

SOBEY FUND FOR OCEANS PRESENTS



September 25th and 26th, 2020

Held online on Zoom

www.sustoceans.com

Dalhousie University | Halifax, Nova Scotia

**SUSTAINABLE
OCEANS**

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Sustainable Oceans Conference

September 25th - 26th, 2020

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 Wəlastəkwiyik (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 Wəlastəkwiyik (Maliseet) title and established the rules for what was to be an ongoing relationship between nations. We are all Treaty people.

The Sustainable Oceans 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 ninth annual conference will take place online from Friday, September 25th and Saturday the 26th. The conference will explore the theme 'Local Ripples, Global Waves', bringing together a diverse audience of students, faculty, members of the marine community, and the public.

Follow us on social media before, during, and following the conference



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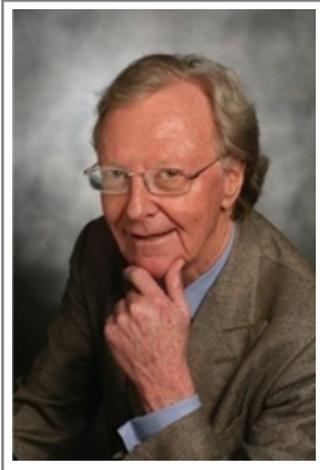


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Sobey Fund for Oceans



“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

Associate Professor and Director, Marine Affairs
Dalhousie University

Lucia Fanning

Professor Emerita, Marine Affairs
Dalhousie University

Becky Field

Administrator, Marine Affairs
Dalhousie University

Jon Grant

Professor, Oceanography
Dalhousie University

Sobey Fund for Oceans 2020-2021 Scholarship Recipients



Lisa Baxter

Entering my graduate studies in Marine Management, I am honoured to have received the Sobey Fund for Oceans Scholarship to support my research goals. Coming from a background in Molecular Biology and Genetics, I hope to use these skills to evaluate management of unconventional and innovative conservation strategies. Many experts have noted the need for bolder, innovative conservation methods to combat the environmental consequences of climate change highlighting the need to streamline and consolidate management approaches for these unique conservation strategies. Through my research, I hope to analyze effective management strategies for implementing unconventional conservation methods, as well as identify key components of productive interdisciplinary and multi-institutional coral reef management through using the Great Barrier Reef as a case study. In future, I hope that my research findings for effective and collaborative coral reef management can be adapted and implemented for the management of other global reef systems.

Victoria Cullen

I am very excited to join the MMM community at Dalhousie this fall. I am grateful for the support of the Sobey Fund for Oceans scholarship, as I pursue my proposed research in sustainable inshore fisheries management. I hope to learn about management tools that can integrate the knowledge and preferences of fisheries stakeholders into the decision-making process. By incorporating the stakeholder perspective, managers can arrive at practical, effective management solutions that support the sustainability of the fisheries resource as well as the resilience and well-being of coastal communities.



Sobey Fund for Oceans 2020-2021 Scholarship Recipients

Martin Ostrega



I am very grateful to have received the Sobey Fund for Oceans Scholarship, which will support me through my graduate studies in the Marine Affairs Program at Dalhousie University. This scholarship will allow me to learn about fisheries management and help me conduct my research into understanding and identifying fish spawning aggregations and lack of protection in the Caribbean. In particular, ensuring that many species that rely on fish spawning aggregations will be sustained and biodiversity will be increased. I hope that my research will help bring about transformative change for conservation in small-scale island states. My objective is to help Caribbean industries, organizations, and communities recognize this significant issue by providing a framework to protect fish aggregation sites.



Welcome

On behalf of the 2019-2020 Marine Affairs Program students, we would like to warmly welcome you to **Sustainable Oceans 2020: Local Ripples, Global Waves**.

The ocean is our lifeline. It feeds us, provides the air that we breathe, links vast continents, and helps foster deeper human connections. A healthy ocean supports a healthy Earth, yet finding ways to help our ocean flourish can be challenging. How can one individual make a difference when there is such a diversity of global interests influencing the ocean?

Leading up to the *UN Decade for Ocean Science*, we strive to inspire local communities in Atlantic Canada by having them consider how their local engagement towards a healthy ocean can contribute to global solutions. In doing so, we will have a panel discussion featuring an array of diverse perspectives on Atlantic Canada's coastal and ocean management, keynote speaker Diz Glithero, and a wide collection of oral and poster presentations from aspiring ocean leaders.

This year, we aim to encourage innovative ocean management by highlighting how local action has the ability to influence global movements. We hope to leave you with a sense of how your actions impact the ocean and how communities may be able to work together to improve ocean and coastal management in Atlantic Canada and abroad.

Through engagement with student and guest speakers, partnering with community organizations, and showcasing artwork describing the connection that people have with the ocean, we hope that the presented concepts still inspire for ocean stewardship from local, national, and global scales.

