional factors that have shaped Canadian development processes. Will be approached to provide economic research on fishermen | http://www.unb.ca/faculty-staff/directory/arts-fr-economics/emery-herb.html |

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| Melanie Wiber | Anthropology | Forms of property rights in dairy and fishing quota, in genetics, and in cultural property, as well as community-based management and local ecological knowledge in the fisheries | Extensive background with DFO, Oceans Management Research Network, Coastal Community and University Research Alliance | http://www.unb.ca/fredericton/arts/departments/anthropology/people/wiber.html |
| Rickey Dubay | Mechanical Engineering | Advanced Process Control; Plastic Injection Molding | Potential collaboration opportunities with procession plants based on previous engagements | http://www.unb.ca/faculty-staff/directory/engineering-mechanical/dubay-rickey.html |
| Scott Bateman | Computer Science | Human Computer Interaction | Research areas are motivated by designing and building technology that works best for people. Potential to be applied to fishing vessels | https://www.cs.unb.ca/people/scottb |
| Mohsen Mohammadi | Mechanical Engineering | Additive Manufacturing | Marine Additive Manufacturing Centre of Excellence, potential to create and design manufacturing components (cages, vessels, etc.) | http://www.unb.ca/faculty-staff/directory/engineering-mechanical/mohammadi-mohsen.html |
| Audrey Limoges | Earth Sciences | Researches the impact of natural environmental and anthropogenic changes on aquatic systems. | Uses microfossils and geochemical tracers preserved in sediments to reconstruct changes in climatic, environmental and oceanographic conditions on time scales spanning decades to millennial that could be used to evaluate lobster habitat. | http://www.unb.ca/fredericton/science/depts/earth-sciences/people/audreylimoges.html |
| Suprio Ray | Computer Science | IoT and Big Data management, cloud computing. | These research areas are applicable to fishing vessels | http://www.cs.unb.ca/~sray/ |
| Brian Hayden | Biology | Satble Isotope Research | | |
| Audrey Limoges | Environmental | Sedimentary analysis | | |
| Yonghao Ni | Chemical Engineering | Pulp and Paper Packaging | | |
| Yuri Yevdokimov | Economics | Regional Climate Change Economics | | |
| John Bird | Law | Maritime and Environmental Law | | |
| Cassidy D'Aloia | Marine Biology | Ecology | | |
| Hsin-Chen Lin | Business | International Marketing | | |
| Barry Watson | Business/Economics | Economics security and wellbeing | | |

Homarus Inc.

Contact: Dounia Daoud, PhD Scientific Researcher ph: 1 (506) 532-2485 email: dounia@mfu-upm.com website: <http://www.homarus.org/>

Homarus Inc. is a non-profit research and development organization created by the Maritime Fishermen 's Union (MFU) in 2001 whose mission is to develop tools to ensure the sustainability of the lobster resource and its fishery. Objectives: / Homarus Inc. est un organisme de recherche et développement à but non lucratif créé par l'Union des pêcheurs des Maritimes (UPM) en 2001 dont la mission est de développer des outils pour assurer la durabilité de la ressource de homard et de sa pêche. Objectifs :

Develop practical and effective approaches for conserving marine ecosystem health / Élaborer des approches pratiques et efficaces pour conserver la santé de l'écosystème marin

Develop practical and effective approaches for enhancing fishermen economic viability / Développer des approches pratiques et efficaces pour améliorer la viabilité économique des pêcheurs

Increase scientific knowledge surrounding lobster biology and its habitat / Accroître les connaissances scientifiques sur la biologie du homard et son habitat

Develop educational tools for raising awareness amongst stakeholders concerning the importance of conserving marine ecosystem health / Développer des outils pédagogiques pour sensibiliser les parties prenantes à l'importance de conserver la santé de l'écosystème marin

Huntsman Marine Science Centre

Contact: ph: (506) 529-1200 website: <http://www.huntsmanmarine.ca/research-applied-science-services/>

The Huntsman Marine Science Centre is engaged in a broad range of marine science and applied research initiatives. Our efforts are focused on everything from marine biology to bird banding. We also have facilities that are research ready and capable of supporting a wide variety of research projects / Services de recherche et de sciences appliquées

Le Huntsman Marine Science Centre participe à un large éventail d'initiatives en sciences marines et en recherche appliquée. Nos efforts sont concentrés sur tout, de la biologie marine au baguage des oiseaux. Nous disposons également d'installations prêtes pour la recherche et capables de soutenir une grande variété de projets de recherche.

