

The Sobeys Fund for Oceans Presents



September 23rd and 24th, 2022

Student Union Building & Hybrid Delivery

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Dalhousie University, Halifax, NS

**SUSTAINABLE
OCEAN**

Sustainable Ocean Conference

September 23rd & 24th, 2022
Dalhousie University, Halifax, NS

We would like to begin by acknowledging that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People. This territory is covered by the Treaties of Peace and Friendship, which Mi'kmaq, Wəlastəkwiyyik (Maliseet), and Passamaquoddy Peoples first signed with the British Crown in 1726. The treaties did not deal with surrender of lands and resources but in fact recognized Mi'kmaq and Wəlastəkwiyyik (Maliseet) title and established the rules for what was to be an ongoing relationship between nations. We are all Treaty people.

The Sustainable Ocean Conference is the annual conference organized by the Master of Marine Management (MMM) students of the Marine Affairs Program at Dalhousie University and is supported by the Sobey Fund for Oceans. This event brings together a wide audience and is the only student-led conference of its kind in Atlantic Canada.

This year, the eleventh annual conference will be delivered in a hybrid format, in-person at the Dalhousie Student Union Building and virtually through our conference website at www.sustoceans.com on Friday, September 23rd and Saturday, September 25th, 2022. The conference will explore the theme 'Dive Deeper,' navigating below the surface of current marine issues to bring together a diverse audience of students, faculty, members of the marine community, and the public.

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Sobey Fund for Oceans

“I have a long history with both Dalhousie and WWF. It became clear to me that collaboration between our brightest young minds and our leaders in conservation is the key to solving some of the great challenges in our oceans. And that’s a goal that I share with both Dalhousie and WWF.”

- *Donald Sobey, The Donald R. Sobey Foundation*

The [Sobey Fund for Oceans](#) is made possible by a generous and innovative gift by Donald R. Sobey in 2013. It is a unique partnership that was formed by the Marine Affairs Program at Dalhousie University, “Canada’s Ocean University” in Halifax, Nova Scotia, and WWF-Canada, a leader in marine conservation.

The goal of the Sobey Fund for Oceans is to inspire innovative multi-disciplinary approaches for creating healthy oceans and sustainable economies. The Sobey Fund for Oceans provides resources to support scholarships and work placements to help tomorrow’s leaders see “beneath the surface” of our oceans’ problems to find lasting solutions.

Sobey Fund for Oceans Advisory Group

Jerry Bannister, Director, Marine Affairs, Dalhousie University

Becky Field, Administrator, Marine Affairs, Dalhousie University

Lucia Fanning, Professor Emerita, Marine Affairs, Dalhousie University

Jon Grant, Professor, Oceanography, Dalhousie University

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Sobey Fund for Oceans 2022-2023 Scholarship Recipients

Grace Akinrinola – Master of Marine Management



I am excited to start the Master of Marine Management (MMM) program at Dalhousie University and grateful for the support of the Sobey Fund for Oceans Scholarship. I have an educational background in Marine Biology, Marine Pollution and Management with over 7 years of experience in environmental impact assessment, implementation of ecosystem-based approach programs, and strategic marine-related research. Throughout my applied marine biology work, I continued to witness and develop an interest in the human dimensions of resource use, particularly aspects related to conflict and justice. I look forward to bringing my knowledge and experiences to the MMM program and developing an interdisciplinary approach to address contemporary issues in ocean and coastal management. Specifically, my research is to apply the DFO (Maritimes Region) Ecosystem-Based Management (EBM) Framework to the case of Treaty fisheries implementation (particularly lobster) to assess and understand gaps in what the Framework offers and what the Sipekne'katik First Nation community may need. Further, the newly developed Sipekne'katik Governance Initiative (SGI) will provide the Mi'kmaw lens against which DFO's EBM approach will be co-examined.

Brianna Crosby – Master of Marine Management



I am extremely grateful to have been chosen as a recipient for the Sobey Fund for Oceans Scholarship as I begin my Master of Marine Management at Dalhousie University. A lifelong love of the ocean and an undergraduate degree in biology has fostered my interest in coastal marine ecology. I am particularly interested in the conservation of native species and the management of invasive species along the coasts of Atlantic Canada. It is my hope that through the Marine Management program, I will learn how to effectively develop management policies that integrate citizen science as I believe that community involvement can be instrumental in conservation and management efforts.

Abigael Kim – Master of Marine Management



I am so very humbled to be receiving the Sobey Fund for Oceans Scholarship as I continue my studies with the Marine Management program at Dalhousie. Blending my love of the ocean and passion for supporting those communities that rely on its resources; my research is rooted in the socio-ecological dimensions of marine protected areas and the ability to achieve mutually beneficial outcomes for both ocean and community. I am passionate about creating marine management strategies that are ecologically sustainable and encourage resiliency and capacity building in coastal communities. My hope is that this work will drive socio-economic and ecological change across a diverse range of stakeholders and rightsholders, providing a common thread of conservation and capacity building through local, industry, and government partners, keeping our oceans healthy and our communities prosperous. I am extremely grateful to the Donald R. Sobey Foundation for their trust and support as I aim to reach these goals.

Adam Williamson – Master of Marine Management



I am hugely looking forward to pursuing a Master of Marine Management at Dalhousie, with no small thanks to the Sobey Fund for Oceans Scholarship. The interdisciplinary nature of this program is what made it attractive for me; my academic and professional background is mainly in freshwater ecological research, so I am excited to expand my knowledge and experiences through to marine research and management. I have always been interested in ecological restoration, as such I hope to explore the challenges and interdisciplinary approaches to marine restoration in Atlantic Canada and how solutions for better restoration outcomes can combine positive synergies among biodiversity gains, climate change adaptation and sustainable economic opportunity.

Welcome

On behalf of the 2021-2022 Marine Affairs Program students, we would like to warmly welcome you to **Sustainable Ocean 2022: Dive Deeper**.

The connections our world has to the ocean are limitless. It enables us to eat, breathe and travel while simultaneously linking people, cultures, and ecosystems. We have always relied on the ocean; however, this relationship has become threatened by human actions, bringing forth an abundance of challenges to repairing the relationship. Working toward a sustainable relationship with the ocean will require a diverse mosaic of perspectives and a deeper exploration of current marine issues. The question begs, if we want to save our ocean, what should we do? Where should we start?

At this year's Sustainable Ocean Conference, we are working to establish links between communities, government, industry, and academia to find a shared pathway towards ocean protection. This conference will provide a platform for discussion and constructive dialogue that may change the way we manage ocean policy and ocean sciences. These challenging conversations will be facilitated by: a panel discussion featuring diverse perspectives on Atlantic Canada's protected areas; two keynote speakers addressing Indigenous and scientific knowledge systems, community and Indigenous engagement and collaboration in Canada's Arctic; and a wide collection of oral and poster presentations from aspiring ocean leaders.

This year, we aim to encourage our attendees and our presenters to dive deeper into marine issues by highlighting challenges found below the surface. We hope to leave you with a desire to learn more from each other and work collaboratively to address the issues plaguing our ocean.

By working together with students and guest speakers, partnering with community organizations, and welcoming those from a variety of ocean backgrounds, we hope the conference is an instrument of knowledge sharing between local, national, and global perspectives.

Thank you for your support of our student-led initiative.