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

Kind regards,

Delaney Ewing, Stefan Miller, and Rachel Rickaby

Conference Co-Chairs | Sustainable Oceans 2020



Introducing the MMM Class of 2019/2020

Submissions

Catherine Thompson
Noémie Roy

Logistics

Jessica Cucinelli - Team Lead
Shannon Wood - Team Lead
Shahriar Nazrul
Kiana Endresz

Conference Co-Chairs

Delaney Ewing
Rachel Rickaby
Stefan Miller

Marketing & Outreach

Morganne Robben - Team Lead
Jenna Morissette
Camille Mancion
Rebecca Croke
Noémie Blais

Fundraising

Omar Sickander - Treasurer



[View the 2019/2020 MMM Student Biographies here](#)



Schedule of Events

Friday, September 25th, 2020

Time	Events
6:00 PM	Land Acknowledgement & Welcoming Remarks
6:10 PM	Mi'kmaq Blessing & Teaching
6:30 PM	Sobey Fund for Oceans Scholarship Presentations
6:45 PM	Short Break
6:50 PM	Panel Discussion - Local Contributions to the UN Decade for Ocean Science
7:40 PM	Short Break
7:45 PM	Panel Discussion Continued
8:30 PM	Closing Remarks

Panelists:

Stella Bowles - *Environmentalist and Public speaker*

Gerald Singh - *Researcher*

Colleen Turlo - *Ocean's North*

Moderator:

Dr. Lucia Fanning - *Marine Affairs Program*

Schedule of Events

Saturday, September 26th, 2020

Time	Events
10:00 AM	Welcoming Remarks
10:05 AM	Oral Presentation Session 1: Exploring Social Aspects of Fisheries and Aquaculture
10:30 AM	Oral Presentation Session 1 Continued
11:15 AM	Snack & Learn Session 1: Innovative Ocean Management in Atlantic Canada
11:30 AM	Snack & Learn 1 Continued
12:00 PM	Keynote Address: Diz Glithero
12:30 PM	Keynote Address Continued
1:00 PM	Oral Presentation Session 2: Local Contexts for Global Solutions
1:30 PM	Snack & Learn Session 2: Global Strategies for Ocean Management
2:00 PM	Snack & Learn Session 2 Continued
2:15 PM	Oral Presentation Session 3: Creative Approaches for Innovative Solutions
2:45 PM	Oral Presentation Session 3 Continued
3:15 PM	Contest Winner Announcements, Closing Remarks



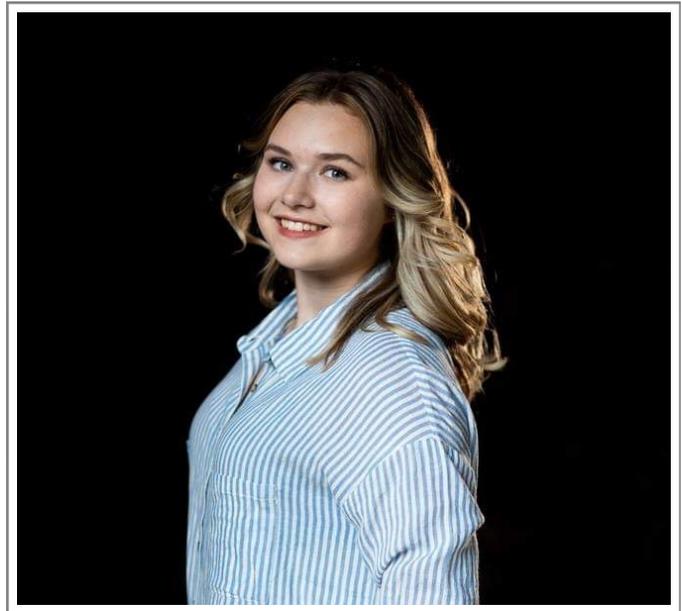
Panel Discussion: Local Contributions to the UN Decade for Ocean Science

This panel features experts in environmental activism, the science-policy interface, and community-based marine conservation. Panelists will discuss the importance of community-level initiatives in supporting global and local sustainable development, particularly as it is defined in the UN Decade of Ocean Science for Sustainable Development (2021-2030).

Panelists

Stella Bowles

Stella Bowles is a 16 year old environmentalist and public speaker. Her grade 6 science fair project prompted three levels of government to commit 15.7 million dollars to clean up the LaHave River. She is proof one little girl can make a difference and she hopes her story inspires others to take on a cause to create more positive environmental changes.





Gerald Singh

Gerald Singh's research is primarily situated in the science-policy interface, and focused on understanding the dynamics between social, economic, and environmental dimensions in sustainable development. This focus takes form in the following ways: 1) assessing cumulative anthropogenic impacts on the environment and understanding the consequences to people; 2) determine priority policy actions and plans to achieve specific sustainable development objectives (particularly the Sustainable Development Goals); 3) understand risk and uncertainty in sustainability policy and management.

Colleen Turlo

With expertise in post-secondary education and marine policy, Colleen Turlo currently works with Oceans North on community-based marine conservation initiatives. Her work focuses on engaging communities and communicating with stakeholders to strengthen marine protection in the Atlantic and Arctic Oceans. Colleen spent several years working on sustainable seafood market initiatives, and was an assistant professor at the Korea Maritime and Ocean University in Busan, South Korea. She earned a master's degree in marine management from Dalhousie University.



Panel Moderator

Dr. Lucia Fanning

Lucia joined the Marine Affairs Program at Dalhousie University in September 2007 and served as Director until 2013. Prior to coming to Dalhousie University, she was involved in addressing transboundary fisheries governance in the Caribbean Sea where some 45 countries and territories with diverse cultures, politics, economics, laws and environments are working towards enhanced decision-making for the long-term sustainability of the fisheries. Lucia is interdisciplinary in her approach to scholarship and is passionate about including and raising the awareness of the value of all branches and sources of knowledge to better inform decisions affecting the sustainability of our coastal and marine resources. Lucia now holds the status of professor emeritus within the Marine Affairs Program.



