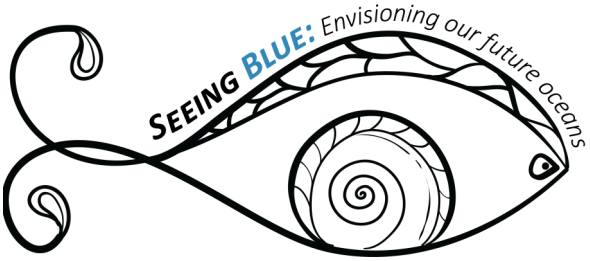
Sobey Fund for Oceans

Conference 2017

Seeing Blue: Envisioning our future oceans

SUSTAINABLE OCEANS



September 22
Kenneth Rowe Management Building
Dalhousie University
6100 University Ave.

September 23
Paul O'Regan Hall
Halifax Central Library
Queen St. and Spring Garden Ave

30 years MARINE AFFAIRS PROGRAM

DALHOUSIE UNIVERSITY 1818 2018

WWF

Halifax Public Libraries

"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.

Sustainable Oceans Conference

Marine Affairs Student Conference, September 22-23, 2017

The key goal of the 2017 Sustainable Oceans Conference is to explore the future of our oceans. As such, this student-led conference aims to achieve this by investigating ocean science through the 'three seas': Collaboration, Communication and, Creativity. We hope that by identifying the challenges at this interface, we can work towards sustainable ocean management solutions in Canada.

Special objectives of the conference are to:

- Identify challenges currently facing the knowledge-policy interface in oceans management in Canada and to collaboratively identify solutions
- Provide students with the opportunity to practice their presentation skills, publish their work in an online technical series and to network with others involved in the field of ocean management.
- Provide an exciting, innovative, and interactive platform for participants and professionals alike to learn from one another.
- Bring together all sectors of ocean management and the wider community to explore and collaborate to achieve greater management solutions.

Welcome

Dear Attendee,

On behalf of the students in the 2016-2017 Marine Affairs Program class, we would like to warmly welcome you to *Sustainable Oceans 2017: Seeing Blue: Envisioning our future oceans*.

The well-being of humans is inextricably linked to the health of the oceans, as it provides ecosystem services for us. Although the future of our oceans is threatened by human-induced stresses such as climate change, ocean acidification, coastal development, pollution and overfishing, there is still reason for ocean optimism. There is positive momentum with major global movements to bring ocean conservation and policy issues to the forefront. The time is now to learn from the past, so we can envision solutions and actions for sustaining the health of the oceans into the future.

This year, we are challenging conference participants to think critically about the future health of our coastal and marine environments and communities. Everyone presents a different view or lens on ocean issues and finding solutions to make our resources and communities sustainable. We invite you to join us as we explore our three "Seas," of collaboration, communication, and creativity.

Our goal for the conference is to engage with the public, experts and students, and increase awareness and education about ocean issues to promote tangible actions for sustaining the future of our oceans.

We hope that the research and ideas presented during this conference will inspire you to take a positive action towards our oceans and keep its future within your gaze

Thank you for your support!

Sincerely,

Christina Callegari and Jessica Bradford
Conference Co-Chairs
Sustainable Oceans Conference 2017
Website: https://www.dal.ca/sites/sustainable-oceans
oceansconf@dal.ca
Twitter: @SustOceans

Friday, September 22nd Program

Potter Auditorium and Atrium
Kenneth Rowe Management Building

5:30pm: Registration

6:00pm: Welcoming Remarks

6:20pm: Presentation of Sobey Fund for Oceans Scholarships

6:30pm: Keynote Address - Dr. Julia Baum
Marine Biologist and Conservationist

7:50pm: Closing Remarks

8:00pm: Reception

9:00: Event Ends

Saturday, September 23rd Program

Paul O'Regan Hall

Halifax Central Library

9:00am: Registration

9:30am: Opening Remarks

9:35am: *Collaboration* Presentations

10:55am: Break

11:05 am: *Communication* Presentations

12:25: Lunch Break

1:05: *Creativity* Presentations

2:30: Keynote Address - Mr. Nick Hawkins
Wildlife Photojournalist

3:10pm: Marine Pollution Panel & Discussion

4:05pm: Announcement of Awards,
Acknowledgements, & Final Remarks

4:30pm: Event Ends

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Saturday, September 23rd
You, Me and the Sea - Family Program

Second floor of the Halifax Central Library

10.00am - 1.00pm

Time	Event	Location
10:00AM-1:00PM	***Back to the Sea Society***: Touch tanks	Creative Lab, 2nd floor
10:00AM-1:00PM	***Dalhousie / Marine Affairs Student Society:*** Zoom in on the sea, microscope demonstration	Creative Lab, 2nd floor
10:00AM-12:30PM	***Jennifer MacLatchy:*** Creating with Ocean Treasures	Creative Lab, 2nd floor
10:00AM-1:00PM	***Ecology Action Centre:*** Colouring and identifying ocean creatures and marine pollution	BMO Room, 2nd floor
10:00AM-1:00PM	***Marine Affairs Student Society:*** Oceans Crafts & Movie	BMO Room, 2nd floor
10:00AM-1:00PM	***Marine Affairs Student Society:*** Micro plastic filtering activity	Library Foyer
10:00AM-1:00PM	***Marine Affairs Student Society***: Photo booth	Library Foyer
10:30-11:30 AM	***Anika Riopel***: Ocean Play Station	Children's play area, 2nd floor
11:00-11:30 AM	***Paul Mcnab (DFO):*** Presentation	Lindsay Children's Room, 2nd floor
11:30-12:00 PM	***Sea Turtle Network:*** Working together to study and protect sea turtles in Atlantic Canada	Lindsay Children's Room, 2nd floor

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Conference Committees

Overarching Organizing Committee

Co-Chairs
Jessica Bradford
Christina Callegari

Co-Coordinators
Liz Wilson, MMM
Jordan Gardiner, MMM

Sub Committee Heads
Becca Aucoin (Logistics)
Mikaila Bickford (Communications)
Kalene Eck (Submissions)
Ainslie McLeod (Fundraising)

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Taylor Brown
Noah Eisner
Kelly Fretwell
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Genevieve Renaud-Byrne
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Logistics Committee

