DALHOUSIE UNIVERSITY'S OCEAN RESEARCH STRATEGY 2021–2030

DALHOUSIE UNIVERSITY

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INTRODUCTION

DALHOUSIE'S OCEAN POWERHOUSE

Dalhousie University (Dal) is one of Canada's leading research-intensive university. Our students and faculty engage in learning and discovery across 13 faculties and attract more than $194 million in grants and awards annually. We host key ocean research facilities including the new Biological Oceanography laboratories in the Steele Ocean Sciences Building, the Aquatron and the Ocean Glider Facility.

Dalhousie has established itself as a world leader in ocean research and has embraced the United Nations Sustainable Development Goals (SDGs) identified as essential for a sustainable ocean.

Dalhousie's multidisciplinary approach and involvement in international research projects including the Ocean Frontier Institute (OFI); Ocean Tracking Network (OTN); Marine Environmental Observation, Prediction and Response (MEOPAR), and others allows Dalhousie researchers to contribute to the most pressing ocean challenges of our time.

HISTORY

Dalhousie ocean researchers were historically centred in the Faculty of Science, and Departments of Oceanography and Biology. The establishment of the Institute of Oceanography in 1959 launched a broader trajectory linking biological, physical, geological and chemical areas of ocean science, and eventually paving the way for a dedicated building (part of the Life Sciences Centre in 1971), the Aquatron facility, and a clearer mandate for transdisciplinary research and graduate teaching.

By the mid 1970s, Dalhousie's marine and environmental law group was also becoming established, leading to important initiatives such as the Dalhousie Ocean Studies Program (DOSP) and eventually, the establishment of the Marine and Environmental Law Institute in 2004, and the later development of the transdisciplinary Marine Affairs Program. The recent construction of the Steele Ocean Sciences building adjacent to the Life Sciences Centre has allowed important multidisciplinary initiatives such as the Ocean Frontier Institute to be housed adjacent to key ocean-related natural science departments.

DEVELOPING AN OCEAN RESEARCH STRATEGY – WHY NOW?

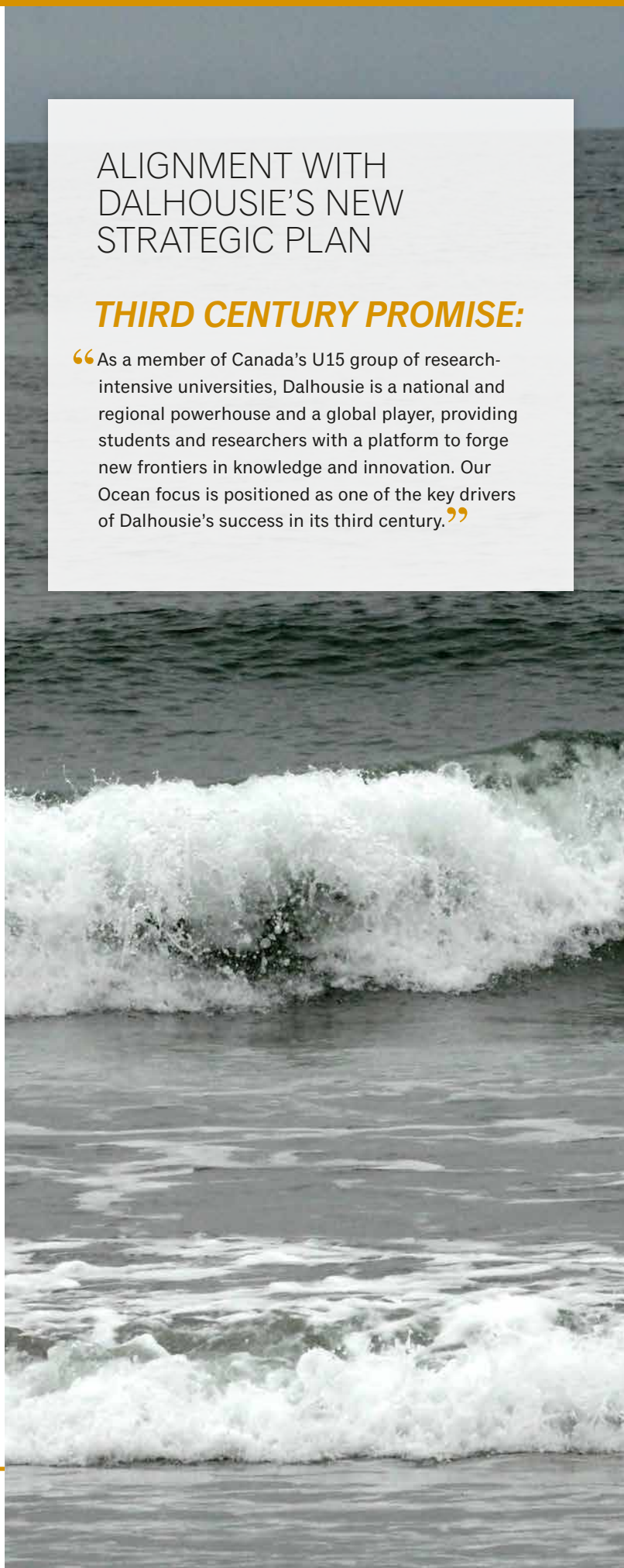
Recent initiatives have highlighted the challenge of integrating research at Dalhousie across ocean disciplines spanning the natural, social and applied sciences, as well as engineering and the humanities. As research funding patterns change, there is increased importance, indeed urgency, for linking fundamental research to societal needs and benefits, and communicating research findings to funding agencies, governments, industry and the general public.