Kind regards,

Cailey Dyer, Armand McFarland, Michaela Mayer

Conference Co-Chairs | Sustainable Ocean 2022



Introducing the MMM class of 2021-2022

Co-Chairs
Cailey Dyer
Michaela Mayer
Armand McFarland

**Submissions
Committee**

Maryam Nakhostin
(lead)
Dylan Seidler (lead)
Marine Courtois
Abdirahim Ibrahim
Sheik Heile

**Marketing &
Outreach
Committee**

Carly Green (lead)
Samanta Martinez
Gwen Marty
Debra Sinarta

**Fundraising
Committee**

Raven Elwell (lead)
Kyle Gordon (lead)
Ian McLean
Drew MacLean
Krish Thapar

Logistics Committee

Claire Armstrong
(lead)
Hannah Kosichek
(lead)
Ela Cichowski
Raven Elwell
Laurel Genge
Corie Rooyakkers
Victoria Winslow



Schedule of Events

Friday September 23rd, 2022, 6:00 pm – 9:30 pm

- **6:00 pm – 7:00 pm** Welcome and Opening Ceremony
- **7:00 pm – 7:30 pm** Poster Session One - Current Waves in Conservation
- **7:30 pm – 9:00 pm** Panel Discussion
- **9:00 pm – 9:30 pm** Networking
- **6:00pm - 9:00pm** Raffle

Panelists

Dr. Anna Metaxas – Professor, Department of Oceanography, Dalhousie University

Patricia Nash – Indigenous Protected and Conserved Areas Manager, Unama’i Institute of Natural Resources

Dr. Joanna Smith – Director, Ocean Planning and Mapping, The Nature Conservancy Nature United

Max(in)e Westhead – Section Head, Marine Planning, Fisheries and Oceans Canada

Moderator: Raven Stephens Elwell, Marine Affairs Program, Dalhousie University

Saturday September 24th, 2022, 8:30 am – 5:30 pm

- **8:30 am – 9:00 am** Opening
- **9:00 am – 10:00 am** Oral Session One - Folks and Fish
- **10:00 am – 10:30 am** Poster Session Two - Charting Forward
- **10:30 am – 11:30 am** Oral Session Two - Sea Creature Features
- **11:30 am – 12:00 pm** Poster Session Three - Tide to Table
- **12:00 pm – 12:45 pm** Lunch
- **12:45 pm – 1:45 pm** Keynote Presentation
- **1:45 pm – 2:15 pm** Poster Session Four - Sustainable Shores
- **2:15 pm – 3:00 pm** Networking
- **3:00 pm – 4:00 pm** Awards + Prizes
- **4:00 pm – 5:30 pm** Networking

Panel Discussion: Coastal and Marine Protected Areas

Canada is home to the world's longest coastline, that spans over 243,000 km, and supports immense biodiversity and dynamic marine ecosystems. The ocean is a part of our Canadian identity, and our economy and culture are tied to marine and coastal spaces. The mosaic of connections Canadians have with the ocean has created a need for spatial management of these important areas. Responding to a changing climate and declining ocean health requires collaboration and knowledge that spans across disciplines, sectors and ways of knowing. This panel discussion will focus on Canada's Marine Protected Areas and involve discussion and presentations from a diverse array of experts who will dive deeper into the complexities of marine spatial conservation. Through this panel discussion, we hope to achieve diversity through depth by bringing together experts in the field to share their perspectives and insights on the issues affecting our ocean.

Panelists

Anna Metaxas



Anna Metaxas grew up in Greece spending every free moment as a child in the Mediterranean Sea. As part of her BSc degree she took a field course in Marine Biology at the Huntsman Marine Science Center, where after talking to her TAs and prof discovered that she could make a career out of playing in the sea. After a MSc in Oceanography from the University of British Columbia, a PhD from Dalhousie University postdocs at Harbor Branch Oceanographic Institution Woods Hole

Oceanographic Institution, she landed a job at Dalhousie where she is now a Professor in Oceanography. She studies marine benthic populations of ecological and economic importance, including invasive species. Her research group uses a combination of approaches, such as field sampling, laboratory experiments and mathematical modelling. She has worked in habitats from shallow rocky subtidal regions to the deep sea, including hydrothermal vents and deep-water corals, in temperate and tropical regions of the world. Her research has implications for marine conservation, such as the establishment and success of conservation areas. She is currently involved in many national and international initiatives that have as an ultimate goal the translation of scientific outcomes into information that is relevant to policy. She still seeks warm waters whenever she can and has spent time at the University of Western Australia in Perth and the University of Queensland in Brisbane. She is heading back in January on sabbatical leave.

Patricia Nash



Patricia Nash is the Indigenous Protected and Conserved Areas Program Manager at Unama'ki Institute of Natural Resources based in Eskasoni, NS. She grew up in the territory of her Haudenosaunee ancestors in southern Ontario and has an Honours BSc. in Zoology. Trish has worked with First Nation and Inuit Nations and organizations across Canada to strengthen their voices, identities, and self-determination. Currently she is working for the Mi'kmaq to establish Nova Scotia's first IPCA that will include terrestrial, island and marine habitats.

Dr. Joanna Smith

Dr. Joanna Smith is the Director, Ocean Planning and Mapping with The Nature Conservancy (TNC; Nature United in Canada). Joanna leads a global team for marine spatial planning (MSP), ecosystem services science, and conservation in support of TNC's oceans programs worldwide. Joanna's experience spans 20 years in science and resource management including seabird and fisheries research, ocean planning, government policy, governance frameworks and stakeholder engagement. She uses an ecosystem-based, multi-disciplinary and rights-based approach to develop marine spatial plans with governments and stakeholders, and has supported more than 10 active MSP processes globally including the Marine Plan Partnership in Canada and the Seychelles Marine Spatial Plan Initiative. Joanna received a Ph.D. from the University of Washington in Seattle, is a member of the IOC-UNESCO and EU DG Mare MSP global expert group, member of the High Level Panel Ocean Action 2030 coalition, and is an Adjunct Research Scientist at Memorial University of Newfoundland, Canada. Fun fact is that Joanna sailed with friends on a 13 meter sailboat from the Galápagos Islands to Victoria BC in 1999, a voyage that took 47 days. She published a paper in Marine Ornithology on the seabird communities in relation to oceanographic features for this unusual 9,000 km transect!



Maxine Westhead



Max Westhead holds a B.Sc in Marine Biology from the University of Guelph and a Master of Science in Marine Biology from Acadia University. Her graduate degree focused on the ecological impacts of clam and baitworm harvesting on the mudflats of the Minas Basin.

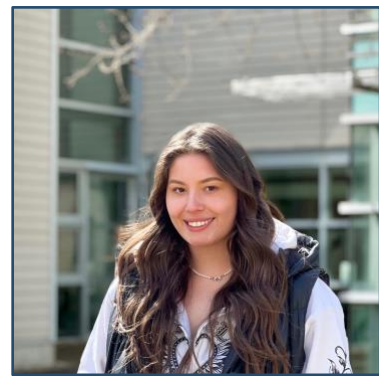
She has worked for the Marine Planning and Conservation Program with Fisheries and Oceans Canada (DFO) since 1998, mostly at the Bedford Institute of Oceanography. Max was Section Head of DFO's Marine Protected Areas

Program for the Maritimes Region from 2007 to 2018, and her team was responsible for a broad range of MPA activities – MPA network planning, identifying and designing new sites, consultation requirements, and ongoing management and monitoring of existing MPAs. From 2018-2019 she was National Manager of the Marine Spatial Planning Program in Ottawa, and she is currently Section Head of the Marine Planning team back in the Maritimes Region. Max is also the first Professional in Residence, and an Instructor with the Marine Affairs Program at Dalhousie University where she teaches the graduate level Marine Protected Areas course.

Max is a fitness enthusiast and is a CanFitPro certified fitness instructor and personal trainer, as well as a Level II CrossFit coach. When she is not at work you will most likely find her at the gym, either coaching CrossFit or working out.

Panel moderator: Raven Stephens Elwell

Raven Stephens Elwell is from Millbrook First Nation and is a former undergraduate student from Mount Allison University where she completed her Bachelor of Science degree. She is now currently a master's student studying Marine Management and is working as an intern for Department of Fisheries and Oceans Canada in the Marine Planning and Conservation sector.