Keynote Address

Our Ocean Relations: Cultivating Marine Citizenship and Local Action in Canadians

Canada has the longest coastline of any country in the world, yet over 80% of its population lives inland; how then can we collectively foster a knowledgeable, empathetic, and engaged citizenry that values and cares for the ocean? Dynamic keynote speaker, educator, and community builder, Diz Glithero, will share experiences and insights from recent projects, including her role as the Education Lead for the Canada C3 Expedition in 2017, a 150-day ship-based expedition from Toronto to Victoria via the Northwest Passage, and her current role as National Coordinator of the Canadian Ocean Literacy Coalition, working to co-build a national ocean literacy strategy for Canada.

Keynote Speaker: Diz Glithero

As an educator, researcher, adjunct professor, and consultant, Diz has led community and national projects focused on the intersection of education, environmental stewardship, and civic engagement. In 2017, Diz served as the Education Lead for the Canada C3 Expedition, a 150-day expedition from Toronto to Victoria via the northwest passage. Currently, Diz serves as the national coordinator of the Canadian Ocean Literacy Coalition, a research initiative to explore Canadians' civic relationship with the ocean and establish a national strategy to advance ocean literacy in Canada.



Photo credits: Student on Ice Foundation



Oral Session 1: Exploring Social Aspects of Fisheries and Aquaculture

Name: Shannon Wood

Title: Drivers of social acceptability for bivalve aquaculture in Atlantic Canadian communities

Abstract: Aquaculture is a growing sector in Canada; while salmon remains Canada's largest export, bivalve aquaculture production is increasing. Prince Edward Island produces 58.5% of the bivalves in Canada, which is mostly comprised of mussels. Despite having one of Canada's longest coastlines, Nova Scotia is responsible for only 4.5% of total bivalve production. Bivalve aquaculture is an industry with opportunities for sustainable growth in these provinces, but some ongoing and proposed projects are under intense public scrutiny. The environmental, economic, and social concerns that drive these perceptions are site specific, and this information is mostly missing for coastal communities in Atlantic Canada. This research aims to identify specific factors driving social acceptance of bivalve aquaculture in Antigonish Harbour, Nova Scotia, and North Rustico Harbour, Prince Edward Island, and to identify opportunities for better management to address public concerns.

Name: Mairin Deith

Title: Improving communication of stakeholders' fishery objectives – A case study from managing the rebuilding of an Atlantic Canadian fishery

Abstract: Characterization and assessment of petroleum hydrocarbons in small craft harbour sediments in Nova Scotia. Small craft harbours (SCHs) in Nova Scotia are vital for the fishing industry, economy and have high socioeconomic and cultural importance for surrounding communities. Several pollution sources impact SCH sediments, including petroleum hydrocarbons (PHCs). Ecological impacts in marine sediments can have significant impacts in biota and humans. This research characterized spatiotemporal distribution of PHCs in 31 SCHs sediments in Nova Scotia. An ecological risk assessment for multiple contaminants in sediments was also conducted. While single contaminants can be below sediment quality guidelines, interaction of multiples contaminants can exacerbate ecological risk. Results will inform decision-makers about historical and current state of SCHs, so future risk-management options can be developed and prioritized to comply with established sediment environmental standards.

Name: Allison Cutting

Title: Incidentally undermined: Impacts of bycatch on conservation efforts and community livelihoods

Abstract: Efforts to meet marine conservation goals and livelihood needs of coastal communities often undermine one another, as the short and long term timeframes of their objectives stand seemingly at odds. The Chacocente nature reserve in Nicaragua serves as essential nesting grounds for threatened olive ridley sea turtles, leading to militarized conservation and a six-month fisheries closure. Poverty stricken communities neighbouring this critical area are economically dependent on artisanal fisheries, leading to intensive fishing and turtle bycatch. Lack of attention to bycatch is arguably ineffective for ecological sustainability and negligent to social and economic sustainability. To determine the bycatch rate near Chacocente, a voluntary observer program was implemented. Bycatch will be valued to determine impacts on the olive ridley population, while landed fish will be valued to determine impacts on fishers' income. We anticipate the valuation to reveal considerable management implications and possible actions to improve turtle populations and livelihood security.

Name: Camille Mancion

Title: Exploring traceability in small-scale fisheries; From harvest to landing

Abstract: As the demand for sustainable and traceable seafood products increases, small-scale fisheries (SSF) are forced to improve transparency across the seafood supply chain to distinguish themselves on the global market. Although numerous SSF operate using sustainable practices, many face barriers in demonstrating sustainability and transparency in operations at-sea due to poor data collection and reporting mechanisms. This study outlines global traceability requirements, and develops an evaluation framework for SSF to identify traceability systems appropriate for data collection and reporting from point of harvest to landing. Through a case study, the framework evaluates several traceability tools and provides recommendations for small-scale tuna fisheries in Indonesia. Some of the challenges in implementing traceability systems in SSF are also discussed. Given the significant role SSF play in securing food security and sustaining local livelihoods, it is crucial to support their transition towards improved transparency in fishing operations.



Snack & Learn Session 1: Innovative Ocean Management in Atlantic Canada

In lieu of a dedicated lunch break, Snack & Learn sessions are an opportunity to showcase student posters in a creative and engaging format. Posters are displayed for three minutes, beginning with a one-minute elevator pitch and Q&A session.

