Sobey Fund for Oceans

Presents

September 27th & 28th, 2019
Student Union Building
Dalhousie University
Halifax, NS

SUSTAINABLE OCEANS

Sustainable Oceans Conference

September 27th – 28th, 2019
Dalhousie University, Halifax, NS

The Sustainable Oceans Conference is an annual event that brings together an audience of students, faculty, members of the marine management community, and the general public. This conference is supported by the **Sobey Fund for Oceans** and is organized by the students of the **Marine Affairs Program** at Dalhousie University. It is the only student-led conference of its kind in Atlantic Canada and is being held for the eighth consecutive year.

This year, the conference aims to bring together diverse knowledge groups in order to showcase the abundance of ways that people are connected to the ocean. The goal is to support building bridges between diverse knowledge groups while encouraging conference attendees to consider new perspectives towards the ocean. The conference theme intends to challenge conventional approaches to environmental problem-solving that can result in conflict and division among stakeholders, disciplines, and communities.

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WWF

Marine Affairs Program

DALHOUSIE UNIVERSITY

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Sobey Fund for Oceans

The Sobey Fund for Oceans was 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

"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

Sobey Fund for Oceans Advisory Group

Claudio Aporta
Associate Professor and Director, Marine Affairs
Dalhousie University

Lucia Fanning
Professor, Marine Affairs
Dalhousie University

Becky Field
Administrator, Marine Affairs
Dalhousie University

Jon Grant
Professor, Oceanography
Dalhousie University

Sobey Fund for Ocean 2019-2020 Scholarship Receipients

Tracy MacKeracher

"I am thrilled to receive the Sobey Fund for Oceans Scholarship to support my studies at Dalhousie. Through my PhD research, I aim to understand and quantify the socio-cultural, ecological and economic processes underpinning the sustainability of Nova Scotia's lobster fisheries. I am very grateful to the Sobey Fund for Oceans for supporting this research, which I hope will contribute to sustainable fisheries management by providing an integrated approach for managing fisheries as social-ecological systems."

Noémie Roy

"I wish to help coastal communities thrive through a balance between sustainable resource use and biodiversity conservation. I am grateful to receive the Sobey Fund for Oceans scholarship, because it will allow me to gain knowledge on sustainable development, fisheries economics and area-based conservation through the Master of Marine Management. During my master's degree, I will conduct interdisciplinary research on marine protected areas as tools for both conservation and ecosystem service provision. My goal is to find management strategies that support both healthy oceans and the livelihood of fishing communities."

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Welcome

On behalf of the 2018-2019 Marine Affairs Program students, we would like to warmly welcome you to **Sustainable Oceans 2019: *One Ocean, Infinite Connections*.**

Our connection to the ocean is boundless. Every second breath we take and much of the food we eat comes from the ocean. Yet, the wicked problems facing the ocean often result in conflict, and divide amongst user groups and disciplines. It is important to recognize that these issues cannot be solved from one perspective.

We therefore strive to highlight the many ways we connect to the ocean, and how relationships can be fostered to support societal values towards our one ocean. In doing so, we will showcase these connections through a panel discussion with diverse interests at play in Atlantic Canada's marine and coastal environments, a keynote speaker showcasing the increasing role of marine social sciences in ocean governance, and a wide array of student oral and poster presentations from aspiring ocean leaders.

This year, we aim to build bridges between diverse knowledge groups and encourage individuals to consider a new knowledge perspective towards the ocean. We hope to leave you with a sense of optimisn in how society as a whole can work together to improve ocean and coastal management.

Through engaging with student and guest speakers, ocean connection activities, and community organizations, we hope that the ideas presented instill inspiration to work together to ensure that our ocean sustains us into the future.

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

Kind Regards,

Breanna Bishop, Sara Vanderkaden, & Priyanka Varkey
Conference Co-Chairs | Sustainable Oceans 2019

Conference Committees

Co-Chairs
Breanna Bishop
Sara Vanderkaden
Priyanka Varkey

Logistics Committee
Co-lead: Holly Amos
Co-lead: Reanne Harvey
Gillian Curren
Lindsay Richardson
Bronwen Rowe

Fundraising Committee
Co-lead: Sam Renshaw
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Co-lead: Nadia Dalili
Co-lead: Emily VanIderstine
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Paul Kraly
Justin Schaible

Submissions Committee
Lead: Sarah Hughes
Elissama De Oliveira Menezes

Conference Coordinator
Alex Cole, MMM 2017-2018

Volunteers
MMM Class of 2019-2020

Presentation Judges

Oral Presentation Judges
James Boxall
Laurenne Schiller
Noémie Roy

Poster Presentation Judges
Hugh Williamson
Jenny Weitzman
Kai Laspina

Schedule of Events

Friday, September 27, 2019

5:30 pm – 6:00 pm	Registration & Reception
6:00 pm – 6:45 pm	Smudging Ceremony, Mi'kmaq Land Acknowledgement and Welcoming Remarks
6:45 pm – 7:00 pm	Sobey Fund for Oceans Scholarship Presentation
7:00 pm – 9:00 pm	Panel Discussion – *Reconciling different interests in Atlantic Canada's marine and coastal resources*

Panelists:

Rachel Bailey - *Mayor of Lunenburg*

Sigrid Kuehnemund - *VP of Ocean Conservation WWF Canada*

Colin Sproul - *President of the Bay of Fundy Inshore Fishermen's Association*

Moderator: Dr. Megan Bailey, Assistant Professor, Marine Affairs

Cash bar will be open from 5:30 pm – 9:30 pm

Saturday, September 28, 2019

8:30 am – 9:00 am	Doors Open / Registration
9:00 am – 10:15 am	Oral Session 1: Increasing Transparency to Mitigate Conflict
10:15 am – 10:45 am	Poster Session 1: Ocean Governance and Regulations & *Nutrition Break*
10:45 am – 11:30 am	Oral Session 2: Reconnecting Environmental and Social Wellbeing
11:30 am – 12:30 pm	*Lunch break* and Community Fair
12:30 pm – 1:45 pm	Oral Session 3: Incorporating Diverse Knowledge Groups
1:45 pm – 2:15 pm	Poster Session 2: Technology and Innovation *& Nutrition Break*
2:15 pm – 3:00 pm	Oral Session 4: Fisheries Management
3:00 pm – 3:30 pm	Poster Session 3: Environmental Management and Conflict Resolution
3:30 pm – 4:30 pm	Keynote Address by Dr. Emma McKinley
4:30 pm – 5:00 pm	Closing Remarks

Community Fair will take place from 10:00 am – 1:00 pm

Panelists

Rachel Bailey was elected as the first female Mayor of the Town of Lunenburg during Municipal Elections in the fall of 2012 and was re-elected to a second term in 2016. Her involvement in municipal politics was a natural progression from her volunteer service to the community. She holds a Bachelor of Public Relations degree (BPR) from Mount Saint Vincent University and her professional résumé highlights experience in the fields of marketing, fund development, event promotion and journalism. As a direct descendent of original settlers, Mayor Bailey can identify the plot of land within the grid of the UNESCO World Heritage Site, OLD TOWN LUNENBURG, granted to her family, which is within blocks of where she grew up in one direction and where she raised her own family in another. Proud to be serving her hometown through her leadership role in municipal government, her passion for her ocean –side community and the people that shape it motivate her daily.