Raven is passionate about marine conservation and restoration and her research paper focuses on deep-sea coral and sponge conservation with a particular interest in climate change integration. She hopes to identify the gaps within science and management and look internationally to attempt to fill in those gaps to aid in the development of a climate change monitoring and management strategy for deep-sea coral and sponges.

Raven also previously published her first book called *Painting our Legacy* which aims to celebrate the beauty and creativity of her Mi'kmaq culture through the artistic medium of makeup. Her book highlights Indigenous teachings and information on cultural heritage, sacred meanings, symbols, designs and more. Raven is also a member of the exec team for the marine affairs student society as a co-vice president, is co-lead of the fundraising committee and a part of the logistics committee. She also spends her free time volunteering with the Sculpt Shore project which aims to raise awareness for the endangered right whales by promoting and hosting local ocean clean ups.

Keynote Speakers

Kunuk Inutiq



Kunuk (Sandra) Inutiq is newly self-employed. She previously served as the Director of self-government at Nunavut Tunngavik Inc. (NTI), studying self-government for Nunavut. Before that, she was the Chief Negotiator for the Qikiqtani Inuit Association for the Tallurutiup Imanga National Marine Conservation Area’s Inuit Impact and Benefit Agreement. She has also worked as a Senior Associate for Inuit Nunangat at the Tides Canada Foundation (now known as MakeWay).

Inutiq has lived in various communities in Nunavut. She spent her childhood in Kangiqtualluk outpost camp and in Clyde River. In her youth she moved to Iqaluit, where she now lives. After graduating high school, she attended Nunavut Sivuniksavut, an Ottawa-based college program that teaches Inuit history, then returned to Iqaluit and took on a paralegal training position with Justice Canada. She then worked for Corrections with the Government of Nunavut, serving youth, before returning to school for an undergraduate law program at Carleton University for two years. Inutiq received her law degree from Akitsiraq Law School in 2005, and in 2006, she became the first Inuk woman in Nunavut to pass the bar exam. She has worked as legal counsel for the Government of Nunavut, as the Director of Policy for the Office of the Languages Commissioner, and also served as the Official Languages Commissioner for Nunavut.

Shari Fox

Shari Fox is of mixed settler descent, originally from Ontario, and has lived and worked most of her adult life in Nunavut. She is the Director of the Ittaq Heritage and Research Centre (Ittaq) in Clyde River, Nunavut and has worked with the community since 1999.

Shari is a geographer and research scientist with a background in both physical and social sciences. For 25 years, she has been dedicated to working on projects that centre Inuit knowledge and support Inuit leadership in research. She was a co-founding member of Ittaq in 2005 and has worked with Inuit on many local to international-scale projects across the Arctic. She holds bachelor and Masters degrees from the University of Waterloo, a Ph.D. from the University of Colorado, and completed a postdoc at Harvard University in Oceanography and the Kennedy School of Government. In addition to being the Director at Ittaq, Shari holds senior research appointments at Carleton University and the University of Colorado. A decade-long project she co-led with a team of Inuit, ‘The Meaning of Ice’, won the 2018 International Mohn Prize for “outstanding research related to the Arctic” and Shari was shortlisted for the 2022 Shackleton Medal for her work linking Indigenous and scientific knowledge systems. Shari loves being outdoors and on the land and is especially passionate about dog teaming, something she learned in Nunavut and has done for many years.



Poster Session 1: Current Waves in Conservation

Name: Katharyn Chadwick - katharyn.chadwick@smu.ca

Title: North Atlantic Right Whales: Stressing About Their Future

Abstract: The endangered North Atlantic right whale has been in decline since 2010 with leading causes of mortality and serious injury being attributed to anthropogenic activities, including vessel strikes and entanglement in fishing gear. Additionally, those individuals lucky enough to survive such encounters are often left with painful wounds and/or gear entanglements that can last from days to years. It is well documented in mammals such as humans, rats, and baboons that stress events can cause changes in gene expression (“epigenetics”) through impacts they have on DNA methylation levels, that can persist to death. With 50% of the right whale population having been entangled at least once and 80% of those more than once, there is a need to better understand the non-lethal impacts of these stress events on this critically endangered species, to inform appropriate management and conservation plans in both Canada and the US. The project aims to improve our understanding of the effects that non-lethal entanglement and vessel-strike are having with respect to individual health, fitness, and reproduction, via the analysis of changes to an individual’s global methylome and specific changes in DNA methylation patterns at loci/genes of interest. From this, downstream epigenetic effects of hyper- and hypo-methylation will be elucidated. It is thought that right whales will experience changes in gene expression following alterations in DNA methylation causing suppression or promotion of gene transcription. This research forms part of a PhD project being conducted at the Frasier Lab at Saint Mary’s University.

Name: Raven Elwell - rv447059@dal.ca

Title: The Integration of Climate Change Modelling, Monitoring and Management for Cold-Water Coral and Sponges in Eastern Canada

Abstract: Deep-sea cold-water coral and sponges are vital for maintaining ecosystem integrity. They can be found individually or in a grouping; both systems create habitat for marine species by providing an area to rest, spawn, feed and seek refuge. Deep-sea corals and sponges are both immobile species that contain long lifespans and slow-growing times, making them extremely fragile and vulnerable to surrounding threats and pressures. Canada contains multiple conservation strategy and methods; however, they’re ‘effectiveness’ is being limited by climate change. Direct impacts can be restricted but indirect impacts are estimated to create inhabitable environments for deep-sea corals and sponges which will bring them to extinction. With these species being relatively unknown the impacts from climate change can only be estimated. Canada has yet to fully implement a climate change monitoring and management plan for the deep-sea; and without proper instructions, these ecosystems will perish within the next 10-20 years. Nonetheless, international countries are further advanced and have produced deep-sea cold-water coral and sponge protection and restoration measures themselves. Canada often reviews international plans when developing their own policies; therefore, extensively reviewing international coral and sponge protection requirements and measures related to climate change adaptation, is crucial for understanding how to implement climate change into conservation methods that involve vulnerable species. Additionally, understanding how Canada can adopt such methods into future management and

monitoring plans. Recommendations will be presented and are hypothesized to include that climate change monitoring be implemented in conservation areas, and management needs to be further developed alongside scientific research to fully understand how to actively protect corals and sponges from further depletion.

Name: Samanta Martinez - samanta.martinez@dal.ca

Title: Exploring an Ecologically Significant Area in the Stewiacke River, Nova Scotia

Abstract: Canada's *Fisheries Act* was modernized in 2019 and included added protections to all fish and fish habitat. To implement some of the new provisions in the *Fisheries Act*, Fisheries and Oceans Canada (DFO) is working on a National Framework for Identifying, Establishing, and Managing Ecologically Significant Areas (ESA). An ESA is a spatial regulatory tool for the protection and conservation of fish and fish habitat and can apply to freshwater, estuarine, and marine waters. ESAs are areas of fish habitat that are sensitive, highly productive, rare, or unique. As there are currently no ESAs in Canada, DFO is working on case studies throughout Canada to better understand how ESA provisions could apply in practice and to inform the development of the National ESA Framework. In DFO's Maritimes region, one case study being explored is the Stewiacke River, as it is home to the last spawning ground for the Bay of Fundy Striped Bass (*Morone saxatilis*) population. Striped Bass is an important species in the region. It holds cultural importance to Mi'kmaw and is an important recreational fishery. The DFO *Guidance on Assessing Threats, Ecological Risk and Ecological Impacts for Species at Risk* was used as a guide for completing a risk assessment and adapted for the application to the ESA case study. The risk assessment was used to identify and analyze the human threats to Striped Bass spawning. Recommendations around applicability of the risk assessment for analysis of ESA case studies were made, and next steps for the Stewiacke River ESA case study were identified.

Name: Corie Rooyackers - corie.rooyackers@dal.ca

Title: Lessons in use of Marine Protected Areas for the Management of two Fisheries, Manta Ray and Conch: Comparative Analysis of Indonesia and Belize Experiences in Conservation of Economically Important Species.