Ocean research at Dalhousie currently spans almost all faculties and disciplines, such that it has become a complex mosaic of activity, resulting in multiple individual strengths and institutional initiatives, with timelines for ambitions and funding often crossing trajectories. So, while the research itself has become broader and richer, there is currently no single locus for ocean research at Dalhousie, and communication between researchers and between institutes and departments has become patchy at best. This leads to ongoing logistic and financial challenges in defining and supporting ocean activities at Dalhousie across the broad spectrum of activities. In addition, the development of increasing numbers of undergraduate offerings in ocean sciences has made new demands on faculty, while opening up new opportunities for graduate recruitment and for broader impact in the field.

ALIGNMENT WITH DALHOUSIE'S NEW STRATEGIC PLAN

THIRD CENTURY PROMISE:

"As a member of Canada's U15 group of research-intensive universities, Dalhousie is a national and regional powerhouse and a global player, providing students and researchers with a platform to forge new frontiers in knowledge and innovation. Our Ocean focus is positioned as one of the key drivers of Dalhousie's success in its third century."



STRATEGIC ALIGNMENT

CURRENT OCEAN RESEARCH LANDSCAPE AT DAL

"A Sustainable Ocean" is one of Dalhousie's five Signature Strategic Research Clusters (top of page 5). Activities in this cluster reach right across the Dal campus, and touch on all four of the Sustainable Ocean Strategic Research Clusters and themes (bottom of page 5). Ocean Technology and Engineering touches on Clean Tech / Energy, the marine Social and Human Impact are part of a broader effort in Culture, Society and Community Development, Marine Life impacts Food Security, and ocean health (Climate) impacts Healthy People, Healthy Communities, and Healthy Populations.

Ocean research, particularly in the natural and applied science, is nested in the requirement for, and generation and management of, big data. All areas of ocean research currently have interactions with industry, building and generating innovation, and talent and entrepreneurship that support business development.

RESEARCH THEMES AND CONNECTIONS

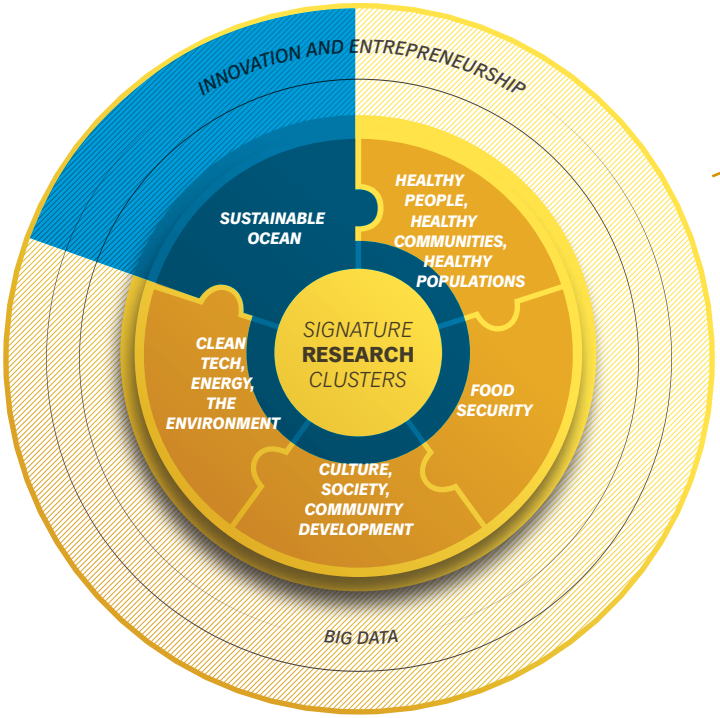
Ocean Research at Dal clusters under the four broad Sustainable Ocean Strategic Research Clusters and research themes defined below, all of which connect in numerous ways to our Ocean Strategic Pillars (Unify, Partner, Challenge, Impact on pages 6 and 7). These themes overlap in various ways and are not intended to be exclusive. Most research would fall under one or two of these overlapping themes:

1. **Climate Impact** — This theme includes physical, geological and chemical oceanography that seeks to understand ocean dynamics across multiple spatial and temporal scales. It would include ocean observations, modeling and prediction, aspects of biological oceanography and elements of marine risk.