Sigrid Kuehnemund is the VP of Ocean Conservation at WWF-Canada. Based in St. John's, NL, Sigrid leads WWF-Canada's Oceans Program with a focus on sustainable fisheries, marine planning, protection and habitat restoration. She advances conservation initiatives at local, national and global scales through advocacy and partnerships with fellow eNGOs, industry, government, scientists, Indigenous groups and local communities. Sigrid has helped secure minimum standards for MPAs in Canada, developed a national forage fish initiative, and helped increase protection for species at risk, like the endangered Southern resident Killer Whale.

Colin Sproul is the President of the Bay of Fundy Inshore Fishermen's Association. He is a member of the board at the Clean Ocean Action Committee, Southwest Lobster Science Society and Wood's Hole Oceanographic Institution's Ropeless Consortium. He has spoken previously on Ocean issues at Dalhousie University, The Canadian Centre for Ethics in Public Affairs, the Legislature's Standing Committee on Natural Resources and the Senate Standing Committee on Energy. Colin helped lead his fishermen's association through its protracted battle with Emera, Fundy Ocean Research Centre for Energy and Nova Scotia's Department of Environment over tidal development in the Minas Passage. His family has fished from Delap's Cove in Annapolis County for 5 generations and he's passionate about the people in his community carrying on their way of life.

Moderator

Dr. Megan Bailey is an Assistant Professor and SSHRC Canada Research Chair with the Marine Affairs Program at Dalhousie University. Megan's research is motivated by notions of equity and fairness, and a belief that the way humans use the ocean, and the resources within, should be governed in ways that ensure ecological resilience and social wellbeing.

Keynote Address: Dr. Emma McKinley

One Ocean, Infinite Connections: Connecting People and the Sea

Despite its vastness and seeming never-ending capacity to withstand the pressures placed on it by human society, the global ocean is not limitless. Worldwide, marine and coastal ecosystems are experiencing unprecedented levels of anthropogenic pressure, and as efforts to address the challenges facing the global seas continue, recent years have witnessed a resounding call for greater consideration of the human dimensions of life on this blue planet. As management of our global seas and coastlines becomes ever more complex, there is a need for us to take account of the complex human dimensions intertwined within them. While society and the sea have always been inextricably linked, public awareness and concern for the global seas appears to be shifting, following the success of certain high-profile media coverage - as seen, for example, in Blue Planet 2. Despite this apparent increase in public concern, understanding of the complexities of both individual and societal connection to the sea remains low in places.

Despite a growth in the marine social science research community, challenges persist. Historically, society has been positioned as the key driver of negative impacts for our global seas, with anthropogenic activities and people more broadly regularly cited as one of the most pressing challenges facing our seas. Recent years have seen efforts to change that narrative, placing more emphasis on the role of people in addressing these challenges. For society to be an active part of the solution, there is first a need to better understand the complex layers of the relationship between people and the sea. This is multifaceted, encompassing the multiplicity of values held across different users, stakeholders and communities, and therefore, must be viewed through multiple lenses. There is a clear role for marine social sciences to contribute to this dialogue and to consider how human connection to the sea can become a greater part of the future of our sea.

Through this lecture, Emma will discuss the growing dialogue around the role of marine social sciences for the global seas, drawing on recent research to discuss future opportunities and challenges, and highlighting the role of marine social science in working towards solutions. She will draw upon her knowledge of recent efforts in the UK to place more emphasis on the growing marine social science community within governance and decision making. Finally, Emma will introduce the recently launched Marine Social Science Network; an international, interdisciplinary community of researchers and practitioners. As we enter the UN Decade for Marine Science For Sustainable Development, Emma will close with a call for creating a strong global mandate mixed values of the sea to be an integral part of future conversations.

Bio

Dr. Emma McKinley is a Research Fellow at Cardiff University in Wales, UK. Emma has an interdisciplinary background, with an initial grounding in natural sciences having completed a BSc in Marine Biology (University of Stirling), she went on to undertake her MSc in Marine Environmental Protection (University of Wales, Bangor), which was followed by a short position as a research assistant on Koh Phra Tong in the Andaman Sea. It was during her work here that Emma's interest in how society interacts with the global seas and coasts really started, marking a significant shift in her career from natural sciences to a career that is now firmly within the world of social sciences. This led her to complete her PhD, which took the concept of 'marine citizenship' and examined the role of general society contemporary UK marine and coastal management and policy development (University of Bournemouth).

Following 5 years as a Research Fellow at the University of Chichester, working mainly with maritime industries and coastal communities and stakeholders on EU funded projects, Emma took up the position of Ser Cymru Research Fellow at Cardiff University. Currently her work focuses on societal interactions with coastal environments (specifically looking at saltmarsh environments around Wales), the socio-cultural values of marine and coastal ecosystem services and how these are embedded within marine and coastal governance. Drawing on her multi-disciplinary background, Emma examines the relationships between society and the sea by applying a range of techniques, working on a diverse range of research topics including; marine spatial planning, ecosystem services, public perceptions and attitudes towards marine issues, coastal community resilience and sustainability and the Blue Growth agenda, focusing on supporting a sustainable 'blue' economy.

Her work has led to collaborations with numerous partners including local and regional government bodies, the United Nations Environment Programme – World Conservation Monitoring Centre (UNEP-WCMC), NGOs including the RSPB, WWF, the Marine Conservation Society, as well as academic partners across Northern Europe, United States, South America, Australia, and South Africa. In addition to her research, Emma is the Chair of the Royal Geographic Society (with the Institute of British Geographers) Coastal and Marine Research Group and co-chair of the British Ecological Society's Wales Policy Group. Recently, she has led the formation and growth of the international and interdisciplinary Marine Social Sciences Network, which was officially launched in September 2018. The Network seeks to develop an active community for an emerging marine social science community across the globe. You can follow her on @EmmaJMcKinley, and can find out more about the Marine Social Sciences Network by going to the website www.marsocsci.net or following on @MarSocSci.

Community Organization Fair

During the lunch break of the Sustainable Oceans Conference, you are welcome to explore the community fair, an event that aims to connect guests with local marine-related organizations. From ***10:00 a.m. to 1:00 p.m. on Saturday, September 28th*** guests can interact with various engaging booths to get a first-hand look at the type of work that is being conducted throughout Atlantic Canada and how they can get involved. Themes range from hands-on learning of local marine plastics pollution, to aquatic animal tracking and technology development.

The Canadian Sea Turtle Network is a charitable organization working to conserve endangered sea turtles in Canadian waters and worldwide with the help of scientists, commercial fishermen, coastal community members, and you.

Clean Foundation works for a clean climate and clean water – and to support these foundations of a clean economy, we foster clean leaders of all ages. We provide the knowledge, tools and inspiration needed to encourage the actions that lead to positive environmental change and a greener economy.

Coastal Action is a charitable organization that addresses environmental concerns within the South Shore region of Nova Scotia, and was established in December 1993. Our goal is to promote the restoration, enhancement, and conservation of our environment through research, education, and action. Coastal Action is currently tackling many environmental issues that fall under the following theme areas; species at risk and biodiversity, watersheds and water quality, climate change and education, as well as coastal and marine.

The earth's terrestrial and aquatic ecosystems face many serious problems requiring timely information-based policies, decisions and, above all, solutions. ***EIUI***'s research addresses the use and influence of marine environmental and fisheries information produced by governmental and non-governmental organizations, with a focus on their grey literature publications. Our research is especially probing the complex science-policy interface(s) so as to understand and maximize the role (use and influence) of such information in policy and decision-making processes.