Joana Costa
Catherine MacInnis
Jasmine Prior
Laura Steeves
Weishan Wang

Submissions Committee

Amanda Goncalves
Emma Marotte

Judges

Oral Presentations

Collaboration

Dr. Megan Bailey
Marine Affairs Program
Dalhousie University

Elizabeth Edmondson, MMM
Interdisciplinary PhD Candidate
Dalhousie University

Michael Orr
MMM Candidate
Dalhousie University

Communication

Dr. Claudio Aporta
Marine Affairs Program
Dalhousie University

Dr. Suzuette Soomai
School of Information Management
Dalhousie University

Seth Jenkins
MMM Candidate
Dalhousie University

Creativity

Dr. Ramon Filguiera
Marine Affairs Program
Dalhousie University

Adrian Gerhartz-Abraham, MMM
Interdisciplinary PhD Candidate
Dalhousie University

Alex Cole
MMM Candidate
Dalhousie University

Posters

Dr. Jenny Baechler
Faculty of Management
Dalhousie University

Liz Wilson, MMM
Interdisciplinary PhD Candidate
Dalhousie University

Haley Welsh
MMM Candidate
Dalhousie University

Keynote Speaker
Friday, September 22nd

Dr. Julia Baum

“Coral Reefs and Climate Change: Ecological Surprises and Hope for Our Future Oceans“

Tropical coral reefs around the world were devastated by the 2015-2016 global bleaching event. In this talk, I will share our recent experiences on Kiritimati (Christmas) Island, which was the epicentre of the bleaching event, and highlight the ecological surprises nature had for us and our discoveries that provide hope for our future oceans.

Dr. Baum is Associate Professor of Biology at the University of Victoria in British Columbia, Canada. She earned her BSc from McGill University, and her MSc and PhD from Dalhousie University, all in Biology. Julia subsequently held a David H. Smith Conservation Research Fellowship at Scripps Institution of Oceanography, UC San Diego, followed by a Schmidt Ocean Institute Postdoctoral Fellowship at the National Center for Ecological Analysis and Synthesis (NCEAS), UC Santa Barbara. A leader in marine conservation, Julia is best known for her research documenting precipitous declines in shark populations and her analyses of the global state of marine fisheries. She was named an Alfred P. Sloan Research Fellow in Ocean Sciences in 2011 and a Pew Fellow in Marine Conservation in 2017. Julia's current research program focuses on understanding how human disturbances, ranging from overfishing to climate change, are impacting marine ecosystems and how we can ensure the persistence of healthy marine ecosystems over the long-term. Most recently, Julia documented mass coral mortality at her long-term field site Kiritimati (Christmas) atoll resulting from the 2015-2016 El Niño event. She is now investigating how some corals managed to survive the intense heat stress of this event.

Keynote Speaker
Saturday, September 23rd

Nick Hawkins

"Communicating the Oceans of Tomorrow"

The talk will bring the audience through three recent assignments: “Treasured Islands”; the protection of an Eastern shore archipelago, “Depths of Despair”; a look at the Campobello Whale Rescue Team and the issue of whale entanglement and finally, my current assignment, covering the federal governments Marine Protected Area’s program for Canadian Geographic. To shape the oceans of tomorrow we need to become better communicators of marine science and conservation issues today. I will speak on my experiences working as an assignment photographer, seeking to bridge the gap between science and the public, showing both the beauty of our marine areas and the dedicated people working to better understand and protect them.

Mr. Hawkins is a Canadian conservation photographer and photojournalist specializing in natural history, science and conservation related issues. A biologist by training, Nick believes that photography and story telling are key components of conservation. As an assignment photographer working in Canada and Central and South America, Nick has produced feature articles for Canadian Geographic, BBC Wildlife Magazine and Canadian Wildlife Magazine. From the importance of biological corridors in Costa Rica, to the heroic efforts of whale rescue teams in the Bay of Fundy, Nick seeks stories that bring attention to the impacts of human activity on wildlife and inspire people to care for the species and ecosystems where he works. Nick is a member of the International League of Conservation Photographers, an elite group of the world’s top wildlife, nature and culture photographers who have each demonstrated a deep commitment to conservation efforts around the globe. Nick’s work has received awards in the Windland Smith Rice International photography awards as well as the BBC Wildlife Photographer of the Year.

Marine Pollution Panel and Discussion

As part of our Saturday event at the Halifax Central Library (Sept. 23, 2017), there will be a panel discussion on marine pollution specifically, micro and macro plastics. Marine Pollution is an important issue facing the health of our oceans today and, we hope that this discussion will encourage insights on this topic and identify real actions that we may take moving forward.

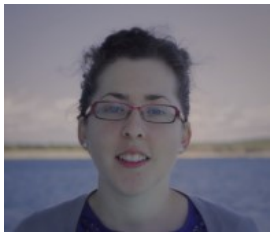
Prior to the panel, our secondary keynote speaker, Nick Hawkins, will introduce the topic of marine pollution within Nova Scotia, setting the stage for discussion around this issue. Nick Hawkins is an award-winning wildlife photojournalist and works to raise awareness of global conservation issues through photography and journalism. He will be discussing his work in the Bay of Fundy and New Brunswick on whale entanglements to address the severity of marine pollution and its harmful impacts to wildlife.

Members of the MMM class of 2017 will open the panel discussion with a brief presentation on a marine pollution class project in order to further describe the situation in the Halifax Harbour and issues that have discovered.

The panel discussion will then commence with the three panel experts; Ms. Ashley David (Nova Scotia Environment), Dr. Peter Wells (Dalhousie University), and Mr. Cameron Deacoff (Halifax Regional Municipality). The audience will be encouraged to engage in the discussion and identify tangible actions for reducing marine pollution. This will provide an opportunity to focus on the issues within Nova Scotia, but will also give insight to the issue at an international level.

Following the conference, a document will be created and published in our Marine Affairs Policy Forum, as well as a post-conference press release summarizing what was discussed in the panel and outlining any recommendations on how the public can reduce their impact.

Panel Members



Ashley David currently maintains a full-time position with the Provincial Environment Department developing and overseeing solid waste-resource management policy. Previously employed by the Clean Foundation, Ashley developed and delivered the award-winning Ship to Shore program engaging commercial fishers in waste management practices. She is an alumni of the Masters in Marine Management program from Dalhousie University researching marine litter under the supervision of Dr. Peter Wells.