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Province: Newfoundland & Labrador

| College of the North Atlantic | | | | |
|---|-------------|--|---|--|
| Contact: Wayne Quilty (Director - Partnerships, Entrepreneurship and Community Engagement) (709) 643-7782 | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Paul Hearn | Engineering | Advanced Automation/Robotics for the Fish Processing Industry; Machine Design; Machine Vision Systems Design; Vision Guided Robot System Design; 3D Design and Modeling; 3D Printing Prototyping | Automated Snowcrab Robotic Workcell | https://www.youtube.com/watch?v=TNXkGOvdqAs https://www.linkedin.com/in/paul-hearn-p-eng-48880a3a/ |

| Memorial University & Marine Institute | | | | |
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| Contact: Matthew Grimes (Technology Commercialization Officer) (709) 864-3048 mtgrimes@mun.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Baiyu (Helen) Zhang | Engineering (chair in Coastal Environment) | Bio-based solutions for coastal pollution | Waste water treatment | https://www.mun.ca/research/explore/chairs/zhang.php |
| Dr. Barbara Neis | Sociology | Occupational Health and Safety, Local Ecological Knowledge and Science, Political economy, | Lobster fishery sustainability | https://mun.yaffle.ca/projects/1152 and https://www.mun.ca/soc/people/faculty-profiles/barbara-neis.php |
| Dr. Bing Chen | Engineering | Marine and coastal pollution mitigation | Waste water treatment | https://www.mun.ca/engineering/about/people/bingchen.php |
| Dr. David Schneider | Ocean Sciences | Environmental Biology | Conservation (lobster egg production) | https://mun.yaffle.ca/projects/1807 |
| Dr. Paul Snelgrove | Ocean Sciences | ecology/disturbance and anthropogenic impactsconservation (larval lobster) | | https://mun.yaffle.ca/projects/1799 and https://www.mun.ca/osc/psnelgrove/ |

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| Dr. Penny Morrill | Earth Sciences | Hydrocarbon Remediation/phytoremediation | Remediation | https://www.mun.ca/earthsciences/Our_People/Faculty/Faculty_Pages/Morrill.php |
| Dr. Robert G Hooper | Biology | Lobsters and Fishers in Bonne Bay | Conservation (tagg & release/commercial harvest) | https://mun.yaffle.ca/projects/1121 |
| Dr. Arnault Le Bris | Centre for Fisheries Ecosystems Research | Aquatic habitat restoration | | https://www.mi.mun.ca/departments/centreforfisheriesecosystemsresearch/ourteam/directorsandscientists/ |
| Dr. Deepaka Dave | Centre for Aquaculture and Seafood Development | Bi-product utilization | | https://www.mi.mun.ca/departments/centreforaquacultureandseafooddevelopment/ourteam/researchtechnicalpersonnelmarinebioprocessing/ |
| Dr. Sherrylynn Rowe | Centre for Fisheries Ecosystems Research | Stock Assesement | Works with lobster folks right now | https://www.mi.mun.ca/departments/centreforfisheriesecosystemsresearch/ourteam/directorsandscientists/ |
| Steve King (P.Eng) | Centre for Aquaculture and Seafood Development | Shell fish processing and automation | | https://www.mi.mun.ca/departments/centreforaquacultureandseafooddevelopment/ourteam/researchtechnicalpersonnelseafoodprocessing/ |
| | Centre for Sustainable Aquatic Resources | Fish Capture, Gear Design and Testing | | https://www.mi.mun.ca/departments/centreforsustainableaquaticresources/ |

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Recherche sur le homard / Expertise de service préparée par Springboard Atlantic et l'Agence de promotion économique du Canada atlantique