JASCO Applied Sciences is a world leader in the science of underwater noise and its effects on marine life. JASCO supports all stages of environmental assessments of underwater sound for the oil and gas, renewable energy, marine construction, shipping and defence sectors. JASCO designs and manufactures state-of-the-art oceanographic observing systems.

The ***Maritime Aboriginal Peoples Council*** (MAPC), a regional Aboriginal Peoples Leaders Institution established by the Native Council of Nova Scotia, the Native Council of Prince Edward Island, and the New Brunswick Aboriginal Peoples Council, represents the Traditional Ancestral Homeland Mi'Kmaq, Maliseet, and Passamaquoddy Aboriginal Peoples of Canada. IKANAWTIKET Environmental Inc. is our registered charity to promote the preservation of the natural environment by educating and informing the public about environmental issues and respect for the environment, biodiversity and Aboriginal culture, world issues and traditional knowledge.

Located on Argyle St. in the heart of Halifax's entertainment district, ***Neptune Theatre*** is Atlantic Canada's largest professional regional theatre. For 57 years, Neptune Theatre has contributed to the cultural, social and economic well-being of Halifax and the province. For generations audiences have delighted in the stories that come to life on our stages.

About Between Breaths:
From the final moments of his life to his first whale rescue, Between Breaths goes back in time to explore the life of Dr. Jon Lien. Well known in Newfoundland as the Whale Man for his daring rescues and whale-saving techniques.

The ***Nova Scotia Sea School*** is a charity non-profit organization which promotes the Maritime tradition of boats and the sea as a means for young people to learn the values that seafaring has taught for generations; Leadership, Courage, Responsibility, Cooperation, Generosity, Environmental Stewardship and Respect.

Named after the complex and ever-changing ecosystem we work in, ***Ocean Sonics*** was created in 2012, to help better understand, protect and harness the power of our oceans. A small leak has led to a flood of innovation from Ocean Sonics, dedicated to the preservation and prosperity of our oceans. Ocean Sonics is constantly innovating to provide the best products and services to our users.We believe passionately in sustainability, environmental and social stewardship, and understanding and protecting our oceans.

The ***Ocean Tracking Network*** (OTN) is a global aquatic animal tracking, data management, and partnership platform headquartered at Dalhousie University. OTN and its partners are tracking more than 220 keystone, commercially important, and endangered species worldwide using electronic tags, benthic monitoring systems, and a fleet of autonomous ocean-going gliders.

Conserving and restoring ecological integrity is ***Parks Canada***'s first priority in park management. Parks Canada in Mainland Nova Scotia has worked hard to reverse the devastating impacts invasive species, sea level rise and climate change can have on our coasts and shorelines. Parks Canada has been successful with its coastal restoration project at Kejimkujik Seaside, where the invasive Green crab had destroyed much of the local estuary's eel grass. On Sable Island, Parks Canada is working with partners to quantify and understand the marine influences on the coastal ecosystem, including stranded marine mammals, marine litter, sea level rise and sustainability of the freshwater. This important work will ensure the ecological and commemorative integrity of these places for present and future generations.

Stop Trashing It is a grassroots non-profit based in the Halifax Regional Municipality that aims to turn awareness into action when it comes to waste reduction, plastic in particular. They are solutions-focused and promote sustainable habits, communicate proper recycling and waste reduction techniques through community engagement and outreach. They encourage swapping out unsustainable items with reusable options and by making products at home and strive to work together as a community in transitioning to low waste lifestyles. To see what they're all about, check them out on Instagram and Facebook @StopTrashingIt or at www.stoptrashingit.com.

Established in 1987, ***SANS*** is a community-based non-profit organization dedicated to: building an inclusive, fun and respectful surf community; supporting recreational and amateur surfing; and promoting a sustainable surf culture.

The Tare Shop is Nova Scotia's first package free bulk store and coffee shop. They aim to educate and inspire people to live with less waste in their lives.

WWF-Canada's Living Planet @ Campus (LP@C) encourages students, staff and faculty in the practice of sustainability and the protection of nature on campus and beyond. Through LP@C students can earn WWF's Living Planet Leader designation, giving them the knowledge, skills and experience to lead in establishing sustainable systems and practices that help protect and restore nature wherever they live and work. LP@C tracks student impact nationwide and provides students a tangible record of their contribution that they can leverage upon entering the job market in their respective fields.

Oral Session 1: Increasing Transparency to Mitigate Conflict

A multi-stakeholder assessment on shipping risk governance: case study on the proposed ban on the use and carriage of heavy fuel oil by ships in the Arctic

Sarah Hughes, Marine Affairs Program, Dalhousie University

Global interest in Arctic shipping is increasing as a result of melting sea ice and climate change. The potential risks of increased emissions, oil spills, and noise pollution can substantially affect coastal communities and commercial entities living and working in the Arctic. The International Maritime Organization (IMO) is the intergovernmental body that enables regulations on international shipping activities and is working on banning Heavy Fuel Oil (HFO) in the Arctic. The IMO uses the Formal Safety Assessment (FSA) as a systematic cost-benefit assessment process to evaluate the risks associated with maritime safety and marine environmental protection. The aim of the study is to understand the rationale behind developing the ban on HFO and in particular how and why FSA was used or not used. By analyzing the method taken for banning HFO, the research evaluates how the risk management process affects high-level decision-making for shipping-related issues in the Arctic region. Preliminary results indicate variance in how stakeholders view a spill of HFO in the Arctic and how the framing of the risk affects input data for assessments, implementation of risk mitigation strategies, and overall risk governance approaches. Results will be used to inform policymakers and ocean governance actors on the Formal Safety Assessment as a risk management strategy for shipping and any risk governance deficits needed to be addressed for effective marine environmental protection of the Arctic region.

Offshore oil in Nova Scotia: stakeholders, conflicts and future directions

Anuja Kapoor, Department of Environmental Science, York University

The Canada- Nova Scotia Offshore Petroleum Board uses Strategic Environmental Assessments (SEAs) as a planning tool to scope the potential impacts of future offshore oil and gas activities in the region. It is widely acknowledged that SEAs are a good practice to help anticipate environmental, social and economic concerns and achieve sustainable development. Since 2012, seven offshore areas in Nova Scotia were considered using SEAs including the Eastern Scotian Shelf and Slope – Middle and Sable Island Banks, Sidney Basin and Orpheus Graben. Stakeholder consultations were undertaken for each region to identify and address potential conflicts early in the planning process. A detailed examination of stakeholder comments during these years reveals a poor record of consultation. Few stakeholders offered feedback, but the comments allowed us to analyze major areas of conflict. Insights are presented on engaging more stakeholders at the SEA stage to achieve a balance of objectives. In the future, SEAs might be better implemented through a broader framework of marine spatial planning.

Transparency and communication in Norwegian and Nova Scotian salmon aquaculture industries

Justin Trueman, Marine Affairs Program, Dalhousie University

The Atlantic salmon aquaculture industry has the potential to have a significant contribution to economic development and seafood production – particularly in rural and coastal communities. However, the lack of social licence to operate (SLO) can become a barrier for industry development. Transparency and communication have been suggested as two of the potential drivers for the industry to achieve SLO. This study explores the role of transparency and communication in the achievement of SLO in the salmon aquaculture industry by contrasting the perceptions of relevant stakeholders (researchers, managers/regulators, NGOs/community groups, and industry). The comparison was carried out in two distinct jurisdictions where salmon aquaculture occurs: an industry pioneer, Norway, having national ocean policies incorporating SLO, with a younger industry of Nova Scotia, Canada, that has adopted new aquaculture regulations in 2015. These regulations follow a moratorium of four to five years in new lease and licenses that was prompted by the public. Preliminary results reinforce the importance of meaningful engagement, reporting of environmental and social standards, as well as the need for industry (rather than any other stakeholder group) to take on a leadership role in transparency and communication in both jurisdictions. Comparison of these two areas helps to understand the role of transparency and communication in achieving SLO, which may be key to promoting the development and sustainability of the salmon aquaculture industry worldwide.