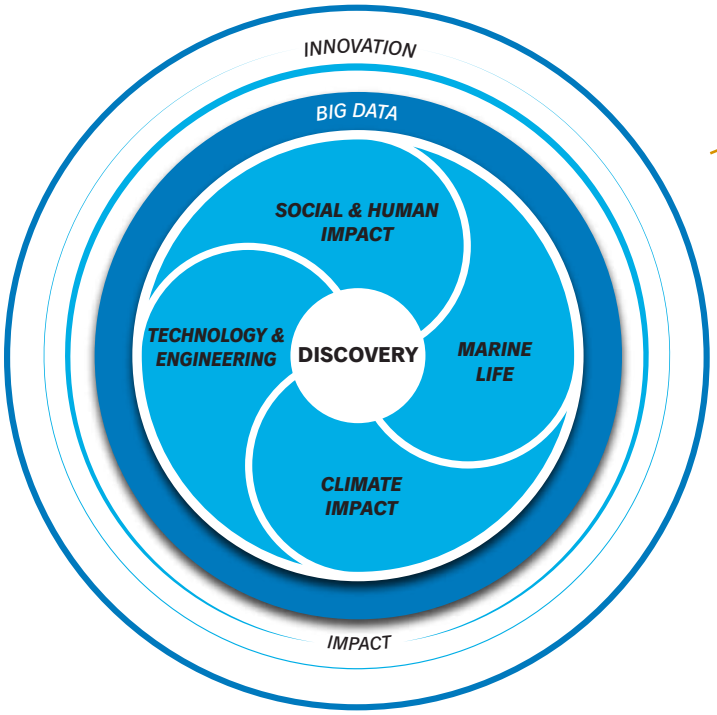
2. **Marine Life** — This theme includes fisheries and aquaculture, food security, ocean health, marine protection and ecosystem dynamics.

3. **Technology & Engineering** — This theme includes development of sensors, materials, tidal energy, underwater communications, analytics and autonomous vehicles.

4. **Social and Human Impact** — This theme includes marine and environmental law, policy and governance, cultural and social development of coastal landscapes and communities (including Indigenous communities), human adaptation to ocean change, human health and the ocean and ocean industrial risk.



Dalhousie's Signature Research Clusters



Sustainable Ocean Strategic Research Clusters

OUR PLAN

OCEAN MISSION

To continue to strengthen our tradition of excellent transdisciplinary ocean research and innovation, to build capacity in the ocean sector, and to create positive impact in our local, national and global communities.

OCEAN VISION

To be a global leader in solving ocean challenges through excellence in research, graduate education and innovation.

OCEAN STRATEGIC PILLARS AND PRIORITIES

1. **UNIFY** — bringing together the Dalhousie Ocean research community — We will connect across disciplines and enhance the integration of research and education.
    - 1.1 Define and clarify core roles of ocean institutes, initiatives, faculties and departments, integrating where advantageous
    - 1.2 Define, develop and integrate governance for ocean research, to link research efforts and ensure coherency
    - 1.3 Develop an integrated communication structure
    - 1.4 Identify gaps in research capacity and succession planning, and co-ordinate an approach for future hires
    - 1.5 Co-ordinate use and acquisition of major campus infrastructure and facilities, linking to integrated research program
    - 1.6 Co-ordinate funding initiatives and donor approaches across campus
2. **PARTNER** — facilitate innovation and knowledge transfer to government, industry and communities, with co-ordinated approaches to leverage activities and avoid duplication — we will partner with the world's best and will seek opportunities that build and expand relationships with industry and government locally, regionally and internationally.
    - 2.1 Build effective and lasting industry partnerships
    - 2.2 Build strong government research laboratory partnerships
    - 2.3 Build strong partnerships with Indigenous and other communities
    - 2.4 Deepen relationships and connections with transnational players to understand and bridge critical knowledge gaps

ALIGNING OUR WORK

OCEAN STRATEGIC PILLARS	DAL RESEARCH STRATEGY*
Unify →	Connect
Partner →	Partner
Challenge →	Propel
Impact →	Drive Impact

* Taken from *Impact Together: Dalhousie's Research and Innovation Strategic Direction* (2018)

3. **CHALLENGE** — bring transdisciplinary ocean research to the next level — we will propel research excellence by attracting and retaining the best researchers and graduate students while fostering diversity, all with the ultimate aim of addressing global challenges and national priorities with interdisciplinary teams.