Province: Nova Scotia Nouvelle-Écosse

| Acadia University | | | | |
|---|-----------------------|--|--|--------------|
| Contact: Leigh Huestis (Director, Office of Industry & Community Engagement) 902-585-1425 leigh.huestis@acadiau.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Trevor Avery | Biology | Marine biologist/biostatistitian with research interests in population dynamics. | Interested in lobster population dynamics, long-term data sets and trends. | |
| Dr. Mike Stokesbury | Biology | Canada Research Chair specializing in marine animal movement, distribution and measures of abundance and quantifying how human activities in the coastal zone impact fish movement. Member of the Fish Tracking Network. | Currently involved in a large project (with the University of Mass School of Marine Science and Technology (SMAST) and an industrial partner) to produce absolute abundance estimates of sea cucumbers off the coast of NS using drop camera survey methods. We believe these methods could be used to survey lobster populations. | |
| Dr. Matthew McSweeney | Nutritian & Dietetics | Food scientist specializing in value added food product development and consumer sensory testing (Matt is Director, Centre for the Sensory Research of Food) | Interested in developing value added lobster products and consumer sensory testing. Have been involved in two lobster sensory trials. | |
| Dr. Don Stewart | Biology | Molecular ecologist/geneticist | Currently working with a sea cucumber fisher/producer to assay genetic variability and population size. These methods may be useful within the lobster industry. | |
| Dr. Danny Silver | Computer Science | Machine learning & data analytics - Director of the Acadia Institute for Data Analytics | Significant experience in all sectors, including agriculture/fisheries. | |
| Dr. Richard Karsten | Math & Stats | Tides and tidal currents, marine forecasts, sediment modelling, modelling marine life movements, impacts of climate change on Bay of Fundy | Significant marine modelling expertise (forecasts, sediment modelling, marine life movements, climate change). PI on large CFI project examining the role of tidal turbines in the Bay of Fundy. This project examines various aspects of marine ecology. | |

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| Dr. Kirk Hillier | Biology | Olfactory processing, and the relationship between odours and an animal's behaviour. We look at the very basis of insect pheromone processing, developmental control of pheromone perception and related neuroanatomy | Expertise in invertebrate neurophys may help develop better lobster baits or traps– adapting strategies for electroantennograms to aquatic studies. Other possible projects include using neurophys/behavioral studies to look at the effects of pollution, environmental hazards, human activities, etc on lobster behavior. | |
| Dr. Russell Easy | Biology | Genomics and proteomics exploring gene signatures and stress biomarkers in vertebrate and invertebrate species | Involved in 2 lobster-related projects, including a project to develop an artificial lobster bait using fish-derived proteins and a project to develop alternative uses for lobster shells. | |
| Dr. Suzanne (Suzie) Currie | Biology | Comparative animal physiologist: understanding how animals cope with environmental stress in marine and freshwater environment | Studies investigating the inherent plasticity (flexibility) of fish to cope with stressful conditions, such as climate change, that can be applied to lobster. | https://www.researchgate.net/profile/Suzanne_Currie |
| Dr. John Colton | Community Development | Socio economic impacts, sustainable community development, social acceptance & community engagement, community based agreements | | |
| Dr. Shelley McDougall | Business | Capital investment in innovative technologies, innovation funding and financing, ecofiscal policy | | |
| Dr. Graham Daborn | Biology | Ecological processes of the Bay of Fundy; effects of dams and energy extraction on biophysical processes; dynamics of plankton, fish, benthos and sediments | | |
| Dr. Anna Redden | Biology | Marine ecology, acoustic detection and tracking of marine life (fish, marine mammals and lobster), environmental effects monitoring in high flow tidal sites | Led a significant number of projects looking at various aspects of marine ecology, acoustic detection and tracking of marine life, environmental monitoring, etc. All of this work is applicable to the lobster industry. | |
| Dr. Paul Arnold | Engineering | Research and industrial experience in fish and shellfish waste management. Previously employed with National Sea Products as a project engineer for the company's meal plant operations in Nova Scotia and Newfoundland. | Interested in creating value-added products from fish and shellfish waste. | |