Cameron Deacoff is an environmental performance officer with the Halifax Regional Municipality. In this role, he leads and supports technical studies and supports policy development related to water quality, aquatic weed management, storm-water management, floodplains, watershed management, and open space planning. Cameron's volunteer work has included years of shoreline cleanups, river restoration, and watershed management initiatives. Cameron holds a Bachelor of Science in Environmental Science degree from the University of Guelph and a Master of Marine Management degree from Dalhousie University.

Peter Wells is a marine environmental scientist (retired) and an Adjunct Professor and Senior Research Fellow at Dalhousie University. He holds a B.Sc. in Biology (McGill,1967), an MSc in Zoology (UofT,1969) and a Ph.D. in Zoology (Guelph,1976). He worked 37 years for the Canadian Government, largely with Environment Canada. At the same time, he taught environmental toxicology at Dalhousie and in Bermuda, and served the United Nations as a marine pollution advisor. Current interests are the principles and practice of marine ecotoxicology and monitoring, the use and influence of marine environmental information, and community action on environmental issues of the Bay of Fundy and Gulf of Maine. He has numerous honors and awards, and many publications, including five books. He is currently Editor for the Nova Scotian Institute of Science. His primary avocation is hiking coastal and mountain trails, with camera in hand.

Panel Moderator: *Laura Steeves*

Laura is a current student in the marine management program at Dalhousie University. She is the 2016 recipient of the Sobey Fund for Oceans scholarship.

You, Me and the Sea

Working together to study and protect sea turtles in Atlantic Canada

Canadian Sea Turtle Network

The Canadian Sea Turtle Network is a charitable organization involving scientists, commercial fishermen, and coastal community members. We work to study and conserve endangered sea turtles in Canadian waters and worldwide.
Did you know that there are 4 types of sea turtles found in the waters of Atlantic Canada? Come learn about the biology of these amazing animals, including the giant leatherback sea turtle! We will share the amazing story of the Nova Scotia scientists and fishermen that are working together with colleagues around the world to study and conserve these animals. You will find out more about how you can help us help sea turtles right here in Nova Scotia.

Appropriate age level: All ages
Time and location: 11:30-12:00, Room 301

Touch Tanks: Back to the Sea Society

Children and families are invited to get their hands wet and meet some friendly local invertebrates. Come learn about sea stars, urchins, crabs and other fascinating critters! SEA you there!

The Back to the Sea Society invites you to participate in their Touch Tank Discoveries. Children and families are invited to get their hands wet and meet some friendly local invertebrates. Come learn about sea stars, urchins, crabs and other fascinating critters! Our mission? To spark curiosity for marine life and inspire a desire to protect our ocean. SEA you there!

Appropriate age level: All ages
Time and location: 10:00 – 1:00, Creative Lab 2nd floor

You, Me and the Sea

Creating with Ocean Treasures

Jennifer MacLatchy, Dalhousie University

Jennifer MacLatchy is an Interdisciplinary PhD student at Dalhousie University in Halifax, Nova Scotia. Her research focuses on the ways in which art can be a method and a medium for exploring ocean issues and conservation. She is particularly interested in art that makes use of marine debris and ocean garbage. Join Jennifer for an interactive art-making activity and help create a sculpture from marine debris!

Appropriate age level: All ages

Time and Location: 10:00 – 12:30, Creative Lab 2nd floor

Colour Ocean Creatures and Marine Pollution

Ecology Action Centre

We will have some crocheted marine species that are native to Atlantic Canada, and talk about local species, endangered species, and fun facts about various animals. We will have some crossword puzzles and colouring pages related to marine species and threats, including plastic marine pollution.

Appropriate age level: Ages 5-12

Time and Location: 10:00AM 1:00PM

Ocean Play Station

Anika Riopel

This family program will involve hands-on and interactive games in which children will have the opportunity to experience and learn about different aspects of ocean ecosystems. Activities will be appropriate for children ages 2 – 10 and all those who are young at heart!

Interested in diving under? Anika will also have her SCUBA diving gear on site for all those keen to touch, play and learn more.

Appropriate Age Level: All ages

Time and location: 10:30AM- 11:30AM, Children's play area 2nd floor

You, Me and the Sea

Fisheries and Oceans Canada (DFO)

Presentation

Fisheries and Oceans Canada | Pêches et Océans Canada

This talk will introduce the audience to the Gully MPA and its inhabitants, the history and evolution of management and science efforts, and present the key challenges and opportunities of management and research in an offshore setting in eastern Canada.
Appropriate age level: All ages
Time and Location: 11:00AM – 11:30AM, Room 301

Marine Affairs Student Society, Dalhousie University

MASS is the Master of Marine Management student society which includes a diverse group of individuals with a passion for the conservation and sustainable use of global coastal and ocean environments.

MASS
MARINE AFFAIRS STUDENT SOCIETY

Ocean Themed Arts and Crafts: Share your creativity and love for the ocean with us by enjoying ocean themed arts and crafts.
Appropriate Age Level: Ages 5 – 12
Time and Location: 10:00AM – 1:00PM, BMO Room, 2nd floor

Filtering Microplastics: Learn about microplastics in our oceans and how you can filter them out using a homemade filtering device.
Appropriate Age Level: All ages
Time and Location: 10:00AM – 1:00PM, Library Foyer

Zoom in on the Sea: Microscope demonstration
There are many microscopic organisms living in the ocean that are not visible to the naked eye. Using micropscopes provided by the Department of Biology at Dalhousie University, and water samples from the Aquatron Laboratory, you'll get to see and learn about these tiny creatures.
Appropriate Age Level: Ages 8+
Time and Location: 10:00AM – 1:00PM, Creative Lab, 2nd floor

Ocean Photo Booth: Come show your love for the ocean with a photo you can share with your friends and family! Ocean-themed props and mascots will be available for you to customize your photos.
Appropriate Age Level: All ages.
Time and Location: 10:00AM – 1:00PM, Library Foyer

Oral Presentations
Collaboration

Dr. Suzuette Soomai, *Environmental Information: Use and Influence (EIUI)*
Collaboration at the science-policy interface: The importance of understanding the role of information in fisheries decision-making.