Abstract: Many tools have evolved in the management of fisheries that sustain local economies. One of the tools that has received the most attention globally is marine protected areas (MPAs). Two well-documented fisheries that have been managed through the use of MPAs include the manta ray fishery in Indonesia, and the conch fishery in Belize. While both fisheries use MPAs, each state has taken a unique approach to the use of this management tool. This research aims to evaluate the effectiveness of the use of this method for each fishery, taking into consideration each areas' distinct cultures, environments, and regulatory frameworks. Lessons learned from the two case studies will provide insight and identify challenges that might arise for the future use of MPAs in fisheries management. A literature review and interviews will be used to critically analyze the operations of MPAs within Indonesia and Belize to develop insights about challenges and best practices regarding the use of MPAs for species protection.

Name: Audrey Salinger - audrey.salinger@smu.ca

Title: Genetic Impacts on the Recovery of Two Endangered Whale Species

Abstract: Despite several decades of conservation actions and protection from hunting, both North Atlantic right whales (*Eubalaena glacialis*) and St. Lawrence beluga whales (*Delphinapterus leucas*) have not shown substantial signs of recovery and remain critically endangered. Instead of rebounding as expected, these populations are currently in decline, which indicates that other (i.e., unintentional) factors are now limiting population growth and recovery. Therefore, for these two populations, it is critically important to identify what these limiting factors are in order to develop appropriate conservation initiatives to mitigate them. Genetic factors have been considered potential limiting factors for both populations since their research programs began. Both have markedly low levels of genetic variability and show several signs common in species suffering from inbreeding depression and/or low genetic diversity, such as high rates of neonate mortality from “natural” causes and evidence of compromised immune systems. The main goal of this work is to quantify the degree to which genetic factors, and inbreeding in particular, are influencing individual health and survival in both species by combining field data on individual health and mortality with genetic estimates of inbreeding from ddRADSeq methods. It is expected that inbreeding will be related with “natural” causes of mortality (e.g., cancer, birth defects, complications during birth), but unrelated with anthropogenic mortalities (e.g., ship strikes and entanglements in fishing gear). Integrated projection models will then be used to quantify how these individual effects combine to shape the overall recovery potential of both species.

Oral Session 1: Folks and Fish

Name: Michaela Mayer - michaela.mayer@dal.ca

Title: Sea Otter Monitoring to Inform Future Population Management Actions on the Coast of Vancouver Island

Abstract: The Maritime Fur Trade in the 1700s drove sea otter populations in Canada to commercial extirpation, resulting in utter depletion of sea otter populations and marking the end of commercial harvest for this species. Reintroduction programs and other conservation measures over the last 60 years have allowed sea otter populations to recover in some regions of their historical range along the Pacific Coast of Canada. The restoration of sea otter populations in this region poses a challenge for marine managers since stakeholders in the coastal community have widely varied perspectives on sea otters and their positive or negative impacts on the coastal environment.

My research question focuses on the current status of sea otter range expansion in western Juan de Fuca Strait and explores insights into appropriate management tools if sea otter densities increase in this area. Consideration will be given to measures that can be brought into place to ensure continued expansion of sea otters while minimizing the potentially negative impacts to the socio-economic activities in the region. I aim to compile information and insights through semi-structured interviews with stakeholders and a literature review on sea otter expansion that will inform an environmentally, economically, and socially sound plan to facilitate increased distribution of sea otters with minimal conflict. I will address the various dimensions of sea otter population management and the implications of sea otter range expansion on marine ecosystems and coastal communities on Vancouver Island.

Name: Dylan Seidler - dylan.seidler@dal.ca

Title: Marine-Based Research in a Changing Climate: Lessons and Methods for Community Engagement in Nunatsiavut

Abstract: Inuit in the Arctic are some of the first to experience the direct impacts of climate change. As these changes intensify, researchers are looking towards localized Inuit traditional knowledge to understand climatic dynamics. However, many projects rely on outside researchers collecting and interpreting this data. Moreover, due to its remote location, Arctic researchers often collect data and leave with little follow up. While research partnerships and initiatives can be collaborative, community benefits are often not the focus. Nunatsiavut is a unique territory run by the Inuit government with a research board to evaluate outside studies and assess alignment with community goals. This project explores how research conducted in this region can support community goals. This will be done through interviews with scientists, NGO representatives, community members and Nunatsiavut government officials involved in the Sustainable Nunatsiavut Futures (SakKijânginnaKullugit Nunatsiavut Sivunitsangit) Project, an initiative aimed at collaborating with Inuit communities. Through these conversations both useful strategies, and barriers encountered in efforts to engage Inuit community members will be identified. These will be evaluated against recommendations for community engagement outlined through previous

studies. Using the SNF project as a case study, this analysis will help inform a larger understanding of how both large-scale projects and individual researchers in the region may best proceed, when it comes to community engaged research. It will also be used in subsequent forms of engagement with Inuit community members to determine how research can align with their needs.

Name: Armand McFarland - armand.mcfarland@dal.ca

Title: Developing an Equitable Framework to Support Indigenous Co-Management of St. Anns Bank MPA

Abstract: Marine protected areas (MPAs) comprise a large proportion of the conservation measures used to achieve the international conservation commitments of the federal government (10% of Canadian waters by 2010, and now 25% by 2025). There is a substantial overlap of Indigenous territories and these ambitious federal goals that may lead to infringements on Indigenous rights. Sharing management of MPAs could be a suitable resolution to these impending infringements. Due to a confluence of Mi'kmaq interest, historical treaty rights, and burgeoning federal support, St. Anns Bank MPA (SAB) located east of Unama'ki (Cape Breton Island), may be a suitable location for implementing a framework of shared governance and Indigenous stewardship. Fisheries and Oceans Canada (DFO) is responsible for the management of this MPA; however, the maritime region of this department lacks the extensive co-management and relationship building experience present on the Pacific coast or within Parks Canada. This research will explore the question: how can DFO equitably support and implement a framework of Mi'kmaq participation and co-management in St. Anns Bank MPA? This question will be addressed with a two-pronged approach: a literature review will first investigate equity in the establishment, development, and management of two sites co-managed by Parks Canada, DFO, and the Haida Nation on the Pacific coast, to identify key principles. Identified principles are then applied using a comparative analysis between the East and West coasts to provide management, policy, and research insights for the co-management of St. Anns Bank MPA.

Name: Artash Nath – artash.nath@gmail.com

Title: Silence of Global Oceans: Acoustic Impact of the COVID-19 Lockdown

Abstract: Low-frequency noise from marine shipping is an underwater acoustic pollutant in oceans. The noise spectrum overlaps with frequencies marine mammals use to communicate and navigate, leading to stress and increasing collision with ships. The research established a model to measure the contribution of anthropogenic activities to underwater noise levels.

The COVID-19 lockdown led to a decline in marine traffic globally. The model quantified the reductions in noise levels before and during the lockdown in the Arctic, Atlantic, Pacific Oceans, and the Mediterranean Sea. Underwater ocean sound peaks between 10 – 100Hz and is dominated by noise from shipping traffic. Hydrophones (underwater microphones) data from seven ocean observatories were analyzed at 1Hz spectral and 1 min temporal resolution. Power spectral densities were calculated, aggregated into monthly long-term spectral averages, and noise levels in the 63Hz third-octave band compared to previous years.

The study found that global oceans quietened by an average of 4.5dB, or the peak sound intensity decreased 2.8 times during the lockdown period. The maximum decrease was at locations close to major shipping channels and cruise tourism destinations. The findings were validated by comparing shipping traffic using the satellite-based Automated Identification System. The study proved that strategic “anthropauses” can reduce underwater noise levels and give marine mammals a chance to reverse the decline in their population.

A web application *MonitorMyOcean.com* was created to provide updated anthropogenic noise levels in global oceans. Policymakers can determine if measures such as shifting shipping channels or moratorium on new shipping routes are leading to “Quieter Oceans.”