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| Dr. Vlad Zamlyunny | Chemistry | Corrosion Inhibitors and other barrier materials, biomimetic materials, biosensors and fuel cells | Involved in a project with a boat building company to examine boat corrosion protection using sacrificial anodes. Continued research may lead to an improvement in existing boat corrosion protection practices, benefiting the lobster industry as well as other related maritime industries that employ small watercraft. | |
| Dr. Donna Sears | Business | Marketing and hedonic consumption, tourism | | |
| Dr. Brian VanBlarcom | Economics | Assessing the economic impacts of various industries on the local (sub-provincial) economies. | Led various projects for government & funding agencies incl: Assessing the Economic Impacts of a Michelin Tire \$500 Million Expansion on the Kings County Economy, Assessing the Potential Economic Impact of Tidal Power Development in Nova Scotia & the Agriculture and Food Processing Industries in Kings County 2001-2010: An Input Output Analysis | |
| RESEARCH CENTRES | | | | |
| Acadia Institute for Data Analytics (AIDA) | Computer Science | Data Analytics focussed on agriculture, fisheries, food production, the environment, and green energy. | | https://aida.acadiau.ca/home.html |
| Acadia Tidal Energy Institute (ATEI) | Multidisciplinary | Expertise in the socio-economic, environmental and physical properties of the Bay of Fundy and surrounding waters | | http://tidalenergy.acadiau.ca/research.html |
| Coastal Ecology Lab | Biology | Quantifies and predicts the impacts of anthropogenic development on energy transfer in aquatic ecosystems using economic and culturally important fish species as indicators of ecosystem function and productivity. | | http://coastalecology.acadiau.ca/Home_Page.html |
| Acadia Laboratory for Agri-food and Beverage (ALAB) | Chemistry | Analytical lab providing state of the art research and analytical services to the wine, craft beverage and food industries. | | http://alab.acadiau.ca/home.html |
| Centre for the Sensory Research of Food | Nutrition | Provides opportunities to the food industry for developing and reformulating products | | https://nutrition.acadiau.ca/sensory-research-of-food.html |

Cape Breton University (CBU)

Contact: Sarah Conrod (Manager, Industry Partnerships & Research Commercialization) (902) 563-1842 sarah_conrod@cbu.ca

| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
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| Dr. Stephanie MacQuarrie | Chemistry | Innovative waste management for lobster shells - repurposing them into secondary products - processing (automation/labour) | Can assist by reducing disposal costs for lobster processors, provides potential secondary products, can have community impacts as immediate use for shells can eliminate odor from residual products. | |
| Dr. Stephanie MacQuarrie | Chemistry | Research around optimal filtration / new technologies to be used in shipping lobster over long distances / prolonged periods of time - transportation/holding/live storage | To assist in maintaining high quality product over longer storage / shipment times. | |
| Dr. Bruce Hatcher | Biology | Research on the impacts to lobsters and other aquatic life from environmental changes as well as from development projects that disrupt sea bed or areas bordering same. | For monitoring lobster migration due to changes in natural environment or other variables. | |
| Dr. Katherine Jones | Biology | Lobster biology/Impact of climate change | | |
| Dr. Tim Rawlings | Biology | Lobster biology/Impact of climate change | | |
| Dr. Martin Mkandawire | School of Science and Technology | Plastics | | |
| Dr. Stephanie Gilbert | School of Science and Technology | Processing/automation/labour | | |
| Dr. Beth Mason | Verschuren Centre for Energy and the Environment | Agriculture & Food Technologies, Aquaculture, Plastics, Lobster biology/Impact of climate change | The Verschuren Centre's Agri-marine platform focuses on conversion of marine co-products into high value feed and food ingredients. A biorefinery project currently underway converts marine byproducts into development of cutting-edge technology that turns unused marine biomass into commercial goods for feed, plant and food markets. | http://www.verschurencentre.ca/index.php/research/research-themes/agri-marine-industries |
| Dr. Sahand Ashtab | Shannon School of Business | Socio-economic impact | | |
| Dr. Robert Campbell | Shannon School of Business | Socio-economic impact | | |