Name: Gabrielle Deveau

Title: Using integrative knowledge to enhance stewardship of American eel (*Anguilla rostrata*) in the Minas Basin

Abstract: The American eel/kataq (*Anguilla rostrata*) plays an important ecological role in aquatic communities and is harvested in commercial, recreational, and subsistence fisheries. Eels have not only been an important food source for the Mi'kmaq, but are also socially, medicinally, economically, spiritually, and culturally significant. Declines in American eel abundance has occurred in recent years due to a cumulation of factors, including migration barriers, turbine mortalities, changing marine conditions, and the over-harvesting of elvers and glass eels. As part of a collaborative project between Mi'kmaq knowledge holders, harvesters, academia, community partners, and government, this study will examine coastal residency and feeding preferences of American eels in Minas Basin, Nova Scotia. Baseline information on preferred food sources and coastal movement patterns may help guide the protection of important habitats. Results from this study will be used to enhance co-management approaches and strategies for marine resources in the Minas Basin region.

Name: Delaney Ewing

Title: Managing the development of Canada's benthic Marine Protected Areas while preserving economic opportunities for Maritime Groundfish Fisheries on the Scotian Shelf

Abstract: Increases to the number and extent of Marine Protected Areas (MPAs) in recent decades has been critical for the conservation of coastal and marine environments. Canada's commitments to conserving 30% of their ocean by 2030 has encouraged the protection of coral and sponge species whose habitat-building capabilities may support entire ecosystems. These reefs may be at-risk of smothering and physical disturbance from fisheries operations, yet the socioeconomic necessity of this industry must be considered in MPA development. A Marxan analysis featuring sensitive benthic area (SBA) conservation targets ranging between 15-100% on Canada's Scotian Shelf Bioregion was performed. The conservation targets ran against locations of known groundfish fisheries operations. The 15% and 25% scenarios resulted in the best output of Areas of Interest for MPA designation because of minimal overlap between SBAs and fisheries. Maintaining opportunities for Canada's coastal industries while conserving the nation's unique marine features is key for developing a sustainable blue economy.

Name: Monica Ragan

Title: The role small craft harbours have for the livelihoods of their users and communities

Abstract: Small craft harbours (SCHs) across Canada are lifelines for their communities and economies. In 2018, the value of Canadian SCHs was \$5.6 billion and accounted for almost 90% of commercial fish landings. SCHs presence in coastal communities provides not only direct economic impacts but also indirect effects through the creation of marine-related businesses. SCHs further provide venues for community events and a channel for volunteerism at the harbour. This research focused on Nova Scotian SCHs and the role they provide to their users and local communities. Semi-structured interviews with SCHs users and a media analysis of SCHs were conducted to capture roles and values SCHs play in the livelihoods of their users and communities. Results were used to contextualize the current outlook of local SCHs, which will assist in understanding the role SCHs have in the global arena and achieving global goals such as the United Nations Sustainable Development Goals.

Name: Lindsay Carroll

Title: Tracking the spawning migration of Atlantic tomcod (*Microgadus tomcod*) within Minas Basin, Nova Scotia using acoustic telemetry

Abstract: The Atlantic tomcod is a small gadid fish abundant in coastal waters in Nova Scotia and is a valuable resource for many predators. Locally it is known as “frostfish” given that it spawns further inshore during the winter months in estuaries and freshwater streams. It has been fished as a minor commercial and recreational species and has traditionally been used as a winter food source by Mi’kmaq First Nations communities throughout its range. In this study, we tagged 129 tomcod using acoustic telemetry to investigate seasonal spawning migrations from November – February from adjoining tidal river systems in Minas Basin to potential spawning areas. Also incorporated are biological sampling methods, including the morphological identifications of consumed prey, to determine baseline tomcod diets and feeding habits in the Bay of Fundy area. Results will be used to inform management approaches and strategies for Atlantic tomcod in local regions to enable better stewardship of this marine fish.

Name: Noémie Blais

Title: Assessing the impacts of plastics on the Atlantic Leatherback Turtle (*Dermochelys coriacea*) and current management strategies in the North-West Atlantic Ocean

Abstract: The production of plastic has greatly increased since the early 20th century resulting in an overwhelming abundance on land and in sea. The solid waste pollution found in the ocean poses sublethal to lethal threats to marine turtles through ingestion, entanglement and habitat degradation. The leatherback turtle is a migratory species that inhabits terrestrial and marine environments and is better known for its migration to higher latitudes. Throughout its life cycle, leatherback turtles are exposed to the multiple threats elicited from plastic debris. Out of the seven species, it is the only marine turtle to frequently migrate in Canadian cold waters for the sole purpose to forage on gelatinous zooplankton (i.e. jellyfish) which are easily mistaken for plastic bags. Moreover, their movements frequently overlap the fishing industry, increasing their exposure to entanglement. This project explores the possible pathways of exposure and the effects of plastic debris on the endangered Northwest Atlantic Leatherback subpopulation through a comprehensive literature review and an analysis of the abundance of plastic litter found on the shorelines of Nova Scotia, Newfoundland, Prince Edward Island, and Sable Island. Additionally, a comparison of the effectiveness of current waste management strategies and leatherback conservation efforts is discussed in the context of the Northwest Atlantic regions.

Name: Gamra Oueslati

Title: Organic geochemical survey of water column in the Labrador Sea

Abstract: Intact polar lipids (IPLs) represent the main building blocks of cellular membranes. They can represent powerful biomarkers in aquatic environments that reflect the response of organisms to varying environmental conditions. IPLs have the potential to delineate the taxonomic diversity, sources and biogeochemical cycles, which are in some cases can be hard to resolve. This research focuses on the analysis of core lipids and IPLs. Water column filtrate samples marking a series of transects extending out across the shelf margin of the Labrador Sea around Newfoundland will be analyzed by UHPLC/ESI-MS. The molecular diversities of lipids gives evidence of the living microbial community and their metabolic activity, the sources of organic matter input, and the productivity of the upper water column. This lipidomics project aims to describe how organic matter recycling as well as nutrient cycling and transport mechanisms are coupled to the microbial ecology of an ocean water column. It is anticipated this project will improve our understanding of marine ecosystem functioning and help to resolve the baseline microbial community of the Labrador Sea thereby helping to contribute to the sustainability of the ocean as a fundamental resource of the planet.