Dr. Suzuette S. Soomai is a Postdoctoral Fellow with the Environmental Information: Use and Influence (EIUI) research program at Dalhousie University. Her interdisciplinary research focuses on the role of scientific information—produced by national, regional, and global fisheries management organizations— in policy- and decision-making for marine fisheries management. As a member of EIUI, Dr. Soomai has also examined the awareness, use, and influence of state of the marine environment reports in policy-making contexts in Nova Scotia and the Gulf of Maine-Bay of Fundy region. Dr. Soomai has considerable experience in fisheries resource assessment and management as she was a government fisheries scientist in Trinidad and Tobago. She has worked closely with commercial/large-scale and small-scale fishers in the Caribbean as well as regional an international fisheries management organizations in a range of research activities including fish stock assessments, freshwater aquaculture farming, and bycatch reduction technologies.

The social-ecological resilience of the Sandy Island/Oyster Bed marine protected area of climate change
***Genevieve Renaud-Byrne**, Marine Affairs Program, Dalhousie University*

Due to their strong dependence on the marine environment for subsistence and livelihood, coastal communities in Caribbean small island developing states are highly vulnerable to the impacts of climate change. Warming sea surface temperatures, acidification, sea level rise and the intensification of storms will have harmful effects on marine ecosystems, causing coral bleaching and changes in the migration and reproductive timing of important marine species. Building strong social-ecological resilience to climate related hazards and long-term stressors will allow marine ecosystems and adjacent coastal communities to cope, adapt and transform in response to these inevitable changes. The Sandy Island / Oyster Bed Marine Protected Area (SIOBMPA) off the coast of Carriacou, Grenada provides neighboring communities with important ecosystem services including tourism-related livelihoods and nursery grounds for small-scale fisheries. The management board recognizes the need to consider strategies to build the resilience of the SIOBMPA as a first response to climate change, however this goal has not yet been comprehensively addressed. This study addresses this management issue by assessing the social and ecological resilience of the SIOBMPA coral reef ecosystem and adjacent communities to climate change. Ecological indicators of coral reef resilience were selected based on a prioritized list of key indicators identified as being strongly linked to coral resilience and recovery following environmental disturbances as well as their compatibility with the Atlantic and Gulf Rapid Reef Assessment (AGRRA) methodology used by the SIOBMPA management team. The social resilience of the SIOBMPA stakeholder community was evaluated through the assessment of three social resilience dimensions: (1) social network structure and composition, (2) ownership and access to capital and (3) capacity for learning. Results from this study will shed insight as to how SIOBMPA managers and stakeholders can implement specific problem-focused strategies to enhance the resilience of the social-ecological system to climate change.

Oral Presentations
Collaboration

An Inuit-Crown partnership for proactive vessel management
***Leah Beveridge**, Marine Affairs Program, Dalhousie University*

Activities in Canada's arctic marine waters are growing, and Canada is working to respond, for example, through the Oceans Protection Plan. At the same time, there is a call to recognize the rights of Indigenous peoples across Canada, including through the full implementation of land claims, treaties, and the United Nations Declaration on the Rights of Indigenous Peoples. One step towards this goal was the signing of the Inuit Nunangat Declaration. To be explored here is what this means for the development of maritime law, policy, and activities in Canada's Arctic, and Nunavut specifically. There are three analyses: (1) an exploration of the Nunavut Land Claims Agreement to identify if Inuit are provided a means of being involved; (2) an analysis of whether there is a duty for the Crown to consult Inuit regarding maritime management decisions under section 35 of the Constitution Act, 1982; and (3) in anticipation of the implementation of the UN Declaration, the analysis on the duty to consult is expanded to consider the right to free, prior and informed consent. To reflect on these analyses, I explore how these rights can be acted upon through the Proactive Vessel Management initiative under the Oceans Protection Plan. I argue that by aligning the Proactive Vessel Management initiative with the bilateral partnership of the Inuit Nunangat Declaration, Inuit would be able to act upon their rights as Indigenous peoples with respect to maritime management, Canada could act upon its commitments to improve its Arctic marine transportation system, and together, steps could be taken to renewing the relationship between Inuit and the Crown.

Envisioning the future of aquatic animal tracking: technology, science, and application
***Robert Lennox**, Biology/Science Ocean Tracking Network / Carleton University*

Electronic tags have significantly improved our understanding of aquatic animal behaviour and informed conservation and management practices in the oceans. Networks such as the Ocean Tracking Network (OTN) have emerged to support the advances being made with electronic tagging by developing large-scale and global tracking infrastructure, facilitating increased data availability and sharing, and fostering international collaboration. Forthcoming aquatic integrative biology and ecology will make increasing use of electronic tags, and the resulting data will have broad application in pursuit of sustainability of oceanic resources. In the midst of an era of rapid acceleration in the availability, applicability, and expertise in aquatic electronic tagging, we engaged a diverse group of aquatic animal trackers, tag engineers, maritime law experts, resource managers, oceanographers, and sociologists to project the future of aquatic animal tracking in a horizon scanning exercise. Within 10 years, we foresee considerable innovation in infrastructure and cyber-infrastructure, facilitating integration of tracking information with individual animal traits that will improve scientific capacity for monitoring the oceans and legal/ managerial resources for managing the oceans.

Oral Presentations
Communication

Anika Riopel, *3M Student Fellow, Dalhousie University*

Jump In - How Making a Splash Helps Shift Public Perception

Anika Riopel is completing a double major in Environment, Society & Sustainability and Theatre Arts at Dalhousie University. She has a deep passion for changing public perception on environmental issues through place-based and experiential learning. Anika believes that the arts are a powerful change affecting tool. In 2015, she led the Wave of Waste Project, a massive art installation that brought public awareness to marine waste. Anika is currently working on Jump In! a project that aims to build swimming infrastructure on the downtown waterfront to change the public's perception of the water quality. She is a PADI Dive Instructor, ocean enthusiast and is an Education Policy Advisor for ConnectOcean.