Poster Session 1: Ocean Governance and Regulation

The uptake of biosphere integrity in planetary boundary concept into environmental policy

Isabelle Hurley, Department of Biology, Dalhousie University

The biosphere integrity planetary boundary was designed to aid policymakers in addressing the dangerous decline of Earth's biodiversity. To determine whether the biosphere integrity planetary boundary has successfully been embedded into environmental policy, on its decadal anniversary, we reviewed the uptake of the boundary into environmental policy on the national and international scale. Using specific search terms, we reviewed environmental reports published since 2009 by national governments in Europe and North America and the leading biodiversity international bodies. Our study found that in the last decade, the planetary boundary framework has been used in biodiversity environmental reports and policy, though relatively infrequently and in general limited to European countries. Assessing whether its uptake in policy is rapid remains challenging due to the paucity of studies on analogous concepts and rates. However, our findings suggest that the biosphere integrity planetary boundary is increasingly embedded into policy.

Predictive modeling in the finfish aquaculture environment: A proactive approach to sustainability and management

Hart Koepke, Department of Oceanography, Dalhousie University

The rise in global prevalence of finfish aquaculture sites demand reliable predictive models of waste outputs and impacts that are structured to accommodate environmental regulatory standards. Assessing impacts fish farms have on their environment is instrumental in developing future resiliency models which can be used to regulate location, stocking density, and fallowing periods between harvests. Current organic matter depositional models for finfish aquaculture have yet to satisfactorily couple benthic and pelagic parameters both spatially and temporally. This research will combine a benthic diagenetic model with a three-dimensional hydrodynamic pelagic model developed by UK partners Longline. Verifying the model with field samples taken at sites both locally and abroad can indicate the feasibility and reliability with which a model can be used as a regulatory tool. The benthic component of the model will focus on the sulfide and organic matter content, variables which are seeing a global increase in their use as proxies for sediment health. This will eliminate variables unnecessary for regulation and thereby alleviate computational workload. An effective model allows for proactive decisions to be made, reducing long-term environmental impacts by informing stakeholders of the best sustainability and financially secure practices.

The Royal Canadian Navy in the Atlantic Ocean – A sustainable operation strategy for cetaceans and their critical habitat

Bronwen Rowe, Marine Affairs Program, Dalhousie University

Royal Canadian Navy (RCN) exercises and trials have the potential to impact marine organisms and their environment. The Canadian Armed Forces (CAF) Maritime Forces Atlantic Local Operating Areas (MARLOAs) Management Plan (MOAMP) provide naval personnel necessary information regarding environmental considerations in designated operating areas, and assists the RCN in planning exercises and trials. The MOAMP covers a variety of topics including Marine Protected Areas (MPAs) and Conservation Areas (NMCAs), critical habitat and seasonality, ocean contaminants, and ocean noise. Currently, the MOAMP requires review and adjustment so relevant environmental information is readily available for exercise planners, Commanding Officers (COs) and their crews. This project focuses on the sustainable use of the marine environment, incorporating tools such as marine spatial planning and ecosystem-based management. The goal is to manage ocean users (RCN) and uses (exercises) to protect the marine environment (critical habitat for cetaceans). The management problem addressed is how to minimize the impact of RCN exercises on cetaceans (with special attention given to engendered species), and critical cetacean habitats, in the Atlantic Ocean. The deliverables of this project include a spatial analysis of military activity in relation to other marine sectors (i.e. fishing, shipping) and marine mammal distribution, an analysis of the observation system in place, and recommendations for a more user-friendly MOAMP document.

Understanding non-compliance in small-scale fisheries: shark fishing in Myanmar's Myeik Archipelago

Tracy MacKeracher, James Cook University

Achieving fisheries compliance is challenging in contexts where enforcement capacity is limited and the financial incentive for rule-breaking is strong. This challenge is exemplified in Myanmar's Myeik Archipelago, where an active shark fishery exists despite a nationwide ban on targeted shark fishing. We surveyed 144 small-scale fishers in five communities to explore the level, distribution, and potential behavioural drivers of illegal shark fishing. Approximately half of respondents were aware of the nationwide ban, yet 24% reported targeting sharks. The fear of sharks and lack of capacity (e.g. equipment, knowledge) were key motivations for compliance, while food and income were key motivations for non-compliance. Non-compliance was negatively related to age and boat ownership, and positively related to perceived levels of non-compliance. We conclude that in resource-dependent communities, improving compliance for effective shark conservation may require strategies to address fundamental issues of poverty, food security and the lack of alternative livelihoods.

Investigating the certifiability of MSC certification of Nunatsiavut's commercial fisheries

Justin Schaible, Marine Affairs Program, Dalhousie University

The aim of this project is to investigate the potential for MSC certification to promote economic development in the commercial fisheries operated by Labrador Inuit in Nunatsiavut, NL, Canada. Currently, there are four active fisheries that are co-managed between the Inuit of Nunatsiavut, the Department of Fisheries and Oceans Canada (DFO), and the Provincial Government. Each year, the Nunatsiavut Government is allocated a proportion of the total allowable catch for northern shrimp, snow crab, turbot, and Arctic char by DFO, which is distributed to beneficiaries within Nunatsiavut's five communities. The fisheries sector is one of the region's largest employers, supporting up to 180 fishers and 220 processors throughout Nunatsiavut. However, the sector is struggling to remain economically viable and competitive. One potential way to improve the economic viability is through market differentiation and MSC certification. The research project assesses the 'certifiability' of fisheries in Nunatsiavut, and what economic benefits certification might bring. To evaluate certifiability, each fishery is compared against the MSC standard using the OSMI Rapid Assessment Tool. Designed to be similar to, but faster than, an MSC pre-assessment, this methodology is used to identify data or performance deficiencies in fisheries sustainability based on the health of the target stock, impacts on the environment, and the management systems (including Inuit co-management). With the results from the rapid assessment in mind, a return on investment analysis is used to compare the potential costs and benefits of MSC certification with respect to furthering the governing principles set out by the Nunatsiavut Government. This research will help contribute to decisions about pursuing MSC certification for Labrador Inuit.

SUP Halifax? Identifying barriers to reducing single-use plastics in the Halifax Regional Municipality

Priyanka Varkey, Marine Affairs Program, Dalhousie University

Ocean plastic was declared a planetary crisis by the United Nations in 2017. Plastic debris poses a serious threat to the marine environment killing millions of seabirds, thousands of marine mammals and turtles, and countless fish annually. Single-use plastics (SUPs) are estimated to contribute to about 50% of all plastic debris in the ocean. Due to its coastal proximity, overuse and improper disposal of SUPs in the Halifax Regional Municipality (HRM) lead to many SUPs ending up in the ocean. Using two sets of surveys as well as semi-structured interviews, this pilot project aims to identify the main barriers to reducing SUPs in the HRM. An online survey of the HRM community gauged its interest in reducing dependence on SUPs and its perceptions on the impact of SUPs on the marine environment. A second survey, distributed to business owners in the food service industry in the business improvement districts (BIDs) of the HRM, identified businesses that were interested in reducing their SUP use. Follow up interviews with interested businesses aimed to understand concerns and challenges faced by business owners in their attempt to reduce SUPs. Preliminary results indicate overwhelming public interest in sourcing eco-friendly alternatives and frustration among business owners toward a seeming lack of support from government. Results of this study will be used to provide a framework to adapt the Ocean Friendly Nova Scotia (OFNS) initiative, a tiered certification system recognizing businesses for their efforts to reduce SUPs, in the HRM.