Name: Myriam Mora

Title: Characterization and assessment of petroleum hydrocarbons in small craft harbour sediments in Nova Scotia.

Abstract: Small craft harbours (SCHs) in Nova Scotia are vital for the fishing industry, economy and have high socioeconomic and cultural importance for surrounding communities. Several pollution sources impact SCH sediments, including petroleum hydrocarbons (PHCs). Ecological impacts in marine sediments can have significant impacts in biota and humans. This research characterized spatiotemporal distribution of PHCs in 31 SCHs sediments in Nova Scotia. An ecological risk assessment for multiple contaminants in sediments was also conducted. While single contaminants can be below sediment quality guidelines, interaction of multiples contaminants can exacerbate ecological risk. Results will inform decision-makers about historical and current state of SCHs, so future risk-management options can be developed and prioritized to comply with established sediment environmental standards.

Name: Morganne Robben

Title: Leaving space to roost: An examination of human disturbances to migratory shorebirds in the Minas Basin, Nova Scotia

Abstract: Each year, up to 1.4 million shorebirds, including the Semipalmated Sandpiper, use the Bay of Fundy as a stopover site before undertaking their transoceanic migration. These shorebirds utilize intertidal mudflats to feed and use coastal areas for roosting at high tide. According to the State of Canada's Birds 2019 report, shorebird populations have decreased by an average of 40% since the 1970s. One threat facing shorebird populations is anthropogenic disturbance. If disturbed while roosting, shorebirds will attempt to avoid the threat, often taking flight and leaving the area in search of a safer roosting site. This waste of energy is detrimental to the shorebirds as it depletes the fat stores used to supply them with enough energy to complete their migration. This research aims to identify the frequency and nature of anthropogenic disturbances to roosting shorebirds caused by recreational beach users in the Minas Basin, Nova Scotia, Canada.



Oral Session 2: Local Contexts for Global Solutions

Name: Shannon Landovskis

Title: Identifying American lobster (*Homarus americanus*) movement patterns and habitat use to contribute to stronger stewardship of marine resources

Abstract: This project aims to identify lobster movement and habitat use in the Bras d'Or Lake. Using Two-Eyed Seeing, the project will contribute to a deeper understanding of lobster within this unique estuary. Movement and habitat use, in conjunction with fishing seasons, will be analyzed to better understand the impact that fishing within or outside of fishing seasons may have on lobster in the Bras d'Or Lake. These conclusions will inform management in a manner that values different ways of knowing and thus enhances stewardship of lobster. This is part of a larger project, Apoqmatulti'k (Mi'kmaw: "we help each other"), a 3-year collaborative research project integrating Indigenous, local, and western knowledge in order to enhance aquatic stewardship. The project focuses on three species of value, Atlantic tomcod/punamu (*Microgadus tomcod*), American eel/katew (*Anguilla rostrate*), and American lobster/jakej (*Homarus americanus*), within two ecosystems, the Bay of Fundy and the Bras d'Or Lake.

Name: Rebecca Croke

Title: Integrating climate-smart management into Ascension Island MPA

Abstract: The effects of climate change present an unprecedented threat to the modern world, and ocean ecosystems are particularly vulnerable. Marine Protected Areas (MPAs) are being looked at as a key method to safeguard the world's ocean. As MPA coverage grows worldwide in an effort to achieve global conservation targets, concerns have been raised about their efficacy. A key criticism for MPA management is that they are neglecting to incorporate appropriate considerations for climate change into their management strategies. Ascension Island MPA is a relatively new MPA that comprises the entire exclusive economic zone (EEZ) of the island – over 440,000 square km. It is one of the largest MPAs in the world. The size, and the fact that the vast majority of the MPA consists of the open ocean, provide unique management challenges. In order to be truly effective as a long term protected area, considerations for climate change should be integral to the management plan. The following research aims to explore how Ascension Island MPA can integrate adaptive climate change measures into their management plan, particularly by examining how these measures already exist, what can be learned from Atlantic Canadian MPAs, and through collaboration with MPA managers.



Snack & Learn Session 2: Global Strategies for Ocean Management

Name: Shahriar Nazrul

Title: Identifying means to reduce institutional barriers to government initiatives within the responsible ministry for sustainable marine fisheries development in Bangladesh

Abstract: Interventions by Ministry of Fisheries and Livestock (MoFL) in Bangladesh for the management, conservation and development of marine fisheries resources have not led to sustained outcomes. Two major development projects implemented in recent years are “Empowerment of Coastal Fishing Communities for Livelihood Security” (ECFC) project (2000-2006) and “Bangladesh Marine Fisheries Capacity Building Project” (BMFCBP) (2007-2019). These projects aimed at several intertwined development objectives, including community empowerment, resource co-management, fisheries sustainability through stock assessment and institutional capacity building. However, in both cases outcomes did not persist post-project. This research is therefore designed to investigate the overall institutional barriers within or related to MoFL for marine fisheries development, and track how these barriers might have impacted the outcomes of these development projects. Simultaneously, recommendations are made to overcome those barriers for future initiatives.