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| Dr. Jasmine Alam | Shannon School of Business | Socio-economic impact | | |
| Dr. Keith Brown | Shannon School of Business | Socio-economic impact | | |

| Dalhousie University | | | | |
|--|---|--|--|--------------|
| Contact: Jolene McEachern (Manager, Truro and Halifax, Industry Liaison and Innovation) 902-(902) 956-9659 jmaceachern@dal.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Fraser Clark | Animal Science and Aquaculture | How do lobster respond to pathogens, pollution (agriculture and aquacultural pesticides) , storage , reproduction, larval health and survival, ocean acidification and climate change (temperature). | Projects with Sydney Harbour (Tar ponds); several projects with Clearwater on storage; recently completed a report for Northern Pulp regarding the potential impacts on lobsters with their new treatment plan | |
| Dr. Tyedmers Peter | Resource & Environmental Studies | New Zealand,Rock Lobster Fishery | Life Cycle Environmental Impacts of the New Zealand Rock Lobster Fishery | |
| Dr. Vinci Thomas | Philosophy - Arts & Social Sciences | New Zealand, Rock Lobster Fishery | Kantian - Cartesian Studies | |
| Dr. Walde Sandra | Biology - Science | New Zealand, Rock Lobster Fishery | Disturbance and Biodiversity in Streams | |
| Dr. Gill Thomas | Process Engineering & Applied Science | lobster | Processing and Packaging of Lobster Tomalley Reference Samples | |
| Dr. Prithviraj Balakrishnan - Raj | Agri-Plant, Food & Environmental Sciences | Plant Diseases/Pathology,lobster shells | Evaluation of lobster shell waste for plant disease management | |
| Dr. Robert Scheibling | Biology - Science | Oceans, Oceans and Inland Waters, Oceans and Seas,Ocean Acidification ,Climate Change,American Lobster, Multi-Stressor Effects, Biology | Elise Keppel - Climate Change Effects on Lobster Biology and Ecology | |
| Dr. Sarah Stewart-Clark | Agri-Animal Science & Aquaculture | Agriculture & Food Technologies, Aquaculture, lobster | Is Green Crab a Risky Bait for the Lobster Industry? | |
| Dr. Gill Thomas | Process Engineering & Applied Science | Products/By-products, Energy | Advisory Assistance and Technical Support in Development of Marketable By-Product From Lobster Processing Discards | |

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| Dr. Leon L. Josh | Electrical & Computer Engineering | First Nations | Lobster Parting Technique Study | |
| Dr. Anderson Derek | Agri-Animal Science & Aquaculture | Agriculture and Food Technologies | Evaluation of local lobster shell as an alternative calcium source for laying hens | |
| Dr. Robert Warner | Mechanical Engineering | Engineering | Design of a novel lobster trap with NS based company | http://nspddc.ca/about-the-centre/ |
| Dr. Matt d'Entremont | Mechanical Engineering | Engineering | Design of novel lobster bands with NS based company | |
| Faculty of Engineering at Dal's Halifax and Agricultural Campus in Truro | I.e.: Dr. Young Chang , Dr. Travis Esau, Dr. Gordon Price, Sophia He and others | Engineering | Young Chang: sensor development and imaging technology; Travis Esau: automation and mechanization; Gordon Price: Innovative Waste Management; and Sophia He: Chemical Engineering on biofuels and polymers which have included products for the protection of boats in the aquaculture sector. | https://www.dal.ca/faculty/engineering.html |
| Sara Iverson, Scientific Director | Ocean Tracking Network | Animal Tracking | Studies included looking at expansions of mussel farms on lobster distribution (C. McKindsey, IML, Gulf of St. Lawrence), lobster movements around tidal power sites in the Minas Basin (Anna Redden, Acadia, PI), and current work on winter movements of lobsters in the Bay of Fundy (Citizen scientists Darrin Porter in association with OTN). And we tracked the Amazing Race Canada Lobsters. | http://oceantrackingnetwork.org/research/ |
| Dr. Boris Worm | Biology | Marine Biodiversity in space and time, Ecosystem Oceanography, | Ecosystem oceanography: understanding the dynamics of a changing ocean' comes from the National Science and Engineering Research Council of Canada. Analyze the causes & consequences of recent changes in marine food webs. Attempt to analyze the potentially complex interdependencies of observed changes in predator & plankton abundance throughout the world's oceans. | |
| John Batt, Manager | Aquatron Laboratory | Canada's largest university aquatic research lab | Advisory Assistance and Technical Support in Development of Marketable By-Product From Lobster Processing Discards | |