Oral Session 2: Reconnecting Environmental and Social Wellbeing

Reflections of the impact of certification and traceability in the Nunavut seal market: Implications for Inuit rights

Sara Vanderkaden, Marine Affairs Program, Dalhousie University

Under the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which Canada has signed, Inuit have the right to food, culture, and economic opportunities. Seal harvesting has sustained countless generations of Inuit, and is therefore at the centre of these Inuit rights. However, anti-sealing campaigns targeting the commercial seal hunt in Newfoundland have resulted in international bans that have collapsed the market for sealskins and imposed hardships on communities across Inuit Nunangat (the collective Inuit regions in Canada). In an effort to improve market access for Inuit seal products, the Canadian Government established the Certification and Market Access Program for Seals (CMAPS), which is creating certification and tracking systems for Inuit seal products in European Union markets. In 2015, the Government of Nunavut became an Attestation Body under the EU Indigenous Communities Exemption, which enables the Government to certify Nunavut seal products for export into EU markets. As such, this research will explore the suitability of certifications and traceability in supporting the Nunavut seal market and Inuit rights. Through an analysis of Fur Tracking System data and focus group discussions with value chain actors in Iqaluit and Qikiqtarjuaq, this research will: a) document and analyze barriers, bottlenecks and challenges in the seal value chain, and b) identify credence qualities of the Inuit seal harvest that should be considered in the development of certification and traceability systems. Collectively, these findings seek to better inform decision-makers on best measures for supporting the Nunavut seal market in the context of Inuit rights.

Exploring the alignment of human and environmental health recommendations for fish and seafood consumption

Holly Amos, Marine Affairs Program, Dalhousie University

The global population is expected to reach 9.8 billion by 2050, and with this climbing population, comes the challenge of supporting the health of people around the world. Sustainable food systems have been suggested as a tool to produce sufficient quality and quantity of food to achieve this. Fish and seafood are included in many health recommendations for several reasons, however fisheries around the world are overfished and overfishing continues. This project will use an in-depth literature review to explore four aspects of aligning human health and environmental health recommendations for fish and seafood intake: i) Canada's human health recommendations, the health evidence supporting these recommendations (quantities and species recommended); ii) the environmental considerations for the sustainability of the recommended species and quantities of consumption; iii) the provenance of Canada's seafood supply; and iv) the affordability of fish and seafood species. A comparative analysis will be used to assess whether there is, or is potential for, alignment of human health and environmental health recommendations with consideration of the four areas of interest. The anticipated results are that there is little alignment between human health and environmental health considerations and that there are underrealized opportunities for considering environmental health and human health together with regards to moving towards sustainable food systems. Through considering the alignment of human and environmental health we can move towards recommendations that support the integration of multiple policy areas to develop policy that reflects the complex, interconnected nature of human and environmental health.

Oral Session 3: Incorporating Diverse Knowledge Groups

Spatio-temporal model for recovery of American plaice

Andrea Perreault, Marine Institute, Memorial University

American plaice (*Hippoglossoides platessoides*) on the Grand Banks of Newfoundland was a historically important commercial fishery, accounting for over ten percent of the Canadian groundfish fishery in the 1950's. Due primarily to overfishing, the stock collapsed in the mid-90's and a ban on direct fishing currently remains. We propose a spatio-temporal state-space stock assessment model for this stock which will provide realistic projections to aid fisheries managers in assessing the recovery of the stock. State-space models (SSM) can integrate knowledge and data from different sources and thus provide a more representative description of fish stock dynamics than previous methods. Recently, we fit a SSM for Grand Banks American plaice and our next research goal is to include spatial and temporal variation in the model. There is evidence of spatial and temporal differences in the stock distribution and other productivity processes including body growth rates, and this variation may be attributed to many factors, including the availability of food between regions and differences in water temperature across the Grand Banks. Accurately including all sources of variability in the stock assessment model for American plaice is vital, as managers need the best available science with which to assess the recovery of the stock. This state-of-the-art state-space stock assessment model will therefore be key in aiding to rebuild this depleted stock. Additionally, the model will have further-reaching applications as variants of this model can be used in future stock assessments for similar species to ensure sustainable harvesting advice.

Documenting oceanographic features in Nunatsiavut: Practices to mobilize Labrador Inuit knowledge into marine research

Breanna Bishop, Dalhousie University, Marine Affairs Program

Climate change is having profound effects on arctic and subarctic communities, and at times related oceanographic trends are less documented at larger geographic scales. This is evident in Nunatsiavut – an Inuit self-governing region in northern Labrador – which has received less research attention in comparison to other areas. As such, research focusing on oceanographic variables may be used in support of decision making and planning for future change in Nunatsiavut. Further, the land claims agreement has provisions to include Inuit knowledge in such decision making, and new waves of marine research are looking to engage both western science and Labrador Inuit knowledge. However, methods of mobilizing Inuit knowledge into marine research guided by western scientific paradigms are less defined. This research explores the question: when recording Labrador Inuit knowledge of oceanographic features, what practices of documentation can be used to facilitate knowledge mobilization that respects the original ontological context? Through participatory mapping and semi-structured interviews in the Nunatsiavut communities of Rigolet and Hopedale, this question is addressed through two parallel approaches. First, through documenting Labrador Inuit knowledge of oceanographic features at a larger geographic scale, this work identifies oceanographic trends and changes that Nunatsiavut communities are experiencing. Second, documenting such knowledge provides a case study to identify practices that marine researchers can incorporate when documenting Labrador Inuit ocean-knowledge.

“Whose voices are not in the room”: Indigenous women representation in Arctic climate crisis research

Elissama De Oliveira Menezes, Dalhousie University, Marine Affairs Program

Climate crisis is the new black with thousands of articles and reports published on the topic every year. In the Arctic, most research funding goes to climate crisis related projects as the temperature there has risen more than twice the rate of the rest of the world. In the last two decades, the number of scientific works published in the Arctic climate crisis field has increased by more than 700%. Because the Inuit, indigenous peoples inhabiting the Arctic regions of Greenland, Canada, Alaska, and Chukotka, hold generations of local knowledge on the dynamic of the Arctic environment, they are sought to be involved in the Arctic climate crisis research process. Most climate studies in the Arctic associate the men with a broader knowledge of the environment and climate, whereas women knowledge is usually associated with the domain of the household generating a scientific knowledge gap. I will be presenting the preliminary results of a systematic review which aimed to quantify and qualify the representation of indigenous women on Arctic climate crisis research focusing on Nunavut, Canada. Why is it important? Effective climate emergency response incorporates the roles of women in the decision-making process, and scientific information plays a fundamental role in the climate crises action: indeed, quality and valid information is the first step to effective decision making.