Name: Debra Sinarta - debra.sinarta@dal.ca

Title: Mapping and Assessing Blue Carbon Ecosystems in Canada

Abstract: Despite growing recognition of the potential for blue carbon ecosystems to sequester carbon, their value is often overlooked in marine management decisions and climate change policies. Canada has the world’s longest coastline that supports an extensive range of productive blue carbon ecosystems. Coastal and marine ecosystems can serve as buffers against anthropogenic climate change through their ability to sequester and store atmospheric carbon dioxide long term. Assessments of blue carbon extent and carbon storage evaluation methods are currently unrefined and costly. Consequently, blue carbon geospatial data and measurement tools remain limited across Canada. Blue carbon assessments of most Atlantic and Pacific ecosystems yet to be conducted, such as in the case of the Owls Head Provincial Park (OHPP) of the Eastern shore of Nova Scotia (NS) and the Marine Protected Areas (MPA) Network of British Columbia’s (BC) Northern Shelf Bioregion (NSB). To explore the mitigative value of OHPP and NSB, we will map the extent of blue carbon habitats and establish carbon budget baselines of ecosystems such as eelgrass, wetlands, salt marshes, and kelp forests. This work will help communicate the benefits to marine managers and highlight the conservation potential of areas of high carbon sequestration and storage.

Poster Session 2: Charting Forward

Name: Kyle Gordon - kyle.gordon@dal.ca

Title: Identifying potential spatial use conflicts between offshore wind development and commercial fishing in Nova Scotia.

Abstract: Offshore wind (OSW) is beginning to emerge as a major player within the Nova Scotia renewable sector as the province moves to fulfil its commitment of net-zero emissions by 2050. The addition of OSW as a new use in the ocean introduces a risk of spatial conflict with the various pre-existing uses including commercial fishing, shipping, aquaculture, tourism, and oil/gas. Approaches such as Marine Spatial Planning (MSP) seek to consider the needs and requirements of the various users so that potential spatial conflicts can be identified and proactively avoided. Marxan is a software designed to act as a decision support tool to aid in conservation, and other spatial planning issues. In this study, an MSP approach was applied using the software Marxan to proactively identify areas with high potential and areas with low potential for spatial conflict between future OSW development and the commercial fishing industry. The results of this study seek to develop an initial framework for the use of Marxan in OSW planning/siting and provide a practical demonstration of how MSP can be applied as an approach to address a complex issue within the context of Nova Scotia.

Name: Carly Green – carly.green@dal.ca

Title: Limited Options in Canada's Regulatory Tools for Addressing Underwater Noise

Abstract: Over the last two decades, noise has become recognized as a significant threat to marine mammals and fish. The risks of underwater noise are growing with a variety of increasing ocean activities. While the ocean is naturally noisy from waves, earthquakes, or other marine life, human activity adds to this environment. Underwater noises come from various sources such as vessels, seismic surveys, or construction. With so many users of ocean spaces, there is often spatial overlap between industries such as tourism, shipping, fishing, or scientific research. Marine Spatial Planning (MSP) can act as a tool to help decision-makers plan to minimize the negative impacts of underwater noise. However, there is still a lack of understanding of underwater noise and where it fits into developing marine spatial plans. Canada does not currently have any existing marine spatial plans. Therefore, it is vital first to utilize Canada's existing regulatory tools to develop comprehensive plans. Canada's federal legislation and regulation demand the inclusion of underwater noise. This study provides an overview of Canada's regulatory tools and their potential to regulate underwater noise. A deductive document analysis was completed to help understand the current gaps in the legislation. The result of this study is a total count of the relevant finds of terminology related to underwater noise. The term occurrence and qualitative analysis helped form conclusions from the text, which supports the need for additional measures to capture underwater noise restrictions within federal legislation and regulation.

Name: Hannah Kosichek - hn652899@dal.ca

Title: Seaweed Aquaculture: An Emerging Industry

Abstract: The escalating demand for seafood and the exploited states of wild-capture fisheries has led to increasing interest in aquaculture to meet global needs. Growing interest and development in seaweed aquaculture has focused on the opportunities it offers to contribute to delivering a safe and healthy food source, renewable biofuel, low-carbon feed and economic opportunities for coastal communities. With potential for economic and societal benefits, it has become an emerging industry with opportunities for sustainable growth in Canada. However, lack of aligned regulations, conflicting perspectives, technology barriers, minimal inclusive spatial planning and a limited understanding of the potential of seaweed have impeded growth of the industry. This research uses Nova Scotia as a case study to understand the potential for the seaweed aquaculture industry in Atlantic Canada and how marine spatial planning (MSP) might be used to plan for it. A literature review and SWOT analysis will be used to explore seaweed aquaculture and strategies for incorporating it into MSP. Cue methodology and semi-structured interviews will be used to explore the potential of the seaweed aquaculture industry in Nova Scotia. Understanding the barriers and opportunities currently impacting the seaweed aquaculture industry will help to understand it's potential in Atlantic Canada and the broader Canadian context. This will be meaningful in informing plans for emerging blue economy industries and how the coastal communities that constitute them should be considered.

Name: Gwen Marty - gwen.marty@dal.ca

Title: Exploring Local Knowledge and Interpretations of the Seafloor on the Eastern Shore of Nova Scotia

Abstract: Benthic ecosystems are poorly mapped and increasingly threatened by climate change, visualizing these changes can help characterize impacts and their associated effects on complex socio-economic, cultural, and ecological systems. Mapping the social and cultural values connecting people to benthic ecosystems alongside ecological and economic dimensions can increase our understanding of the seafloor, supporting holistic marine management that accounts for interconnected objectives and diverse knowledge systems. This research will explore how people engage with benthic and coastal environments, as well as document features and observed changes. This knowledge sharing will help define benthic ecosystem boundaries, or lack there of, which has important implications for the management of coastal and marine spaces. Participatory mapping workshops and semi-structured interviews will be used as a tool to document cross-cultural and local knowledge on the Eastern Shore of Nova Scotia, including uses, observed changes, historical information, place names etc. The results of this study will examine how participatory mapping can be an effective tool to define ecosystem-boundaries in a cross-cultural setting, to visualize complimentary cultural and ecological values. This methodology could be used to support future knowledge co-production with multiple ways of knowing and local people, the recognition of the interconnection between systems and the use of holistic, ecosystem-approaches in marine management.

Name: Victoria Winslow - vc415545@dal.ca

Title: Strategically Employing Conservation Measures through Marine Spatial Planning in Canada

Abstract: With increasing unsustainable usage and dependence on the oceans, there are concerns regarding the expected rise in conflict between human usage and the marine environment. As such, there have been efforts to develop ecosystem based management practices that can recognize the intersections between marine life and human uses, including the process of marine spatial planning (MSP). Given its importance in ensuring the long term sustainability of our oceans, the Canadian Government has committed to implementing marine spatial plans and has a mandate to do conservation via the Oceans Act. Currently, the Canadian Government has several laws and regulations that specifically pertain to marine conservation that prioritize different conservation objectives that could be considered when implementing MSP. This project seeks to analyze the existing provincial and federal ocean legislation and regulatory tools to determine how MSP can be used to strategically employ these tools, encourage synergies, and address potential gaps. In doing so, the full suite of tools available and their conservation objectives can be understood and summarized for future marine managers to understand how MSP can be used to enhance marine conservation objectives. This is especially important given the desire for the Canadian Government to implement several marine spatial plans by 2024 and their efforts to prioritize marine conservation within their national blue economy development plans. Overall, well executed marine spatial plans, through prioritizing marine ecosystems, can support blue economy development and assist in the long term sustainability of Canadian oceans.