Name: Jenna Morisette

Title: Identification of tools for implementing an ecosystem-based approach to species recovery under the Species at Risk Act

Abstract: The objective of the Species at Risk Act (SARA) is to protect at-risk species and their habitat, however, limitations have been identified for its implementation with aquatic species. These include taxonomic biases, economic considerations, slow listing and plan development, and poor critical habitat protection. This study aims to assess if the utilization of alternative tools under an ecosystem-based approach could strengthened conservation efforts in Canada, and the Stewiacke River as a case study, based on the objectives of SARA. Tools were identified in current processes in Canada, such as the Oceans Act, and evaluated for potential use. Additionally, to help inform recommendations, the results of other countries like Australia and New Zealand who have adopted ecosystem-based approaches in their conservation programs were evaluated for comparison.

Name: Rachel Rickaby

Title: Consideration of marine non-indigenous species in marine protected area planning, management, and monitoring in Canada

Abstract: Marine Protected Areas (MPAs) can help protect the ocean. They can decrease anthropogenic impacts on marine environments and protect biodiversity. However, there is concern that many MPAs worldwide are ineffectively protected and managed. One issue jeopardizing MPA effectiveness is marine non-indigenous species (NIS). These species can cause widespread damage to ecosystems and threaten biodiversity. Because MPAs lack physical boundaries between them and surrounding waters, invaders may disperse into MPAs. Marine NIS are a key management concern for many scientists worldwide. However, there is evidence suggesting marine NIS are not adequately considered during MPA planning or management. This research aims to determine how marine NIS are considered in Canada's federal MPAs during MPA planning, management, and monitoring. The study included a review of all available federal MPA management plans, structured interviews with MPA practitioners and aquatic invasive species practitioners, and a literature review of global best practices for managing marine invasions.

Name: Kiana Endresz

Title: Understanding the energy and nutrient linkages that exist between salt marsh ecosystems and nearshore fisheries

Abstract: Salt marshes are some of the most productive ecosystems on the planet however they continue to experience severe threats from human activities. These ecosystems have been increasingly recognized for their capacity to sequester large amounts of carbon and keep pace with sea level rise. Salt marshes provide numerous other ecosystem services including improving water quality and reducing flooding for coastal communities, however their importance for nearshore fisheries is often overlooked. Many species of marine fish and crustaceans including those that hold commercial value utilize salt marshes at some point throughout their life history. Salt marshes offer refuge and an abundance of food resources making them ideal nursery habitats. It is through the direct export of juvenile fish and that essentially act as biological vectors of energy and nutrients that salt marshes support nearshore fisheries. Large amounts of detrital matter from salt marshes are moved by the tides providing another important source of energy and nutrients for nearshore food webs. While researchers have examined various aspects of these salt marsh – nearshore fisheries linkages, no studies have evaluated the connections between Canadian salt marshes and respective nearshore fisheries. My research will focus on compiling some of the knowledge and data from previous studies that can be used in a Canadian context to better manage and conserve salt marsh ecosystems while maintaining the benefits for nearshore fisheries.

Name: Vivian Guido

Title: Aquae Vitae: The effects of textile waste from the fashion industry on the oceans

Abstract: Since becoming a scuba diver, I have taken to the ocean myself, to see first hand the global effects of pollution in the oceans. What I saw proved the worst; species were rapidly declining, human debris was scattered through even my deepest dives and finally, large portions of ocean habitats such as coral, kelp fields, and seagrass valleys were dying. My research consists of studying the impacts of synthetic fashion waste on the ocean's ecosystems. The fashion industry contributes almost 40% of the microplastic in the oceans and produces over 20% of global industrial pollutants. Specifically, through synthetic microfibers, chemical clothing dyes and mass-production standards, ocean, and human health are declining. Through education and awareness, I believe that companies can shift their harmful design practices to more eco-friendly goals. The main takeaways from this research are: Reducing microplastic waste in the oceans, finding alternatives to synthetic textiles, educating brands on sustainable design, and preserving marine life and their habitats.

Name: Jessica Cucinelli

Title: Assessing shipping risk in the eastern Canadian Arctic: A Mary River project case study

Abstract: Sea ice is melting at an unprecedented rate, improving access to the Arctic and greatly increasing development opportunities such as mining. The Mary River Project aims to expand iron ore production at the Baffinland facility in Nunavut. If approved, this development would increase vessel density in Eclipse Sound and Milne Inlet contributing to shipping hazards that will likely have serious environmental and social impacts. This study aims to identify current management strategies used to mitigating risks associated with increased Arctic shipping and employs a risk-based analysis to determine areas of management priority and optimal resource allocation necessary for this proposal to move forward. It is anticipated that recommendations are required to strengthen management plans in order to effectively mitigate the multiple risks associated with the increased vessel traffic from the Baffinland mine.

Name: Catherine Thompson

Title: Influences to advice and decision-making in DFO Maritimes Region: Opportunities for improved ocean management

Abstract: Program managers at DFO Maritimes Region frequently engage in decision-making processes as part of their regulatory responsibilities in addition to providing advice for decisions outside of their program. There are, however, various internal factors that influence the advice provided by the Departments regional programs, such as regulations and policies, governance structures, timelines, program capacity and expertise, the sources and types of information available for formulating advice, and other factors. The purpose of this research is to identify and analyze these factors in the context of three key programs within the Aquatic Ecosystems Branch. Structured interviews are conducted with program managers (n=9) to determine where improvements are thought possible based on staff experience and expertise. The results from this study will be used to provide recommendations for the development of regional ocean managements tools, such as a Marine Spatial Planning (MSP).