Poster Session 2: Technology and Innovation

Using drifting passive acoustic to monitor Atlantic Harbour Porpoise in high flow environments

Mike Adams, Acadia Centre for Estuarine Research

Monitoring marine life in the high flow environment of the inner Bay of Fundy presents unique challenges that require advanced technologies and techniques to overcome. Atlantic harbour porpoise (*Phocoena phocoena*), which are common to the Bay of Fundy, are sensitive to anthropogenic activity, particularly changes in the acoustic environment. Passive acoustic monitoring has been used since 2011 at the Fundy Ocean Research Centre for Energy (FORCE) tidal energy test site to investigate porpoise activity in relation to tidal energy developments. More recently, and to fill knowledge gaps, icListenHF hydrophones were deployed on GPS tracked drifting equipment platforms in Minas Passage. Our 2017 deployment involved six 5-7 hour drift tracks through Minas Passage using a vertical array of two synchronized hydrophones with two additional C-POD porpoise loggers. Data from the 2017 array allowed for a rough estimation of harbour porpoise use of the water column. The 2018 deployment involved additional hydrophone drift tracks through Minas Passage using an expanded vertical array of four hydrophones. Data obtained from the 2018 array are currently being analyzed to obtain precise depth and range data on echolocating porpoises in Minas Passage. Developing methods and procedures to collect and process array type datasets is a crucial step towards determining abundance and behavior of porpoises from passive acoustic monitoring efforts, which can then be used to assess porpoise-turbine interactions.

The use and value of opportunistic sightings for cetacean conservation and management in Canada

Nadia Dalili, Marine Affairs Program, Dalhousie University

Twenty-six marine mammal species are designated under the Species at Risk Act. Some of the most endangered include the North Atlantic Right Whale, St. Lawrence Estuary Beluga Whale, and the Southern Resident Killer Whale. When species are designated under the Species at Risk Act, management plans, recovery strategies, and action plans are outlined to prevent wildlife species from being extirpated or becoming extinct. In these plans, monitoring and outreach are often key recovery objectives for the species. Opportunistic sightings (OS) can help support monitoring and outreach of at-risk species and can provide an important source of information on the presence of a species when systematic surveys are impractical or costly. To better understand the use and value of OS for cetacean conservation and management, marine mammal experts in Canada were interviewed (n= 16). A thematic analysis was used to examine the qualitative data of the interviews. OS are being used in a variety of different ways, from species distribution analyses to outreach and engagement tools. Reliability of OS was reported as key to being able to use the data. One main limitation of OS is there is no measure of effort. However, many noted this as the nature of the data. Recommendations on how to improve OS include creating a centralized platform where data can be shared across the country, improve the quality of OS data by adding pictures or video of cetaceans when reporting, and increase cetacean ID training sessions for stakeholders on the water.

Monitoring elasmobranchs in marine protected areas: A Canadian case study of the Laurentian Channel

Sam Renshaw, Marine Affairs Program, Dalhousie University

Support for the application of Marine Protected Areas (MPAs) for shark and ray (herein elasmobranchs) conservation varies widely throughout current literature. Several MPAs around the globe have been created with the purpose of protecting elasmobranch species, however their suitability and effectiveness are often left in question. Telemetry is widely used to better understand shark ecology and behaviour, yet the application of insight gained through these studies for conservation and management, particularly with respect to MPA efficacy, is inconsistent. A systematic literature review was conducted to determine how telemetry has been used to monitor and evaluate MPAs for elasmobranch species. Several aspects of telemetric MPA monitoring were investigated including the study size, duration, species, MPA restrictions and methodology. The results of this review will be used in a Canadian case study of the newly designated Laurentian Channel MPA (LCMPA) to inform the potential avenues for post-designation evaluation in pursuit of its conservation objectives to protect three species of elasmobranch: Porbeagle shark (Lamna nasus), Black Dogfish (Centroscyllium fabricii) and Smooth Skate (Malacoraja senta). Expected results include a suggested monitoring plan to assist with management of the LCMPA aimed at bridging the current gaps in knowledge of these species' movements and distribution.

Acoustic tagging to document Atlantic coastal residency patterns and inter-year site fidelity of Atlantic torpedo rays (*Tetronarce nobiliana*)

Gabrielle Deveau, Acadia University

The Atlantic torpedo ray (*Tetronarce nobiliana*), the largest known species of electric ray, periodically inhabits the coastal waters of Nova Scotia. However, their temporal and spatial distribution along the coast has not been thoroughly investigated. To study the residency and distribution of Atlantic torpedo rays in the Northwest Atlantic Ocean, 27 individuals were dart tagged with 69 Hz acoustic transmitters over multiple years starting in 2016. Tagged fish were subsequently tracked, primarily on two acoustic receiver arrays: the Halifax Line which spans the continental shelf off Duncan's Cove, NS, and the Nova Scotia Torpedo Ray (NSTR) array, composed of three receivers near the tagging sites off Halifax, NS. Rays occupied inshore areas in autumn (September and October; within < 22 km from shore), moving offshore during winter months (> 153 km from shore). The absence of detections between mid-December and late February suggests the animals moved off the shelf for extended periods of the year. Ten rays were detected over multiple years, with five individuals returning to the NSTR site over two consecutive years between July and November. Receiver site Residence Index (RI) analysis revealed the rays display a strong site fidelity to the inshore waters. The results suggest that the Atlantic torpedo ray undergoes yearly movements, possibly linked to water temperatures. Evidence of inter-year site fidelity demonstrates that the Nova Scotian shelf may serve as a vital habitat for the Atlantic torpedo ray.

Media perspectives of finfish aquaculture over time in Atlantic Canada

Paul Kraly, Marine Affairs Program, Dalhousie University

In Canada, salmon aquaculture has been growing rapidly and is consistently being promoted for its potential to support economic growth and employment opportunities. However, salmon aquaculture is a controversial topic in Canada, making maintaining and acquiring social license an enduring challenge. The factors that drive acceptance by neighbouring communities and wider society, however, are poorly understood and are likely highly place-specific, mainly due to different environmental, economic and social contexts. This study explores the historical dimension of salmon aquaculture and social acceptance in Atlantic Canada. Through the media analysis and literature review, this research seeks to understand the relations between how aquaculture is portrayed and the evolving environmental, socio-economic, and political dimensions of the industry. This study explores differences in Nova Scotia, New Brunswick and Newfoundland to compare areas that have different histories and to identify any potential similarities or differences among the factors that drive social acceptance. This work could lead to a better understanding of how social acceptance of salmon aquaculture has developed in relation to industry growth and its varied environmental and socio-economic contexts. The findings from this research could also help identify critical factors that shape social acceptability of aquaculture. Furthermore, this work could help industry and governments in Atlantic Canada conduct more effective outreach, community engagement, and development decisions to support more socially accepted and sustainable aquaculture.

The use of Remotely Piloted Aircraft Systems (RPAS), or "drones", to promote coastal climate change adaptation in Nova Scotia
Reanne Harvey, Marine Affairs Program, Dalhousie University

Remotely Piloted Aircraft Systems (RPAS), more commonly known as "drones", are a rapidly developing technology with uses expanding across a variety of fields. As such, it is a pertinent time to explore the potential applications of RPAS in relation to marine management. This project looks at whether drones have the potential to provide improved, more cost effective and accessible aerial photography, that can be used to enhance understanding of the impacts of climate change and contribute to coastal adaptation. A RPAS was used to capture high resolution images of two sites, representing different coastal environments, along the coastline of the Port Mouton area of Queens County. This region of Nova Scotia supports a diverse array of coastal ecosystems, many of which have been recognized for their ecological importance and designated as protected areas, as well as coastal communities engaged with conservation and climate change adaptation. The images obtained from the RPAS were then processed to create 2D and 3D maps. Through interviews with a variety of stakeholders, the maps have been assessed on their ability to communicate and enhance awareness of the effects of climate change. The interviews also highlighted the potential applications of the maps for coastal communities to assist with climate change adaptation at the provincial, municipal and community level.