Climate change and shellfish mariculture: perceptions and projections

Laura Steeves, *Marine Affairs Program, Dalhousie University*

Warming ocean temperatures driven by climate change are altering the distributions of marine shellfish. Changes in distribution and survival of economically important species such as the eastern oyster (*C. virginica)*, and the blue mussel (*M. edulis),* are relevant for regions of Canada in which shellfish mariculture is well established, such as Nova Scotia and Prince Edward Island. Impacts of these such changes could include the development of new mariculture sites where previously water temperatures were too cold, and conversely, the closure of existing farms where temperatures are too warm. Planning for the development of new sites and the viability of current farms is a two-fold question of 1. Physiologically, where is the environment suitable for shellfish growth and 2. Socioeconomically, where stakeholders will embrace the development/ adaptation of sites. Using a previously established Dynamic Energy Budget model, and a high resolution climate model, mussel and oyster physiology was coupled to sea surface temperature projections from 1986-2050 in the coastal waters of NS and PEI to predict the future growth and distributions of these species. As well, semi-quantitative interviews were used to understand how stakeholders perceive the relationship between shellfish mariculture and climate change. Stakeholders for this project include shellfish farmers, research scientists, and marine planners. By combining modelling techniques and stakeholder perceptions, changes in shellfish distribution can be anticipated for the purpose of creating policy to adapt to these changes.

Photo: Mikaila Bickford

Oral Presentations
Communication

Current tides: opening the doors of oceanography research to a broad audience

Lorenza Raimondi, *Dept. of Oceanography, Dalhousie University*

The graduate students and the Department of Oceanography at Dalhousie University are very enthusiastic to announce that the third edition of Current Tides magazine is in progress! For the third time graduate students from our department will produce a new volume of the magazine, which is set to release by the end of the year. Current Tides is a students-led magazine, entirely written and edited by graduate students, showcasing some of the ongoing research at Dalhousie University. The magazine is composed of eight articles that summarize cutting-edge science from the four subdisciplines of oceanography (geological, physical, chemical and biological), with this volume additionally featuring an undergraduate student article. In order to make the research more accessible the magazine is not run as a typical peer reviewed scientific journal; articles are instead written in a style that emulates "popular science" magazines, such as National Geographic. To do so the articles include simplified graphics and plots as well as illustrations in the form of infographics thus making the content accessible to a broad audience. Through this magazine the students successfully explain and describe complex concepts in an accessible manner, they are able to highlight the most significant findings of their research and therefore explain interesting ocean processes while engaging a broader audience. In this presentation we will give an overview of our magazine and the process through which we produce it, and how it promotes ocean research among a general public (and hopefully to potential new students) and allows the graduate students to improve their communication skills.

Changing tides of information access: a case study of the use of the international aquatic sciences and fisheries abstracts database

Diana Castillo, *School of Information Management/Faculty of Management, Dalhousie University*

A significant hallmark of today's society is the large quantity of scientific information about oceans available to researchers and decision-makers in a wide diversity of formats. Although much information is easily obtained, sizeable volumes may be unknown or limited in access despite benefiting researchers, industry personnel, community members, marine resource managers, and public policy and decision-makers. Numerous initiatives have been undertaken over the past half century to improve awareness and access to the burgeoning volume of information. One example, the Aquatic Sciences and Fisheries Abstracts (ASFA) database, has been a resource on the science, technology, and management of marine, brackish water, and freshwater environments, and related economic, social, and legal subjects. Operating as a partnership of over 60 agencies internationally, ASFA compiles and disseminates information produced around the world and is overseen by the Food and Agriculture Organization of the United Nations (FAO). Accessible through a subscription, ASFA currently contains more than 2 million records, with its aim is to facilitate global sharing of information, particularly of grey literature, i.e., information that is not produced by a commercial publisher, and unique reports otherwise unavailable. Partially due to a rapidly changing information landscape and partly because of questions about who is using it, the future of ASFA in its present format is being questioned. This paper will report on my Master's thesis research to determine how ASFA is accessed and used. This study, pursued in collaboration with FAO, will consider the possible impact(s) if ASFA ceased to operate in its current form. The research is being conducted through surveys and interviews with the assistance of the International Association of Aquatic and Marine Science Libraries and Information Centers, a non-profit organization that promotes cooperation and sharing of resources among institutions. The initial results from the research will be presented.

Oral Presentations

Creativity

Dr. Fred Whoriskey, *Ocean Tracking Network*

Dr. Fred Whoriskey is the Executive Director at Dalhousie University's Ocean Tracking Network. Prior to joining Dalhousie University in 2010, Fred was the Vice President of Research and Environment of the Atlantic Salmon Federation (ASF). Other positions include an Assistant, then Associate Professorship at McGill University (1986-1995), and a research assistant for Woods Hole Oceanographic Institution (1976-1981). He has also served on the Boards of the AquaNet National Centre of Excellence in Aquaculture, the Canadian Rivers Institute (Chair since 2016), and the Huntsman Marine Science Centre (Chair from 2003-2011). Fred's research interests are in fish biology and ecology, and the impacts of exotic species on native ecosystems. He has been heavily involved in public policy issues, especially in regards to environmental impact assessments, and has worked extensively in public education.

Protection on the move: applying dynamic ocean management to address shark bycatch in Atlantic Canada

***Jasmine Prior**, Marine Affairs Program, Dalhousie University*

This project investigates how Dynamic Ocean Management (DOM) can be applied to the issue of pelagic shark bycatch in Atlantic Canada and proposes an effective management plan for future use. Dynamic Ocean Management is classified as "management that changes in space and time in response to the shifting nature of the ocean and its users based on the integration of new biological, oceanographic, social and/or economic data in near real-time" (Maxwell et al., 2015). This project reviews how different DOM strategies might be applied to mitigate pelagic shark bycatch, specifically, in the Atlantic longline fishing industry. The species that this industry impacts the most are Blue, Porbeagle, and Shortfin Mako sharks. Therefore, the project focuses on the management of these three species. The methodology of this project undergoes an extensive literature review of current and future management strategies and the governance systems that support them. In tandem with this, interviews with key stakeholders help support a discussion of how management can be improved for the future. The interviews include individuals from Northwest Atlantic Fisheries Organization (NAFO), Fisheries and Oceans Canada (DFO), the Nova Scotia Swordfish Association, the World Wildlife Fund (WWF) and Ecology Action Center (EAC). Finally, the mapping of Blue, Porbeagle, and Shortfin Mako distribution in Canadian waters will be shown to highlight primary areas where static and dynamic management are the most beneficial. DOM applications are being implemented internationally and are proving to be a very effective tool, particularly for bycatch management. DOM helps fill gaps that static management practices, such as MPAs, cannot address. This study provides Atlantic Canada with the initial development of a new marine management tool while assisting in the reduction of pelagic shark bycatch.