Name: Bailey Levesque

Title: Toxic Effects of Various Plasticizer and Polyethylene Microbead Exposure on Larval Zebrafish (*Danio rerio*)

Abstract: Microplastics are found in almost all aquatic environments worldwide yet their specific threats to wildlife remains unclear. Here, larval zebrafish (*Danio rerio*) models of toxicity were used to assess the effects of plasticizer and polyethylene microbead exposure through the OECD (Organisation for Economic Co-operation and Development) recognized Fish Embryo Toxicity test and the General Behaviour Toxicity test. Exposure of zebrafish to plasticizers Bisphenol A, Bisphenol S, Dibutyl Phthalate, and Santicizer 160 at various concentrations resulted in structural changes including large yolk, heart and yolk sac edema, along with slow heartbeat, and inability to remain upright. Chemical exposure also resulted in larval behaviour changes, suggesting neurotoxic effects. No toxic phenotypes or behavioural changes were observed following exposure to polyethylene microplastic beads. Uptake and accumulation of microplastic particles within the larval gastrointestinal tract was confirmed. This may provide insight to the potential toxic effects of both microplastics and plasticizers on other marine fauna.

Name: Omar Sickander

Title: Factors affecting IMTA (Integrated Multi-Trophic Aquaculture) implementation on Atlantic Salmon (*Salmon salar*) aquaculture farms

Abstract: Aquaculture operations are currently the fastest-growing food production industry increasing in output over 20 times in the past few decades alone. Waste management on “fed” aquaculture farms, like Atlantic Salmon, is a large issue for both public perception and management. Integrated Multi-Trophic Aquaculture (IMTA) is the co-cultivation of species from different trophic levels, as opposed to a single species (monoculture), on an aquaculture farm. From a theoretical perspective, in an IMTA farm, the metabolic waste and uneaten feed from the top-level species like Atlantic Salmon is used by lower-level trophic species like shellfish and macroalgae, minimizing the potential impact of these wastes on the ecosystem. Though this logic has long been used in polycultures in history, and there is a theoretic rationale to support it, IMTA is currently not being applied as a mitigation measure in Atlantic Salmon aquaculture facilities. This project will look into current methods, applications, uses and efficiency of IMTA to address challenges on salmon farms through an in-depth PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method literature review. Once the literature review is completed, industry experts will be surveyed to understand industry perspectives on IMTA effectiveness and the potential for use. The main goal of this research is to determine if IMTA can be used as a waste mitigation technique on Atlantic Salmon aquaculture farms



Oral Session 3: Creative Approaches for Innovative Solutions

Name: Noémie Roy

Title: Ocean literacy and community resilience: A case study on a coastal middle school in Quebec

Abstract: From scuba diving in their physical education class to reading about shipwrecks in their French class, the students of a middle school in Québec learn about the ocean in every subject. This school uses the whole-school approach to ocean education. Through this approach, the entire school community, from parents to administrators, is involved in fostering ocean citizenship among the students. I study how this approach, often applied to environmental education, was adapted to ocean education. With surveys and interviews, I investigate the factors enabling the success of this unique program and how it could be applied to other schools in Canada.

Name: Jessica Hum

Title: Using nature-based solutions in the fishing sector to address climate change

Abstract: How can we apply the knowledge, expertise and skillset of the fishing sector to address climate change? In the past decade, the term "Nature-Based Solutions" (NBS) began emerging in literature with contributions such as Nature-based solutions to climate change, and in the United Nations Framework Convention on Climate Change. For the World Wildlife Fund, NBS are actions which intentionally work with nature to deliver measurable climate change adaptation and/or mitigation benefits which simultaneously co-benefit human development and biodiversity. As a Sobey Fund for Oceans intern, the researcher worked with WWF-Canada to interview numerous agents of nature-based solutions which illustrate ways that fisheries are mitigating, adapting and become more resilient to climate change. This presentation tells the story through case studies and identifies new opportunities for meeting the climate crisis using nature-based solutions within marine ecosystems and fish habitats.

Name: Stefan Miller

Title: Electrically stimulated artificial mussel (*Mytilus edulis*) reefs to create shoreline protection and coastal habitat in St. Margaret's Bay, Nova Scotia

Abstract: Infrastructure designed to protect coastal environments, such as seawalls, can have adverse effects on the coastal environment. They can be expensive and will eventually degrade and require repairs. Biorock electric reefs have shown improvements in the growth and rehabilitation of tropical coral reefs. These marine structures become reinforced through a process called electrodeposition. It is the accretion of carbonate minerals to a steel structure by sending a small voltage charge through conductive seawater via electrolysis. This research focuses on testing the technology's effectiveness in cold water with low dissolved carbonate mineral levels, and its benefits to blue mussel (*Mytilus edulis*) survival and growth. Blue mussels are habitat-forming animals that offer a suite of ecosystem services such as improving water quality and protecting shorelines. The ability to grow living structures with little electrical input presents an environmentally constructive solution and cost-effective stepping stone for communities that require coastal protection and habitat reconstruction.



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 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

World Wildlife Fund (WWF) is one of the world's largest and most renowned leaders in conservation. As part of the WWF global network, founded in 1961 and active in more than 100 countries, WWF-Canada actively contributes to the achievement of the organization's mission: to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature. WWF-Canada has an ambitious national oceans program and eight offices across the country. The Atlantic Region is home to two of them, one in Halifax, NS since 2001 and one in St. John's, NL since 2007, both of which focus on issues pertaining to marine conservation.



© 1986 Panda symbol WWF - World Wide Fund for Nature (Also known as World Wildlife Fund).