Sofishticated tracking: investigating postspawning migration and predicting encounter rates with in-stream tidal turbines of Alewife (*Alosa pseudoharengus*) in Minas Basin, Bay of Fundy
Liza Tsitrin, Department of Biology, Acadia University

The Minas Basin, Bay of Fundy, is an important potential source for tidal power development in Atlantic Canada due to its large tidal amplitudes and fast currents. This area also serves as a migratory corridor for species such as Alewife – a pelagic forage fish whose annual spawning runs support lucrative commercial fisheries in the maritime provinces of Canada. Acoustic telemetry can enable us to assess the spatiotemporal distribution of fish in areas where tidal turbines are present. However, to date there have been few tracking studies using internally implanted transmitters for herring-like species due to their sensitivity to handling. This research uses acoustic tagging to analyze postspawning migration of Alewife in coastal habitats across Minas Basin, and estimate predicted encounter rates with in-stream tidal turbines located at the Fundy Ocean Research Center for Energy (FORCE). A new tagging method was developed, combining better fish handling protocol with smaller tags, and tested for behavioural and physiological effects in fish prior to tag deployment. 75 spent Alewife from the Gaspereau River population were tagged during the summers of 2019 using high-residency VEMCO/Innovasea acoustic tags with a two-month life span. Receiver arrays located in the river, basin, and at the FORCE site were used to track fish movements. These data will provide new insights into the post-spawning migratory patterns of Alewife, and present an opportunity to address ongoing questions regarding the effects of tidal energy development on fish populations.

Oral Session 4: Fisheries Management

A Science-industry study of the distribution of community benefits in Atlantic Canadian fisheries

Daniel Mombourquette, Saint Mary's University

To properly assess the state of Canadian fisheries, it is important to measure how benefits are distributed within, and across, fishing communities and how this changes over time. I collaborated with government and industry members to identify and examine a suitable set of indicators that can satisfy this objective. Examining Grand Manan, New Brunswick, and communities in the Maritimes Region of Atlantic Canada, I tested the indicators using quantitative and qualitative methods. The quantitative methods included proportional trend, Lorenz Curve, Gini Coefficient, and spatial analyses. I collected qualitative data from participants who were knowledgeable of Grand Manan fisheries. I analyzed three case fisheries (lobster, herring purse seine, and mobile groundfish) for comparison based on: reports of changing distribution of community benefits, data availability, and the ability to interview knowledgeable participants. The results revealed that all community data reported increasing inequality, and most data signified inequality spread throughout the region. Survey data documented a series of factors (e.g. resource scarcity, financial unviability, asset transferability, and a short-sighted management regime) which are driving the widening inequality and reinforcing negative community effects. This research has the potential to guide future efforts which aim to understand distribution of benefits in fisheries, which is critical to policy and sustainable communities.

Weaving ways of knowing to improve capelin management in the Northwest Atlantic

Chelsea Boaler, Fisheries and Marine Institute, Memorial University

Capelin (*Mallotus villosus*) is an important forage fish for piscivorous predators in North Atlantic waters and holds a range of subsistence, commercial, and intrinsic values. These values, however, may be shifting as capelin dynamics have changed. In recent years, there has been variability in the timing, locations, and tactics of capelin spawning in Labrador and the eastern Quebec Lower North Shore. Further, two spawning runs have been observed in Northern Labrador, suggesting potential mixing with the Arctic stock. These changes have important implications for the marine social-ecological system. As such, this research aims to answer the following questions: (1) How has capelin spawning demonstrated temporal and spatial variability over time? (2) How do current spawning dynamics expand on genetic and morphological information regarding stock structure? (3) What is the socio-cultural importance of capelin and how do these observed changes influence wellbeing within coastal communities? and, (4) How can we weave ways of knowing to sustainably manage this species? As genetic and phenotypic analyses distinguishing stock structure offer only partial information, we use a mixed-methods approach with citizen science initiatives, community knowledge sharing, participatory mapping, and knowledge-holder interviews. Our preliminary results confirm the spatial-temporal shifts observed acrsoss Newfoundland spawning grounds are also prevalent across the study area and that community wellbeing has been negatively affected due to such changes. We continue to expand on how generational resource knowledge is contextualized within colonization and institutionalization, and how management in North Atlantic Canadian waters can be improved to include all pillars of sustainability.

Poster Session 3: Environmental Management and Conflict Resolution

Evaluating the integration of cumulative effects in the management of Canada's marine conservation areas

Gillian Curren, Marine Affairs Program, Dalhousie University

The cumulative effects of human and natural stressors are recognized as one of the biggest threats to the sustained health of the world's oceans. Despite improvements in research and assessment methods, ocean managers appear to struggle to sufficiently evaluate and incorporate cumulative effects into management plans. Furthermore, there is limited focus on the socio-economic components of marine ecosystems in relation to the assessment and management of cumulative effects. To address the cumulative effects of multiple stressors, marine conservation areas may be implemented. However, these areas often remain exposed to external pressures. This study examined how Canadian ocean managers evaluate and integrate cumulative effects and multiple stressors into their management practices. Anticipated results include practitioners are not fully integrating cumulative effects or multiple stressors and the consideration of socio-economic factors is limited. Gaining insight into how ocean managers in Canada evaluate multiple stressors and cumulative effects should help improve the efficacy of conservation areas.

Accumulation rates of marine debris on an important marine turtle nesting beach in Costa Rica

Melina Damian, Department of Environmental Studies, York University

Marine debris pollution poses a threat for wildlife and can negatively impact the economy of communities whose livelihoods depend on ecotourism. Playa Norte beach, in northeastern Costa Rica, is an important nesting ground for four marine turtle species all identified on the IUCN Red List. It is highly polluted but has low human occupancy suggesting that marine debris deposition is primarily influenced by external factors. We conducted accumulation rate surveys following a standardized marine debris protocol. Macro-debris was categorized by size and material type. The quantity, concentration (number of debris items per m2) and type of marine debris will be presented and examined with local environmental variables. This study contributes towards understanding the drivers of marine debris pollution in critical habitats; and informs managers and the local community on possible strategies to prevent and reduce marine pollution, thereby aiding in ecotourism derived economies.

Microplastics and shellfish in Nova Scotia

Erin Dunn, Marine Daoud, Jessica Kern, Farrah Stevens, Dalhousie University

The awareness of plastic pollution has become a prominent feature in mainstream literature, in particular around its abundance in coastal areas and in marine environments. Plastics make up 60-95% of marine human-made debris worldwide. Marine plastics can be broken down into two overarching categories: macroplastics and microplastics. Macroplastics are plastics larger than 5mm in size and can range from gateway plastics (i.e. plastic straws) to fishing gear. On the other hand, microplastics are smaller than 5mm in size and are derived from the breakdown of macroplastics, microbeads, and microfibers. Although the risks associated with macroplastics have been documented throughout the 21st century, little political action has been directed to the serious environmental impacts of microplastics within our marine ecosystems globally. Microplastics have been shown to bioaccumulate in marine species and transfer up the marine food web. Microplastics have been found in shellfish species which are harvested by the fishing industry for human consumption. The fishing industry employs around 30,000 people in Nova Scotia. In addition, it has approximately 5,000 fishing vessels which capture more than 30 species, with shellfish being the most significant species. The aim of our project is to examine microplastics and shellfish within the context of Nova Scotia. We will examine the issue from the biophysical, law and policy, and socio-political dimensions, in order to acknowledge the many facets of the marine plastic crisis.