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| Doug Wallace, CERC-Ocean | Oceanography | Ocean carbon cycle, Ocean-atmosphere exchange, Ocean time-series observations | | |
| | Marine Affairs Program, Faculty of Science | | Multiple Options | https://www.dal.ca/faculty/science/marine-affairs-program/research.html |

| Mount Saint Vincent University (MSVU) | | | | |
|--|-------------------------|--|--|---|
| Contact: Danielle Goodfellow (Industry Liaison Officer) (902) 420-5270 danielle.goodfellow@smu.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Bohdan Luhovyy | Applied Human Nutrition | Functional foods and food derived bioactivities, product development, human food trials and sensory evaluation | | http://www.msvu.ca/en/home/programsdepartments/professionalstudies/appliedhumannutrition/facultyprofiles/BohdanLuhovyy.aspx |

| Nova Scotia Community College (NSCC) | | | | |
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| Contact: Dwayne MacLeod (Community Innovation Lead) 902-670-5152 dwayne.macleod@nsc.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Craig Brown | Applied Research | Seafloor Habitat Mapping/Ocean technology R&D | Predictive habitat maps of scallop and lobster habitat - Bay of Fundy (DFO and Full Bay Scallop Association) | https://www.cbu.ca/faculty-staff/faculty/bruce-hatcher/ |
| | | Underwater Imaging Systems | Collaboration with Cape Breton Fish Harvesters Association | https://cogsnscc.maps.arcgis.com/apps/Cascade/index.html?appid=cf032e114519410f8237da2390e9bc06 |
| Dr. Mathew Vankoughnett | Applied Research | Ecosystem ecologist, biogeochemical cycling, plant ecology, ecophysiology, microbial ecology, and global change ecology. | Climate Change (impact on lobster taste); Use of lobster waste as fertilizer; Recipe development for value-add products | |
| Dr. Wayne Groszko | Applied Research | Energy research including Sensors (Weather, energy, other) | Fuel economy, vessel electrification/hybrid power | |
| Dr. Timothy Webster | Geomatics Research | Coastal mapping of habitats; Mapping migration patterns due to Climate Change | | |
| Mr. Jay Harris | Data Analytics | Market Pricing | | |

Saint Francis Xavier University (StFX)

Contact: Andrew Kendall (Manager, Industry Liaison) (902) 867-3660 akendall@stfx.ca

| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
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| Dr. Shajahan Gulam Razul | Chemistry | Modelling and applied experimental work in biochemistry, Biomolecular Simulations, utilizing Molecular Dynamics, Dissipative Particle Dynamics and Monte Carlo techniques. Agri-Food systems, Analytical chemistry, food preservation | (1) Reducing Freezing Damage to Lobster Meat: Development of a novel cryoprotectant for raw lobsterélobster meat. (2) Measuring Lobster Fullness: Development of a non-invasive & portable tool for accessing meat content in live lobster, and (3) Preserving Meat Quality During High Pressure Processing | Razul Research Lab |
| Dr. David Risk | Earth Sciences, Altus Group Chair in Emissions Research | Technology development; measurement of gas emission from soils, isotope tracers, and sensor techniques; natural ecosystems, soil microbial dynamics in cold ecosystems; Energy industry sensor techniques to detect fugitive emissions (gas leaks) in energy developments. | Signal transformation, embedded software and associated tech hardware for lobster fullness tool research project | Fluxlab |
| Dr. Russell Wyeth | Biology | Invertebrate neuroethology, behaviour, and neurobiology. Neural control of navigation in sea slugs, snail sensory systems, and odour-based navigational strategies. SCUBA, video analysis of behaviour, confocal microscopy, electrophysiology, mathematical modeling, lobster physiology, lobster health | Lobster health, working on mechanics to secure lobster in lobster fullness tool research. | Wyeth Lab |
| Dr. Russell Wyeth | Biology | Assay system for testing different potential baits to identify ‘best’ baits (nutrition, cost, availability) | Identifying more efficient but still cost-effective baits, without bothering or imposing on fishers who cannot afford any down-time to undertake field testing. | Wyeth Lab |
| Dr. Russell Wyeth | Biology | Optimal Lobster bait and trap configurations for more efficient capture and resource management (e.g., relative positions of traps, kinds of bait, soak times, etc.) | Good evidence that lobster bottom travel activity & bottom travel patterns are strongly influenced by odour plumes from bait in traps. Knowledge can be used to trap lobsters more effectively (of interest for fishing on the shelf areas, provide more fishing efficiency, & resource management knowledge). | Wyeth Lab |

| St. Mary's University (SMU) | | | | |
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| Contact: Kevin Buchan (Director, Office of Innovation and Community Engagement) (902) 491-6297 kevin.buchan@smu.ca | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Dr. Pawan Lingras | Mathematics and Computing Science | Data mining, artificial intelligence, soft computing, information retrieval, image recognition | | http://www.smu.ca/research/dr-pawan-lingras.html |
| Dr. Jason Rhinelander | Engineering | Machine learning, big data applications, underwater SONAR imagery for automated identification of objects. | | http://www.smu.ca/research/dr-jason-rhinelander.html |
| Dr. Anthony Charles | Environmental Science/ Finance, Information Systems and Management Science | Fisheries economics, fishery rights, fishery management and governance, policy and planning, Indigenous fisheries | | http://smu-facweb.smu.ca/~charles/ |

| Université Sainte Anne (U-SA) | | | | |
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| Contact: Valérie Lalonde (Agente de recherche et développement) (902) 260-3110 valerie.lalonde@usainteanne.ca | | | | |
| Professor/Instructor/Technician - Professeur/Instructeur/Technicien | Department | Field(s) of Research / Service provided/ Service to be provided - Domaine(s) de recherche / Service fourni / Service à fournir | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects - Travaux pertinents pour l'industrie du homard / Projet en cours avec l'industrie du homard / Projets antérieurs | Links / Liens |
| Michelle Theriault | Centre de recherche marine / Center for Marine Research | Live Lobster Quality / Qualité du homard vivant | Lobster Handling, Lobster Handling Course, Lobster Transport, Lobster Physiology, Industry Training / Manipulation du homard, cours de manipulation du homard, transport du homard, physiologie du homard, formation industrielle | https://www.usainteanne.ca/centre-de-recherche-marine |
| Aleasha Boudreau | Centre de recherche marine / Center for Marine Research | Lobster Physiology / Physiologie du homard | Technical work on lobster handling, holding and transport / Travaux techniques sur la manipulation, la détention et le transport du homard | https://www.usainteanne.ca/centre-de-recherche-marine |

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| Daniel Lane | Science - Centre de recherche marine / Center for Marine Research | Fisheries Management, Climate Change / Gestion des pêches, changement climatique | Natural Resources System Modeling, Lobster Molt Predictive Analyses / Modélisation des systèmes de ressources naturelles, analyses prédictives de la mue du homard | https://www.usainteanne.ca/contact/campus-de-petit-de-grat/daniel-lane |
| Valerie Lalande | Laboratoire d'innovation en science et en industrie / Laboratory for Innovation in science and industry | Biochemistry, Microbiology, Genetics / Biochimie, microbiologie, génétique | Holding systems chemistry & microbiology evaluation and optimization. Lobster genetics & transcriptomics analyses / Évaluation et optimisation de la chimie et de la microbiologie des systèmes de conservation. Analyses génétiques et transcriptomiques du homard | https://www.usainteanne.ca/lisi |

Fishermen and Scientists Research Society of Nova Scotia

Contact: Shannon Scott-Tibbetts (Director of Operations) ph: (902) 461-8119 email: Shannon.Tibbetts@fsrs.ns.ca or info@fsrs.ns.ca website: <https://fsrsns.ca/>

A non-profit organization, is an active partnership between fishermen and scientists to establish and maintain a network of fishermen and scientific personnel that are concerned with the long-term sustainability of the marine fishing industry in the Atlantic Region.