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Sponsors

The **Sobey Fund for Oceans** is based on a generous and innovative gift from the Donald R. Sobey Foundation. The gift provides support for the development of a conservation legacy for oceans, specifically through the funding of scholarships and work placements. The Sobey Fund for Oceans will provide the strong foundation onto which we aspire to build greater investment into the broader work of both WWF-Canada and Dalhousie's Marine Affairs Program.

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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 245 keystone, commercially important and/or endangered species including marine mammals, sea turtles, squid, crab,

lobster, and fishes such as sharks, sturgeon, tuna, salmonids and cod. 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.

Oceana Canada was established as an independent charity in 2015 and is part of the largest international advocacy group dedicated solely to ocean conservation.



Oceana Canada has successfully campaigned to end the shark fin trade, make rebuilding depleted fish populations the law, improve the way fisheries are managed and protect marine habitat. We work with civil society, academics, fishers, Indigenous Peoples and the federal government to return Canada's formerly vibrant oceans to health and abundance. By restoring Canada's oceans, we can strengthen our communities, reap greater economic and nutritional benefits and protect our future.

The **Marine Environmental Observation, Prediction and Response Network (MEOPAR)** is a national Network of Centres of Excellence, connecting top marine researchers across the country with highly-qualified personnel, partners and communities. MEOPAR aims to fund leading-edge research, train the next generation of marine professionals, and connect research results to real-world solutions.

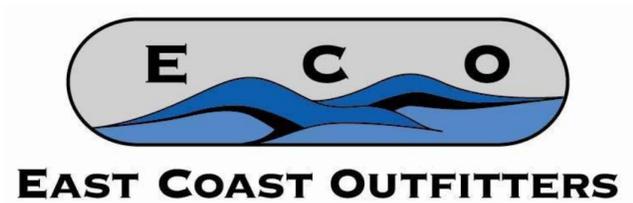


Dalhousie University's Faculty of Science is pleased to support the Sustainable Oceans Conference 2020 and invest in Dalhousie's Marine Affairs Program. Dal Science is Dalhousie University's largest faculty, with eight departments and over 3,500 undergraduate students and 400 graduate students. The world-class professors, graduate students and undergraduate students conducted more than \$26-million in research last year. We would also like to thank the following organizations for their support of the 2020 Sustainable Oceans Conference.

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Community Partners



Acknowledgments

On behalf of the 2019-2020 cohort of Master of Marine Management (MMM) students, we would like to first, sincerely thank all of the student oral and poster presenters, our panelists, our keynote speaker, panel moderator, conference moderator, judges, community partners, and contributors who dedicated their time and expertise to the 2020 Sustainable Oceans Conference. Your continued support, year after year, is what makes Sustainable Oceans the success it is today.

We want to thank the Sobey Fund for Oceans for the Sobey Scholarship award that financially supports educational opportunities for our future ocean leaders. The Sustainable Oceans Conference is made possible through the continued support of the Sobey Fund for Oceans.

This event would not be possible without all of our sponsors and supporters throughout the past 11 months of planning and organizing. Thank you to the Marine Environmental Observation Prediction and Response Network (MEOPAR), Dal Science, the Ocean Tracking Network (OTN), and Oceana Canada for your support through sponsorship. Thank you to Dive Buddies 4 Life, Ripley's Aquarium, and the David Suzuki Foundation for your generous item donations. To our community partners: Coastal Action, Reimagining Atlantic Harbours, Nova Scotia Environmental Network (NSEN), Ocean Wise, East Coast Outfitters, East Coast Scuba, and Dive Buddies 4 Life, thank you for connecting local communities with our ocean and for your help with promoting our conference. Additionally, we would like to thank Oceans Week HFX for their collaboration, which enabled us to raise awareness about Sustainable Oceans.

We would also like to extend our gratitude to our keynote speaker, Dr. Diz Glithero. We are thankful for your belief in Sustainable Oceans and for sharing your insights and knowledge. We would like to thank our panelists, Stella Bowles, Gerald Singh, and Colleen Turlo, as well as our panel moderator, Dr. Lucia Fanning. Additionally, we would like to thank our poster judges, Leah Fulton, Kayla Hamelin, and Justin Trueman, and our oral presentation judges, James Boxall, Dr. Ramón Filgueira, and Caitlin Menzies.

Sustainable Oceans would not be made possible without the hard work and dedication of the MMM class of 2019-2020. We are incredibly thankful to every student for the countless hours they spent ensuring the conference was a success. Special thanks to the committee leads: Omar Sickander- Fundraising, Morganne Robben-Marketing & Outreach, Jessica Cucinelli & Shannon Wood- Logistics, and Noémie Roy and Catherine Thompson-Submissions. We would also like to thank Breanna Bishop, who provided us with invaluable support and guidance throughout the entire conference planning process, and Priyanka Varkey, our conference moderator.

To the Marine Affairs Program faculty, including the Sobey Fund for Oceans Committee members, Dr. Jerry Bannister, Dr. Lucia Fanning, Becky Field, and Dr. Jon Grant, thank you for your guidance during the all stages of conference planning. To the incoming 2020-2021 MMM class, thank you for volunteering your time (both in person and virtually) to the conference while settling into a new program. We wish you the best for organizing Sustainable Oceans 2021!

Finally, if your name is not listed, but you supported us in some way, please know we so are grateful for your support. Thank you once again to everyone for supporting this conference and allowing us to put on such a successful event.

Sincerely,
Delaney Ewing, Stefan Miller, and Rachel Rickaby
Conference Co-Chairs | Sustainable Oceans 2020



Notes