Oral Presentations
Creativity

Solutions beyond the sea: exploring the environmental impacts of seafood waste
***Kathleen Mifflin**, School for Resource and Environmental Studies, Dalhousie University*

In the context of growing concern for the sustainability of global seafood systems, there has been ample effort to enhance the eco-efficiency of seafood production methods. In contrast, little work has been devoted to understanding the role that seafood consumption patterns and volumes have to play in sustaining seafood systems and maintaining human welfare. This knowledge gap is critical to fill because eco-efficient forms of production have limited success in reducing environmental impacts and conserving natural resources if products are not used or consumed sustainably. Preliminary research in North America indicates that seafood is being consumed unsustainably, given that between 30-50% of seafood products are wasted in post-production stages of seafood supply chains and at final points of consumption. Thus, it is likely that current seafood consumption practices have serious environmental impacts and consequently, undermine efforts to improve the sustainability of seafood production methods. This study will execute a literature review and a life cycle assessment to explore and quantify the environmental of current seafood consumption practices in post-production stages of seafood supply chains. Given the diverse origins, forms, and modes of conservation and transportation of seafood products, the analysis will focus on a set of widely consumed seafood products in Canada. Within these parameters the study will determine: 1) how seafood losses in post-production stages impact the resource investment and environmental impacts of seafood products that are consumed; 2) if and how these environmental impacts differ between seafood types and product forms; and 3) the extent to which activities of post-production stages of the seafood supply chain contribute to the environmental footprint of the seafood product. Understanding and addressing the impacts of seafood losses will elucidate opportunities to maintain and expand global access to seafood without requiring increased seafood production and correspondingly, increased use of biotic resources and fossil fuels.

Art as a force of change: creative responses to marine debris
***Jennifer MacLatchy**, Faculty of Graduate Studies, Dalhousie University*

Marine debris is a growing threat to all life on earth that results primarily from human exploitation of the ocean's resources and excessive production of and disposal of plastics. No shoreline, no matter how remote from human activities, is free from this plastic debris. One way that some people are working to address this issue is through art. Artists are often the culture-makers who conceive of creative responses and solutions and push forward the avant garde. Because of its abundance, availability, and versatility of materials, many artists are using plastic marine debris as the materials, tools, and focus for a variety of forms of art. Many of these works contribute directly to removing plastics from the ocean and remediating shorelines, and all of them create visual and cultural objects that can serve to engage the public in considering the ways in which we are all complicit in ocean pollution. This paper will briefly explore the work of a small selection of artists who work with marine debris, including Alejandro Duran (Mexico), Aviva Rahmani (United States), Pam Longobardi (United States), Andy Hughes (England), Aurora Robson (Canada), and Karen McCready (Canada), as well as the author's own forays into marine debris art. This selection will include sculptures made from marine debris, site-specific installations, photographs that depict marine debris as captivating and beautiful, paintings created using marine debris as tools for mark-making, and photo documentation of daily debris collections. It will then consider the sorts of messages that these various works present, and how these messages and ideas may contribute to an optimistic future of reducing and reusing ocean debris. In doing this, this paper will argue for the importance of collaborative and interdisciplinary research in addressing this mounting global issue.

Poster Presentations
Collaboration

Reconciling Indigenous governance in marine spaces: Mi'kmaq engagement in tidal energy in the Bay of Fundy, N.S.

***Taylor Brown**, Marine Affairs Program, Dalhousie University*

As activities in the Bay of Fundy, Nova Scotia continues to expand, the room for new development and technology is becoming increasingly more difficult. The movement toward renewable energy has sparked industry to begin development of In-Stream tidal energy in the Bay of Fundy. Although space is limited, the technology is being deployed to consider its potential contribution to the targets set in Nova Scotia's Renewable Electricity Plan. Managing conflict with other marine users in the area has become one of the biggest issues in implementing this new technology. It has been highly recommended that significant management decisions about the planning of this marine space are made to ensure sustainability for future generations. This research explores how Indigenous nations can help federal and provincial governments manage marine space. Management decisions from a co-governance perspective can help to identify gaps between theory and practice. Involving Indigenous governance in managing marine spaces can aid the federal government toward reconciling a nation-to-nation relationship and can help to improve the overall management of marine spaces. However, to reconcile and develop on the notion of a nation-to-nation relationship with Indigenous peoples in marine spaces, it will be necessary to develop a standard of meaningful consultation and engagement for both government and industry. As the Duty to Consult with Indigenous nations lies with the Crown, the Crown is also legally able to delegate tasks to major developers or proponents. These tasks are not always well defined and therefore, this research highlights the importance of meaningful engagement with Indigenous nations on behalf of the proponent in the development of a (new) project with a case study on the In-Stream tidal energy project in the Bay of Fundy, N.S.

Evaluating the role of working groups for informed decision-making in fisheries management

***Kalene Eck,** Marine Affairs Program, Dalhousie University.*

The use of scientific information to inform policy and decision-making is a critical component in addressing marine environmental issues. However, ensuring that the "right" information is available for decision-making can be a challenge as this information often resides in different organizations with different management mandates. Consequently, many governmental organizations have utilized a range of approaches, including technical advisory committees and working groups, to promote communication of relevant information among stakeholders. Engaging multi-sectoral groups can result in the development of robust solutions and recommendations for coastal and ocean management. This research project will examine the role of multiple stakeholders participating in technical working groups designed to assist in marine fisheries decision-making in Belize. Through interviews of working group members and decision-makers in the Belize Fisheries Department, the study will examine the role of the three working groups in providing information for policy-making. The processes used by the groups will be revealed in addition to enablers and challenges to communication. Insights on the influence of technical and interdisciplinary groups in the production of information, its communication, and its uptake in decision-making will be gained. Recommendations to promote communication and use of information in decision-making will be proposed. The results of this study can be beneficial in informing future multi-sectoral collaboration in integrated coastal and ocean management in Belize.

Poster Presentations
Collaboration

The effects of coastal infrastructure and changes to flow rates on a highly integrated social-ecological System: an Ashton Lagoon case study

Noah Eisner, *Marine Affairs Program, Dalhousie University*

Coastal infrastructure is already in place extensively across coastlines throughout a variety of geographical regions around the globe, with the rate of coastal development projects predicted to continue increasing in the future. Oftentimes these coastal development projects are situated within semi-sheltered areas with reduced water flow, which is often further reduced by coastal infrastructural emplacements. Ashton Lagoon, of Union Island, St. Vincent and the Grenadines is one example. A mega-development project, although incomplete due to bankruptcy, was partially constructed in the area in 1994. This led to a severe reduction in water flow, and extensive changes to the environment. This study investigates the impact of reduced water flow 22 years after the construction of coastal infrastructure by analyzing the biological and social components of Ashton Lagoon , such as: flow rates, habitat extent coverage, biological diversity, benthic structure, and human use patterns. Historical and modern data-sets were compared, including transect studies, aerial imagery, and community meetings and workshops. Social ecological systems theory is utilized to analyze the biological and social datasets, so that proper management methods can be developed, as the area is assuredly going to undergo more development in the future.