Oral Session 2: Sea Creature Features

Name: Cailey Dyer - cailey.dyer@dal.ca

Title: Fishing Fairness: The Case of Class B Lobster Fishing Licenses

Abstract: In 1976 the lobster fishery in Atlantic Canada was in decline and overfished. In response, the national government implemented a “moonlighter policy” which designated fishers who had employment outside the fishery as a Class B license holder. Under this new designation, trap numbers were reduced by one-third and the transfer of the license was prohibited, requiring them to be retired with the license holder. In recent years, Class B fishers have sought to amend the policy to allow them to sell or transfer their license. They claim that the policy is no longer necessary given the current state of the fishery, and that it placed unfair burden of stock conservation on them.

The principles of fairness, particularly in the context of common pool resources and private property rights, have many different definitions, but similar connotations. Having different interpretations of these concepts has resulted in confusion and frustration when discussing the livelihoods of Class B lobster fishers as all sides interpret the issue differently.

The objective of this research is to review the theoretical underpinnings of the concepts of fairness, justice and property and examine how they are applied in the case of the Class B lobster license in Atlantic Canada. Through a series of semi-structured interviews with Class B license holders, this project seeks to understand how their experience and identity as lobster fishers define their concept of fair and sustainable management of this fishery.

Name: Marine Courtois - marine.courtois@dal.ca

Title: A Systematic Review on Socioeconomic Outcomes of the European Union’s Trade-based Measure for Seafood Sustainability

Abstract: Seafood is the most commonly traded food commodity on international markets. Over the past decade, predominant seafood market states have implemented trade-based measures in an effort to improve the transparency throughout the supply chain and to impose certain sustainability standards on the fishing practices and management in exporting states. Under the banner of “fighting IUU (Illegal, Unreported, and Unregulated) fishing”, these trade-based measures leverage the access to their commercially important markets to enact changes in fisheries management beyond the jurisdictions of these states. The European Union’s IUU Regulation (EC No 1005/2008) is one such trade-based measure implemented in 2010, aimed at closing the European market, accounting for 40% of the global imports of fish, to IUU. Through a system of yellow (warning) and red (import ban) cards, the EU-IUU Regulation has been unilaterally applied to 27 exporting countries in the past decade.

The objective of this research is to conduct a systematic literature review, based on nearly 75 peer-reviewed articles from 2010-2022, to summarize the observed socioeconomic outcomes of the EU-IUU Regulations on the fisheries and fishing communities of exporting states and to assess its effectiveness in addressing the IUU fisheries.

Name: Maryam Nakhostin - maryam.nakhostin@dal.ca

Title: Assessing Appropriate Conservation Strategies for Carpet Sharks

Abstract: Although there is considerable momentum for expanding protected area coverage under the 30x30 paradigm, there is key criticism of the existing targets in that they are not linked to conservation outcomes and biodiversity loss continues despite the rise in protection efforts. The success of different forms of conservation strategies is contingent on species-specific characteristics, such as behavior, body size, life-history traits, migratory range, as well as the nature of existing threatening processes. Due to their small average size (~8 km²) MPAs can be more beneficial for endemic species that are localized to smaller regions, than for larger and pelagic migratory species that inhabit and travel over larger ranges. This research develops a conservation classification scheme for the species of the family of carpet sharks, Orectolobiformes, that considers the species based on their distribution, biology, and threats to their populations. This group was chosen due to the large diversity in the size and traits of the species it encompasses; ranging from the walking shark that reaches a maximum length of 107cm and inhabits a geographic range of 28km² versus the significantly larger whale shark that can grow to a length of 2100cm and migrates over 171,000,000km². The findings reveal that only 33% of the Orectolobiformes would benefit exclusively from site-scale protection whereas the other 67% require either a combination of MPAs and fisheries management or solely the latter; illustrating that MPAs might not be the solution for protecting all marine biodiversity and conservation actions must match the species they are intended for.

Name: Herman Djoko, José LaFlamme, Anne Fauré - josee.laflamme@uqar.ca

Title: Alternative Baits in the Lobster Fishing Industry: Consumer Interviews

Abstract: Mackerel and herring are used as bait in the lobster fisheries. On March 30, the federal Department of Fisheries and Oceans (DFO) decided to close the directed commercial and bait fisheries. This decision concerns Southern Gulf herring and the Atlantic mackerel in Quebec and Atlantic Canada (DFO, 2022). More than 10,000 metric tons of lobster are caught each year in Quebec and 16,000 in New Brunswick (DFO, 2020). Alternative baits represent a sustainable and necessary solution for the industry. This study aims to identify the obstacles and motivations of lobster fishermen to the use of alternative baits.

The methodological approach is based on nine semi-directed interviews with fishermen from two groups: 1) members of a Quebec fishermen's association who do not have access to alternative baits, and 2) members of a New Brunswick association that used it. All the interviews were conducted in March 2022. They were planned to be virtually on Zoom but only four participants were familiar with video platform. Five interviews were on phone. We can group the results under the themes: availability, storage, price, and handling. They allow us to conclude on the reasons which motivate the fishermen to use the alternative baits but also the reasons to reject them. They also contribute to the progress of this industry towards sustainable practices.

Poster Session 3: Tide to Table

Name: Claire Armstrong - claire.armstrong@dal.ca

Title: Transformative Change in Shellfish Food Systems: Overcoming Barriers to Indigenous Food Sovereignty in Coastal British Columbia

Abstract: Sea gardens (also called clam gardens) are a resource management system used by many First Nations along the west coast of North America to increase food production. The traditional management of sea gardens increases ecological biodiversity and productivity, especially the productivity of clams. Thus, clams and other shellfish are central to the food systems of many coastal First Nations. However, in recent history, colonization has erected barriers to harvesting shellfish which has negatively impacted communities that depend on shellfish food systems. This study focuses on the concept of Indigenous Food Sovereignty (IFS) as a pathway to restoring shellfish food systems using sea gardens as a case study. IFS is the right to access healthy and culturally appropriate food and to self-determine food systems. Therefore, achieving IFS in shellfish food systems means overcoming barriers to harvesting shellfish. The objectives of this study are to (1) describe what achieving IFS could look like in shellfish food systems, (2) identify barriers to harvesting shellfish, and (3) scope solutions to overcoming or reducing those barriers. This study employs literature review with a mixed-methods qualitative approach to develop a framework that categorizes barriers and solutions based on pillars and indicators of IFS. The framework is then used to describe pathways towards IFS in shellfish food systems and explore how sea gardens can play a role in this transformative change.

Name: Amber LeBlanc - amberdawn@dal.ca

Title: The Occurrence and Potential Sources of Microplastic Contamination in American Lobster (*Homarus americanus*) from Mi'kma'ki (Nova Scotia)

Abstract: Global plastic production is ever-increasing and consequently, so is plastic pollution. Although most plastic pollution originates from land, the oceans act as a final destination for most of this. As plastics move through the environment, they will break down into micro-sized pieces known as microplastics. Microplastics are known to be ingested by various marine organisms, including lobsters. This ingestion can occur when microplastics are mistaken as food and simply because of their abundance within the environment. Little information exists about this phenomenon, and few studies thus far focus on microplastic contamination in lobsters, particularly within Canada. Existing studies have consistently found large plastics and microplastics within various lobster tissues, presumed to have originated primarily from fishing gear and single-use plastic items. However, few definitive links to these proposed sources of contamination exist. This lack of knowledge represents a gap in fisheries microplastics research, especially as lobster is the largest fishing industry in Canada. Therefore, my objective is to measure the extent of microplastic contamination in various tissues of commercial American lobsters across three major fishing regions of Nova Scotia. I will also determine what types of plastics are within these lobsters to identify potential sources of contamination, such as lobster fishing gear. My research will generate some of the first data on microplastic ingestion in lobster within Canada. I hope to provide valuable information to fisheries microplastic research, policy, and management focused on protecting the

health of lobsters and other important commercial marine species.