A partnership based on effective communication and common goals between fishermen, scientists and the general public facilitates collaborative research and the collection of relevant information that promotes the conservation of North Atlantic fisheries stocks.

Lobster Research / Service Expertise prepared by Springboard Atlantic Inc. and Atlantic Canada Opportunities Agency

Province: **Prince Edward Island**

| Holland College | | | | |
|--|---------------------------|--|---|---|
| Contact: Shawn MacDougall (Manager Research Development) (902) 566-9642 SAMacDougall@hollandcollege.com | | | | |
| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
| Chef Allan Williams | Canada's Smartest Kitchen | Product Development, bi-product/waste utilization | Value added products | https://www.smartestkitchen.ca/ |
| Chef Michael Bryanton | Canada's Smartest Kitchen | Product Development, Sensory, enzymatic reactions in cooking, organoleptic studies | Lobster Processing, value added products | https://www.smartestkitchen.ca/ |
| Chef Jennifer Bryant | Canada's Smartest Kitchen | Food Styling | Sell Sheets, Marketing | https://www.smartestkitchen.ca/ |
| | | | Examples of completed projects: | |
| | | | Conducting sensory trials on their cook times for lobster. | |
| | | | Ready-to-serve- lobster sauce for foodservice market. Also developed a Lobster Bisque Product | |
| | | | Reformulation of bonded and non-bonded formed lobster products (2015-16). Developed a "Lobster Slurry product (2017). | |
| | | | Reformulation of lobster dip. | |
| | | | Provided corporate Chef Services at an international seafood show. | |
| | | | Recipe development for showcasing products. | |
| | | | Corporate Chef Services at international seafood expo | |
| | | | Food Styling, food photography for marketing project. | |

University of Prince Edward Island

Contact: Marc Richard (Synapse - Technology Transfer and Industry Liaison Officer) (902) 894-2877 marc@synapsepei.com

| Professor/Instructor/Technician | Department | Field(s) of Research / Service provided/ Service to be provided | Relevant work to Lobster industry/Project on-going with the lobster industry/ past projects | Links |
|--|-------------------|--|--|---|
| Bishnu Acharya | Engineering | Bioprocessing and conversion of waste products to value added products - Plastics and alternatives | | http://www.upei.ca/engineering/faculty/bishnu-acharya |
| Ali Ahmadi | Engineering | Printing of Biomaterials; Bio-sensors; Lab-on-a-chip | Printing Chitosan based polymers | http://www.upei.ca/engineering/faculty/ali-ahmadi |
| Nadja Bressan | Engineering | Big Data to Knowledge; SCADA applications; design, modeling and control of mechatronic systems | | http://www.upei.ca/engineering/faculty/nadja-bressan |
| Nick Krouglicof | Engineering | Opto-Mechatronics; Intelligent Sensors and actuators for unmanned vehicles; Machine Vision | | |
| Grant McSorley | Engineering | Product lifecycle management, Systems engineering and Integrated product development | | http://www.upei.ca/engineering/faculty/grant-mcsorley |
| Trung Ngo | Engineering | Robotics and Intelligent Systems | | http://www.upei.ca/engineering/faculty/trung-ngo |
| William Whelan | Engineering | Processing automation (imaging of shell fragments in meat) | | |
| CERC Aquatic Epidemiology | AVC | Address gaps in knowledge on the dynamics between aquatic ecosystems health and health management of aquaculture | | |
| Dr. Spencer Greenwood | AVC | Lobster Pathogens, Lobster genomics | | http://www.upei.ca/avc/spencer-j-greenwood |