Using a systematic framework to identify potential focal species for a regional cumulative effects assessment of shipping in the Salish Sea

Kelly Fretwell*, Marine Affairs Program, Dalhousie University.*

Shipping in the Salish Sea has been an issue of particular concern in recent years, due to a number of project proposals that substantially increase the already high levels of ship traffic. If all projects are approved the number of large commercial vessels transiting the region annually would increase by 37%. Concerns have been raised about the threats that current and increased levels of shipping pose to the Salish Sea's marine environment, including chronic oiling, chronic acoustic disturbance, ship strikes, and increased risk of catastrophic oil spills. These adverse impacts, which can be incremental but cumulative in nature, are going largely unheeded under the current environmental assessment (EA) processes required for development projects, since project-level assessments are poorly placed to address such cumulative effects. This may change, however, as a key recommendation of the recent Expert Panel Review of Canada's EA processes is that regional impact assessments be required in areas of federal jurisdiction where cumulative effects occur. Determining which ecological components (including indicator species) to evaluate impacts against is a key part of EAs, and is particularly important for cumulative effects since the aspects of an ecosystem that are most vulnerable to cumulative effects may be less obvious compared to direct project-level effects. Yet there is an overall lack of guidance in this selection process, and selection can be extremely subjective and based on values rather than scientific evidence or context. Given the critical importance of this step to the quality of EAs, and the need to decrease subjectivity in the selection process, I use a systematic qualitative framework to identify potential candidate species that could be assessed in a regional cumulative effects assessment of shipping in the Salish Sea.

Poster Presentations
Collaboration

Management solutions for an at-risk population of northern bottlenose whales (*Hyperoodon ampullatus)* in the international waters of the Sackville Spur
***Emma Marotte**, Marine Affairs Program, Dalhousie University*

Recent visual and acoustic evidence has indicated the presence of a previously undescribed population of northern bottlenose whales (Hyperoodon ampullatus) around the Sackville Spur, an undersea sediment drift that borders the Flemish Pass in the international waters east of Newfoundland. The Labrador Current contributes to primary productivity which supports a high level of biodiversity in the area, as evidenced by concentrations of of deep-sea corals, sponges and fish. The area is subject to intense fishing pressure as well as ongoing hydrocarbon exploration activities that directly overlap with where this new population is thought to occur. The negative impacts of sound generated from seismic activity on marine mammals have been well established and there is some evidence that beaked whales may be particularly susceptible to its effects. In addition to acoustic threats, fishing activities in the area pose risks of entanglement, which has been identified as a threat to the species. Because of how little is known about this new population, protective measures are warranted to ensure their long-term survival. In addition to temporal and spatial restrictions to certain activities, a marine protected area (MPA) may offer an effective solution to protect the population, particularly against threats of entanglement. However, the situation is made complex by the lack of clear regulatory and governance mechanisms that exist to guide the implementation and management of a high seas MPA (HSMPA), and questions arise surrounding what kind of role Canada should employ. This work will examine Canadian and international policy and legislation relevant to HSMPA establishment and attempt to provide a clear recommendation plan about how an HSMPA may be successfully implemented and managed in order to help ensure to the long-term survival to this new population. This work contributes to our overall understanding of effective management strategies available for the protection of vulnerable cetacean species.

Towards an ocean connectivity index: understanding public participation in Falmouth, Massachusetts
***Simon Ryder-Burbidge**,* Marine Affairs Program, Dalhousie University

Everyone is connected to the ocean. The challenge for scientists and policymakers today is to figure out how. This project, titled Towards an Ocean Connectivity Index, attempts to understand how coastal residents perceive connections to the marine environment. The OCI will use available datasets to compare a science-based reflection of ocean connectivity with public perceptions in Falmouth. Data on public perception and analysis will compare what the science suggests about ocean connectivity in Falmouth versus what the community says. Where do the two align? How do they differ? The research seeks to uncover any correlations that may exist between demographic characteristics of survey participants and perceptions. Recognizing that communities and individuals therein experience ocean connectivity in different ways, this study attempts to examine where connections exist, providing a community-scale framework for decision-makers and communicators to engage citizens in locally-relevant ocean issues and marine policy.

Poster Presentations
Collaboration

Local experiential knowledge of groundfish bycatch in a Nova Scotian lobster fishery
***Sarah Tasker**, Dalhousie University - School for Resource and Environmental Studies*

Cusk (Brosme brosme) and the southern population of Atlantic cod (Gadus morhua) are officially endangered from over-exploitation. Because these populations have been continually declining, both are currently under consideration for registry on the federal Species at Risk Act. The decline of these groundfish species is exacerbated by natural and fishing-related ecosystem changes, alteration of benthic habitat by fishing gear, directed fishing, and bycatch from fisheries for other bottom-dwelling species, such as lobster. While Canada's most valuable Lobster Fishing Area (LFA) experiences a steady growth in total annual landings, bycatch levels of cod and cusk remain uncertain and require a better understanding under the growth of the fishery. The threat of by-catch to Atlantic cod and cusk also poses a socioeconomic risk to lobster fishers' continued sus-tainable seafood certification by the Marine Stewardship Council in Atlantic Canada, which has stipulated the need for better data on the amount of bycatch in the fishery. This research aims to assess the socioecological climate surrounding Atlantic cod and cusk bycatch within LFA 34 using the local experiential knowledge of fishery stakeholders to incentivize a bottom-up approach to bycatch mitigation in lobster fisheries.