Name: Drew MacLean - drewmaclean@dal.ca

Title: The Register of Honey Holes: Imbuing Quality Diadromous Fisheries Data Through the Modernization of Harvest Reports and Monitoring

Abstract: Fishing activities within Fisheries and Oceans Canada (DFO) Maritimes Region that impacts diadromous and other recreationally-fished species are authorized by fishing licences with licence conditions mandating certain items such as monitoring and reporting. Harvest reports and monitoring data often represent the best fishery-dependent data. Harvest and monitoring information are entered into DFO systems by third-party companies and can be queried to calculate landings by spatial area, bycatch by licence and area, and other items. Additionally, at-sea observer (ASO) coverage in groundfish fisheries is a key monitoring tool used in fisheries management. Issues obtaining required coverage are longstanding and information regarding the level of observer coverage met is necessary for informing future decisions. This study aims to bridge any knowledge gaps related to diadromous species in the DFO Maritimes Region through the modernization of monitoring and reporting practices. This was achieved by organizing and collecting licences by river and population for coastal diadromous fisheries; increasing the effectiveness in the organization and design of offline licence working products (i.e., logbooks); updating the inventory of licences by area; identifying issues with fishing areas, gear types, or status for coastal diadromous fisheries; and determining the level of coverage for at-sea observation obtained in certain diadromous fisheries. This study will result in a greater quality of reporting of harvest and monitoring data which subsequently aids in the quality of resource management decisions made by DFO Maritimes Region regarding diadromous fisheries.

Name: Ian McLean - ian.mclean@dal.ca

Title: Forage Fish in Decline: Understanding the Usage and Management of Bait Fisheries in the Maritimes Region

Abstract: Many important commercial fisheries in the Maritimes Region rely on the use of bait, such as the lobster, crab, and groundfish fisheries. Traditional species of bait include herring, Atlantic mackerel, and gaspereau. These pelagic fish stocks have recently declined due to overfishing and high natural mortality from predation and environmental change. In March of 2022, DFO announced an Atlantic Canadian-wide closure on fishing Atlantic mackerel for commercial and bait purposes while closing the Gulf of St. Lawrence commercial and bait fishery for herring. The closures are resulting in a diminishing supply and increasing cost of bait that places additional pressures on these fisheries. The pressures include political influence to keep landings high and incentives within fisheries to misreport and underreport catch. There can also be pressure to experiment with foreign bait sources, including Asian carp, which raises questions about ecological risks. This paper consists of research into the socio-economic and operational characteristics of bait fisheries in the Maritimes Region, industry perspectives on communication and management measures, and insight into the perceptions of alternative bait sources. Perspectives were gathered from media content analysis and interviews with DFO personnel,

industry, and environmental groups. The analysis included research of commercial fishing data, including numbers of licenses and landings by species, month, and port. Findings and conclusions from this paper will be used to inform DFO regarding how commercial harvesters utilize their bait licenses, the current perceptions of alternative bait, and to make future management recommendations.

Name: Daniel Saunders - daniel.saunders@dal.ca

Title: Abundance and Characterization of Microplastics in Wild and Cultured Blue Mussels (*Mytilus edulis*) and American Oysters (*Crassostrea virginica*) from Nova Scotia

Abstract: Plastics have become ubiquitous within society as production has increased over the last few decades. Due to its rigid structure and composition, plastic pollution can persist within the environment and travel thousands of kilometers from its initial disposal site. Coastal cities, shipping activities, stormwater run-off, and drainage systems are some of the ways in which land-based plastic pollution can enter marine environments. Through mechanical and chemical processes these plastics degrade into micro-sized pieces defined as microplastics. Their small size and abundance within marine ecosystems make them easily ingested by filter feeders such as mussels and oysters. Shellfish aquaculture in Atlantic Canada is significant to the Canadian economy for both national and exported goods. Existing studies have found microplastic fragments in both wild and cultured blue mussels and American oysters. However, due to knowledge gaps within microplastic research, there is little information on the sources of microplastic pollution in shellfish. It is speculated that shellfish aquaculture practices may be impacting the number of microplastics ingested by commercially available shellfish. The objective of my research is to determine the abundance of microplastics in wild and cultured blue mussels and American oysters from Nova Scotia, to identify the size class and types of microplastics ingested, as well as to identify some potential sources of contamination. This research may inform future recommendations for shellfish aquaculture policy, as well as potentially contribute to the movement toward plastic-free or plastic-reduced aquaculture practices.

Poster Session 4: Sustainable Shores

Name: Ela Cichowski - elacichowski@dal.ca

Title: Fisheries and Oceans Canada's Ghost Gear Fund in the Maritimes Region: A Program and Policy Review

Abstract: Abandoned, lost, or otherwise discarded fishing gear (ALDFG) has received increased recognition over the past decade as greater understanding has been obtained regarding its adverse impacts on the marine environment. The transboundary nature of these ecological and socioeconomic impacts have led to growing international interest to address this issue, with many nations enacting initiatives centered around combatting ALDFG. Canada's Ghost Gear Fund (GGF) represents one such initiative, initially implemented over a 2-year period (2020-2022) by Fisheries and Oceans Canada (DFO). The purpose of this research is to review this program with a focus on how it operated in DFO's Maritimes Region. Past GGF participants of the Maritimes Region were invited to participate in an online survey and a follow-up interview. Through the survey and interview strategy, this research aims to identify the successes and limitations of the program so that recommendations can be provided should the GGF continue to be extended or expanded in the future. Additionally, to help inform recommendations, the results of other countries like the US and Norway who have adopted ALDFG mitigation initiatives were evaluated for comparison.

Name: Laurel Genge - lgenge@dal.ca

Title: Coastal Adaptation and Vulnerability Assessment (CAVA) on the Tourism Industry for Sea-Level Rise in Lunenburg, Nova Scotia

Abstract: Although the perception of vulnerability to climate change within the tourism industry is becoming better understood, community resiliency and adaptability remain as a gap in scientific literature (Scott *et al.*, 2019, Dube *et al.*, 2021). The Coastal Adaptation and Vulnerability Assessment (CAVA) process draws on scientific, social, and economic dimensions to consider quantitative measures of climate change alongside a qualitative assessment of the awareness and management capacity on the tourism industry in Lunenburg, Nova Scotia. Studying the impacts of climate change on the community of Lunenburg and their capacity to adapt are the fundamental elements to understanding a sustainable future for coastal communities. The goal of the CAVA project is to better understand the capacity of coastal communities to monitor and adapt to the effects of climate change on the tourism industry.

The significance of the proposed graduate project stems from an important gap in scientific knowledge regarding how perceptions of climate change influence perceived risk and adaptation within tourism-dependent sectors in small coastal communities. More specifically, I will explore the local tourism stakeholders' knowledge of the expected effects of climate change and identify perceived barriers to sea-level rise adaptation.

Name: Abdirahim Ibrahim Sheik Heile - abdirahim.ibrahim@dal.ca

**Title: Somalia Blue Economy Assessment, Taxonomy and Investment Framework:
Comprehensive National Fisheries Sector Development Plan**

Abstract: Somalia has some of the best prospects for the generation of a prosperous Blue Economy (BE) in Africa almost 3,333km of coastline (longest on the continent) and an ocean territory that stretches around 150 kilometers. It is indisputable that the case for land-based natural resource development in Somalia is much stronger than that for ocean development.

The BE represents one of Somalia's significant economic assets and should be at the fore. The objective of this proposed study complement is two-fold. Firstly, to undertake a comprehensive assessment of the BE. To date, no study has quantified the entirety of Somalia's BE, and modeled its growth potential, mapping outcomes to improvements in the broader Somali economy and society; the study aims to fulfill this role. Secondly, the study proposes to initiate a comprehensive BE Framework (and investment strategy) that feeds directly into the national development priorities of Somalia.