Information source and channel preference in marine policy development: A case study on the Eastern Shore Islands Area of Interest consultation process

Hali Moreland, Marine Affairs Program, Dalhousie University

The Eastern Shore Islands Area of Interest was officially announced as a candidate for federal protection on March 22nd, 2018 by the Department of Fisheries and Oceans (DFO). A large, coastal Area of Interest was new for this region. In order to facilitate public participation, and since public consultation is important in policy development, DFO created a 35-member Advisory Committee, comprised of different stakeholders with a variety of backgrounds. This project is examining the information-related activities of the Advisory Committee members, including their preferred information sources and channels, their patterns of information use, and who they trust to provide accurate information in the consultation process. This project will highlight how information is received and used by stakeholders in a marine conservation context. In particular, the findings may identify enablers and barriers to information use during public engagement processes and more broadly in marine decision-making practices.

Many tools with many outcomes: achieving Sustainable Development goal 14 with area-based management tools

Julie Reimer, Marine Geomatics Research Lab, Memorial University of Newfoundland

As ocean ecosystems and resources are inherently spatial, marine management strategies are often similarly rooted in space. Area-based management tools are commonly used across ocean sectors, implemented to achieve diverse ecological, social, and economic outcomes. Some of these outcomes can contribute to the United Nation's Sustainable Development Goal 14: Life Below Water (SDG 14). Using a confidence assessment method, this research connects area-based management tools to SDG 14 targets based on quantity and quality of evidence for outcomes that may support the delivery of SDG 14. A review of well-established evidence reveals a bias toward ecological outcomes, particularly those associated to marine protected areas. Social and economic outcomes, in general, lack well-established evidence in terms of meta-analyses and systematic reviews. A rapid review of evidence reveals some disagreement and diminished confidence for social and economic outcomes, and a general lack of evidence for outcomes of some area-based management tools. An expert opinion survey on the expected outcomes of tools reveals similar trends, with greater certainty and agreement among experts regarding ecological outcomes than social and economic outcomes. Based on these findings, links are drawn between tools and SDG 14 targets, demonstrating how a single tool may contribute to multiple targets and how multiple tools may contribute to a single target. Establishing these links based on confidence of outcomes is intended to clarify the utility of area-based management tools in delivering SDG 14 targets, supporting decision-makers in selecting the most appropriate tools for achieving SDG 14.

Enhancing the Marine Protected Area (MPA) process in the BC Northern Shelf Bioregion MPA network to improve Indigenous participation

Lindsay Richardson, Marine Affairs Program, Dalhousie University

Marine protected areas (MPAs) are becoming increasingly vital in Canada in order to maintain and conserve important fish and marine mammal species and habitats. However, with protection comes certain restrictions within the marine space, whether it be certain fishing practices, harvesting of specific species or marine access. Also, understanding the dynamics of marine ecosystems can be a challenge. It not only involves the marine ecosystem but the people that use the resources. Indigenous peoples have certain rights to marine resources and MPAs may violate these rights. The Canadian government has been making strides to improve Indigenous relations, but Indigenous knowledge and involvement have been largely discounted in MPA governance. With the proposed British Columbia Northern Shelf Bioregion MPA network, there is an opportunity for the Government of Canada to not just consult with Indigenous communities and get their input in the planning process, but to give them a stronger voice and more involvement in how the marine space is governed. There needs to better incorporation of Indigenous knowledge and more meaningful Indigenous contributions to MPA governance to ensure their rights are not being violated, thereby increasing the legitimacy afforded to MPA development by Indigenous peoples. This research focuses on exploring the current processes in the Northern Shelf Bioregion and to determine if, and how, this might be better accomplished. Knowledge generated is expected to increase opportunities for more effective MPA processes, improve legitimacy, Crown-Indigenous relationships and enhance MPA governance in a way that respects Indigenous rights and values.

Opportunities and Constraints to Ecotourism and Marine Protected Areas in Nova Scotia: Perceptions of Tourists and Tourism Operators

Emily VanIderstine, Marine Affairs Program, Dalhousie University

As “Canada’s Ocean Playground,” Nova Scotia relies on a healthy ocean to support its economy and citizens livelihoods. The province is looking to significantly increase its tourism industry revenue from $2 billion to $4 billion by 2024. With an increase in tourism more pressure will be put on coastal and marine environments. Initiatives aimed at increasing nature-based tourism experiences demonstrate Nova Scotia's desire to expand tourism focused on the environment. With the Government of Canada recently announcing the protection of 13.8 percent of its ocean, the creation of marine protected areas (MPAs) may provide the opportunity for growth in ecotourism. An interview-based analysis of Nova Scotia’s tourism operators, and a survey-based analysis of tourists was used to identify perceptions of marine protection and factors that influence a tourist's decision to visit an area or engage in ecotourism activities. Results from interviews and surveys of tourism stakeholders help create a more holistic image of the opportunities and constraints of creating effective MPAs in Nova Scotia. Ecotourism in MPAs provide a unique opportunity to advance conservation objectives and support the economy of local communities at the same time. It has been shown that marine protected areas have commercial and socioeconomic benefits for communities. If successfully implemented ecotourism in MPAs can educate tourists about the importance of protecting marine and coastal ecosystems, in addition to raising awareness of the effect humans have on the environment.

Exploring Ecosystems in Union Island: A Case Study for ecosystem-based management and sustainable livelihoods in Ashton Lagoon

Cassidy Walker, Marine Affairs Program, Dalhousie University

In 1994, Ashton Lagoon in St. Vincent and the Grenadines was the site of a 300-berth marina development. After of a year of construction, the development was abandoned, leaving the community of Union Island to clean up the ecological and economic losses. The construction left a causeway through Ashton Lagoon to nearby Frigate Island, which left coral reefs, seagrass beds, and mangroves to suffer as water flow became heavily restricted. Through the work of Sustainable Grenadines Inc. (SusGren), the restoration of Ashton Lagoon has already begun, and this case study will be used for the next phase of the Ashton Lagoon Restoration Project. Based on community interviews and a review of literature, recommendations for next steps in this restoration project will be developed using ecosystem-based management and sustainable livelihoods as a framework. Based on initial findings and interview feedback, the development of small-scale eco-tourism activities like kayaking, bird watching, nature walks, and community environmental monitoring programs can help to bolster local pride in the area and promote livelihood opportunities for local community members while preserving ecological integrity. Legally enforcing the previous designation of Ashton Lagoon as a Conservation Area will also strengthen the restoration efforts and allow for any development of Ashton Lagoon to be regulated and sustainable. This case study will demonstrate the ecological, social, and economic importance of Ashton Lagoon and the need for legal protection of this area from future harmful development in order to allow for sustainable use of the area.

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.

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Finally, thank you to anyone who supported us in some way and didn't see your name listed. Please know that we are so 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,
Breanna Bishop, Sara Vanderkaden & Priyanka Varkey
Conference Co-Chairs | Sustainable Oceans 2019

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