   3.1 Facilitate research integration and build collaborations across disciplines

   3.2 Bridge priority knowledge gaps to solve research grand challenges

   3.3 Support top-level recruitment and retention

   3.4 Create pathways for future generations of ideas, enabling Early Career Researcher (ECR) leadership

4. **IMPACT** — we will drive impact through translational research and innovation, leveraging research to drive social, cultural and economic development. We will contribute to international / global ocean initiatives.

   4.1 Support science-based policy and industry linkages

   4.2 Align and translate research into policy, innovation and community impact

   4.3 Build and maintain effective outreach to the public

   4.4 Co-ordinate external communications across ocean research activities to maximize impact

OUR CONSULTATION PROCESS

Identifying and creating opportunities for consultation and feedback, both informal and formal, was a critical step in developing Dalhousie's Ocean Research Strategy. In the context of oceans, consultation is even more critical due to the immense scope of the subject matter and the stakeholders involved — our oceans and our collective research around them.

Consultation for Dalhousie's Ocean Research Strategy included:

1. Connecting with Deans, Associate Deans and other leaders across the university to better understand some of the great work that was happening.

This included the Faculties of Engineering, Science, Law, Management and Computer Science and a number of key departments, facilities and institutes, including DeepSense (deepsense.ca), the Department of Oceanography, MEOPAR and the Ocean Tracking Network. The feedback solicited was analyzed and used to validate some of our initial priority areas or "clusters" of work, each supported by an over abundance of tactics and operational plans across disciplines and departments.

Themes that emerged through these connections included:

ISSUES-CHALLENGES

- Organization/coming together
- Connect/link — acting in the aggregate
- Governance diffuse
- Management decentralized
- Coordination of approach to investors and donors
- Siloed Infrastructure
- Succession planning
- Capacity building
- Building Equity, Diversity and Inclusion (EDI)

OPPORTUNITIES

- Innovative solutions
- Fundamental and applied research
- Harness momentum across campus
- Knowledge mobilization
- Rationalize investments
- Diversify funding

HOW DO WE ADVANCE OPPORTUNITIES AND LEVERAGE CHALLENGES?

- Integrate operations
- Interdisciplinary and transdisciplinary research
- Integration of governance collaboration on science/knowledge
- Industry
- International linkages
- Build capacity — undergrad programming and field work to build capacity for the future
- Build capacity — attract best, replace best, mentorship — early career
- Integrate Indigenous knowledge
- Champion EDI

2. A virtual workshop for internal Dalhousie stakeholders was held with the goals of sharing back what we heard to delve deeper into some responses, asking some additional focused questions and moving closer to developing our final Strategy.

Recurring themes that emerged from the responses included:

- Facilitating a way to bring researchers together to communicate and share work and promote interdisciplinarity in research areas:
  - Conferences, workshops, summer school, etc.
  - Director of ocean research / supported office
  - Website and newsletters
  - Dalhousie Ocean Council
  - Coordinated / integrated approach to ocean research and funding research projects.
  - Bottom-up review (department level) of oceans related practices, research teaching, working synergistically with top down, oceans council type of agenda
- Key Research themes that might be unified across Dalhousie:
  - Big data — facilitating ways of sharing research data across different research areas
  - Climate change and impacts
  - Fish stocks and nutritional needs
  - Economy and societies
  - Human relationship with the ocean
  - Ocean plastics
  - Blue Economy
- Education
  - Overhaul interdisciplinary degree
  - Create interdisciplinary graduate program
  - Educate students with interdisciplinary lens to big challenges
- Building relationships with Mi'kmaw communities and facilitating representation in ocean research

3. A follow-up survey was distributed as an additional opportunity to once again, delve deeper and validate what was heard up to this point.

The survey focused on draft versions of the mission, vision, strategic pillars and strategic priorities. The following themes were consistently mentioned throughout survey:

- Under-representation of Black community in ocean science
- Ocean literacy and connection to climate change in the school systems and partnerships with high schools (guidance counselors, career advisors) to bring awareness of career opportunities in ocean science
- Partnerships with NGOs and community groups
- Engaging in public policy advocacy, i.e., contribute to national and international science-based policy
- Addressing gender bias in ocean science faculty members
- Teaching load of faculty and ability to devote time to research

NEXT STEPS

The Ocean Research Strategy provides a framework to bring coherency to our research and understanding around our shared activities and efforts. Faculties, units, institutes, and centres across Dalhousie will draw on this strategic framework, where relevant and appropriate, to shape their focus, priorities, and key initiatives for their own plans.

The planning and rigour involved in developing and launching our Plan enables us to better identify and assign measurable key performance indicators (KPIs).

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