To achieve the study forms the basis for one pillar of the Growth and Economic Transformation Strategy (GETS) in Somalia, an initiative under the National Economic Council. As such, the study aims to position itself as a direct policy tool for the Government rather than an academic research piece. It aims to provide policy direction for subsequent administrations, contributing to the 'what' (sectors worth prioritizing), 'how' (regulatory reforms/policy tools), and 'who' (necessary partnerships – domestic/international) of substantive policy decisions. In addition, the research aims to collate various sources of evidence of Somalia's potential in this space and become a reference point for other interested parties and investors.

Name: Keith MacMaster - kemacmas@dal.ca

**Title: Sustainable Development and Seabed Mining: Environmental Performance
Guarantees, Insurance, Precaution and the Polluter Pays Principle**

Abstract: This research will investigate the development of the standards and guidelines necessary for the sustainable use of seabed mining resources. The draft standards relate to environmental performance guarantees, environmental impact assessments, and environmental management plans. These standards and guidelines must be in place by the time of exploitation and are therefore an important opportunity to ensure the *Draft Exploitation Regulations* contain adequate environmental protections and enforcement mechanisms. However, they have not been researched in academic literature and may have insufficient environmental and economic protections. Further, they may be contrary to the Sustainable Development Goals. SDG14 calls for a wholesale reduction of negative impacts on the world's oceans and the protection of fragile marine ecosystems, including the widespread implementation of marine protected areas. The research will investigate these standards from a precautionary, polluter pays, and ecosystem-based perspective. This research examines how the ISA can implement an ecosystem approach using modern environmental management tools such as strategic assessment of the environmental, social and economic effects of the policies, rules and regulations under development.

One of the goals of seabed mining is to develop the industry under the common heritage of mankind. Benefit-sharing should benefit the entirety of humankind, implying that people(s) most disadvantaged and marginalized should develop seabed mining, and other nations could provide opportunities and financial benefits. Common heritage should be reconciled with the Sustainable Development Goals. This research will incorporate the common heritage and SDG14 into account when analyzing the standards and guidelines. This research will assist academics, practitioners, the federal government and the ISA with policies and strategies to enhance environmental protections. The research also aligns with Dalhousie University's Ocean Research strategy.

Name: Krish Thapar - krish.thapar@dal.ca

Title: Evaluating the Different Treatment Methods used in both Suppressing and Eradicating Aquatic Invasive Species (AIS) in Nova Scotian Freshwater Ecosystems and Exploring Restoration Frameworks that could be used to aid in Ecosystem Recovery after AIS Treatment.

Abstract: Invasive fish species in Atlantic Canada present threats to freshwater ecosystems by out-competing and predating on native organisms, resulting in a shift in biodiversity. This could lead to social impacts, especially for recreational fishers and other users that benefit from the natural resources that are now altered by AIS. As a result of the damage caused by invasive species, some organizations (government and private) have used different types of invasive species management strategies for maximizing the removal of these unwanted fish populations including conventional angling, installation of fish barriers (ex: fishnets, concrete barriers), de-watering, and electrofishing.

In practice the methods above are effective in suppressing AIS populations, but almost never succeed in full eradication. This is where managers often turn to rotenone, a piscicide that has proven to be effective in AIS eradication but is more damaging to nontargeted organisms. The objectives of this study are to evaluate common treatment methods used to suppress or eradicate AIS species in Nova Scotian lakes, by analysing its primary function, operational costs, damages to the environment, and practicality. In addition, current restoration frameworks will be reviewed for its potential in recovering the ecosystem to pre-treatment levels. A novel restoration tool will also be used in this study called *Bounds of Expectation* which was used in past research to determine the timescale of salt marsh ecosystem recovery. Lastly, this study will collect the opinions from recreational fishermen and other stakeholders in regards to AIS management, which could potentially be integrated into future management practices.

Marine Affairs Program

The Marine Affairs Program at Dalhousie University provides an inquiring and stimulating interdisciplinary learning environment to advance the sustainable use of the world's diverse coastal and ocean environments. In education, research and outreach, MAP seeks to develop outstanding marine management professionals by building on extensive global-to-local marine management networks. MAP works with other educational, governmental, NGO, and private sector organizations to promote and conduct timely and relevant interdisciplinary research in a broad array of scholarly topics that is attractive to students and conducted by a team of world-class researchers. Through its worldwide network of faculty, graduates, and associates, the research and expertise developed in the MAP program influences marine policy decisions around the globe.



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WWF-Canada



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The Ocean Tracking Network (OTN) is a global aquatic research, data management and partnership platform headquartered at Dalhousie University in Halifax, N.S. A global community of researchers is using OTN's infrastructure and analytical tools to track the movements and survival of more than 300 keystone, commercially important and/or endangered species. OTN's mission is to inform the stewardship and sustainable management of aquatic animals by providing knowledge on their movements, habitats and survival in the face of changing global environments.



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The Ecology Action Centre is a member-based environmental charity in Nova Scotia. We take leadership on critical environmental issues from biodiversity protection to climate change to environmental justice. Since 1971, the Ecology Action Centre has been working at the local, regional, national, and more recently, international level to build a healthier and more sustainable world. We are grounded in community, and a strong voice and watchdog for our environment. We work to catalyze change through policy advocacy, community development, and building awareness. We take a holistic approach to the environment and our economy to create a just and sustainable society.



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A blurry picture of a sweet little farmhouse popped up on their computer screen. They smiled. A few short weeks later Melanie and Jeremy White were standing at the bottom of a curving drive, somewhat stunned to realise they had just bought over 100 acres of pristine Cape Breton farmland. Perched on a southern slope facing the UNESCO Biosphere Reserve Bras D'Or Lake, a hopyard was planted, and the land was certified organic. Water naturally rich in minerals was perfect for brewing. Construction began.

Ten years later, **Big Spruce Brewing** is focused on creating exceptional ingredient-driven beer. All of our ales and lagers are brewed with organic grain & hops, and we continually strive to keep giving you the perfect pint, every time.

Acknowledgements

On behalf of the 2021-2022 Marine Affairs Program students, we would like to extend our sincere gratitude to all of the student oral and poster presenters, panelists, keynote speakers, panel moderator, judges, volunteers, community partners and contributors who played a role in the success of the 2022 Sustainable Ocean Conference. Thank you for your continued support, time, and expertise.

We would like to thank the Sobey Fund for Oceans for all they have done to support this conference. Thank you for your generosity through the Sobey Scholarship award that provides future ocean leaders with financial support and educational opportunities in the Marine Affairs Program. Without the continued support of the Sobey Fund for Oceans, the Sustainable Ocean Conference would not be possible.

Thank you to all of our sponsors and supporters for your role in the planning and organizing of this conference. Thank you to Sobey Fund for Oceans, Dalhousie's Faculty of Science, The World Wildlife Fund Canada, The Ocean Tracking Network, Clearwater Seafoods, Labatt Brewing Company, Oceana Canada, The Ecology Action Center, and Big Spruce Brewing.

We would like to extend our gratitude to our keynote speakers, Shari Fox and Kunuk Inutiq. We are grateful to you for joining us in Halifax to provide your insights and knowledge on complex topics of ocean conservation and sustainability. Thank you to our panelists Maxine Westhead, Patricia Nash, Anna Metaxas and Joanna Smith for sharing their experiences and participating in an enriching discussion on Canada's protected areas.

To the MMM class of 2021-2022, thank you. We are incredibly grateful for your hard work and dedication over the last 16 months. Special thanks to the committee leads: Carly Green - Marketing, Hannah Kosichek & Claire Buisseret-Armstrong - Logistics, Kyle Gordon & Raven Elwell-Stephens - Fundraising, Maryam Nahkostin & Dylan Seidler - Submissions. We would also like to thank Rachel Rickaby and Delaney Ewing for their support and guidance throughout this process.

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Sincerely,

Cailey Dyer, Armand McFarland, Michaela Mayer

Conference Co-Chairs | Sustainable Ocean 2022