Poster Presentations
Communication

Integrating traditional knowledge and marine spatial planning
***Mikaila Bickford**, Marine Affairs Program, Dalhousie University*

Marine Spatial Planning (MSP) is a tool for comprehensive, integrated ocean management, used to mitigate anthropogenic impact on the environment and promote co-operation between ocean users. It requires the demarcation of use-specific areas in the ocean and management of conflicts of use, based on diverse data sets and reconciliation of this data. In the Beaufort Sea LOMA, Inuvialuit are the primary users of coastal resources, making them a significant and necessary stakeholder in the MSP process. Traditional Knowledge (TK) or Indigenous Knowledge (IK) held by the Inuvialuit is also valuable for planning in the Western Arctic, as the indigenous group(s) both have a historical advantage in knowledge collection, and are able to fill in gaps in scientific data.
In order for TK to be effectively integrated into MSP, problems related to TK data integration must be addressed, and practices for managing, analyzing, and using TK must be explored and crafted. Issues related to TK integration with science and management practices have been brought up repeatedly in the relevant literature, however no practical methodologies have been put forward. This lack of research into TK data practices hinders transparency in MSP and management processes, promoting guesswork and discrepancies. This research addresses the process of TK and MSP integration by exploring ways in which TK is and should be translated into data that is practical for planning. It will first look at ways in which TK has been historically documented in the Western Arctic. Using this review as a background, it will then investigate innovative methods of organizing and analyzing TK, focusing on potential adaptations of non-MSP knowledge organization and analysis, and feasible applications for the Inuvialuit. After addressing the challenges related this process, the research will propose innovative solutions that redistribute authority in governance via alternative knowledge organization and analysis practices.

The Galapagos sea lion at a crossroads: a case of cohabitation between a colony of sea lions and a human settlement in the Galápagos Islands
***Daniel Arteaga Bastidas**, Science, Dalhousie University*

The Galapagos Sea Lion (Zalophus wollebaeki) is an iconic member of the megafauna found in the Galapagos National Park and Marine Reserve, Ecuador. These charismatic marine mammals have drawn the attention of visitors and locals alike due to their extroverted and playful behavior. The scientific community has shown special interest in this species of Sea Lion as it is one of the top predators found along the coastline of the archipelago and is a key bioindicator of oceanographic productivity within the Galapagos Marine Reserve. Currently, over thirteen percent of the total population of Galapagos Sea Lions inhabit San Cristobal island. One of the largest colonies of the archipelago is found in Puerto Baquerizo Moreno, the capital of the Galapagos Province in Ecuador. As this port grows in population and becomes urbanized the locals have devised ways to coexist with their marine mammal neighbors. However, concerns of adverse anthropogenic effects on this colony have been raised for the past decades. This research provides an insight in the developing body of evidence that shows the health of this Sea lion colony is in peril and how collaboration between institutions such as the Galapagos National Park, the Municipality of Puerto Baquerizo Moreno and international private scientific efforts have been working for the last two decades to improve the relationship between the port's population and the Sea lions which they must coexist with.

Poster Presentations
Communication

The role of environmental non-governmental organizations in marine conservation policy-making: a case study on marine protected areas in Canada

Rachael Cadman, *School for Resource and Environmental Studies, Dalhousie University*

At the 2010 UN Convention on Biological Diversity, Canada committed to protecting 10% of Canada's territorial ocean by the year 2020. When the federal government recommitted to that goal in 2015, it also set an interim goal of protecting 5% by the end of 2017. Shortly after the election in 2015, the government convened a meeting for Environmental Non-Government Organizations (eNGOs) to enlist their help in achieving these targets. By engaging with eNGOs to solicit their assistance with achieving the 2020 targets, the federal government encouraged their active participation in the decision-making process. Since 2015, eNGOs have been engaged in gathering and distilling information to advise policy makers on the creation of marine protected areas (MPAs) in Canada's coastal and marine environment. Because of the increased interest in this subject, eNGOs have been refining their techniques to increase their effectiveness. This has included increased collaboration among eNGOs and the creation of national strategies to achieve specific deliverables associated with Aichi target 11. This research seeks to increase understanding of the role of eNGOs in decision-making regarding the designation of MPAs. A case study of two eNGOs: World Wildlife Fund Canada (WWF), and the Ecology Action Centre (EAC), develops and uses a methodology to examine the movement of information through informal and formal channels in the eNGO decision-making process. The study will focus on the efforts of WWF and EAC on the design and implementation of three active MPA projects which are to be completed by the end of December 2017: the Laurentian Channel, the Haddock Box, and the Scott Islands. The study will also seek to understand the role(s) of information in various formal and informal collaborations and partnerships that eNGOs leverage to achieve their mandate.

What public perceptions of coastal marine protected areas can tell us about how we communicate ocean science and policy

Joana Costa*, Marine Affairs Program, Dalhousie University*

As part of the United Nations Convention on Biological Diversity, Canada has committed to protecting 10% of its coastal and marine environment by 2020. The maritime division of DFO is leading the initiative for an MPA network on the Scotian Shelf, an area that has been identified as one of the main bioregions for MPA network development. There is new federal funding and political will to protect Canada's marine and coastal environments, but there needs to also be public will for marine protection. A lack of community support for a coastal MPA can delay the designation process and may hinder the effectiveness of an MPA if community members do not comply with regulations or support in enforcing them. Public support for MPAs in Atlantic Canada is still low due to fishers' concerns over losing access to their livelihood. One of the sites being considered for a coastal MPA in Atlantic Canada is the Sambro ledges ecologically and biologically significant area. A survey was conducted on the perceptions of MPAs and the impact that one would have in Sambro, NS, and other neighbouring communities. Determining public perceptions of MPAs will help to identify how communication can be improved to increase understanding and support for MPAs.

Poster Presentations
Communication

Obama's marine monument legacy: where does it go from here?

***Adrian Gerhartz-Abraham & Elizabeth Edmondson**, IDPhD/Marine Affairs Program, Dalhousie University.*

In the United States, marine protected areas are broadly defined as "...any area of the marine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein" (Executive Order 13158). Although they fall under this definition of a MPA, national marine monuments differ in that they are unilaterally designated by the sitting President under the Antiquities Act, evading the common practices of establishing MPAs within the US and internationally. Under President Obama, the number and size of marine monuments designated was greater than any president before him. His legacy is as a protector of the ocean, providing meaningful contribution to conservation of marine ecosystems and biodiversity within US waters. However, implications of the designation process may have the potential to undermine relationships among stakeholders and ongoing efforts that promote the use of MPAs. This research provides a discussion on how establishing MPAs under the Antiquities Act influences the management and overall effectiveness of these areas. Specifically, we examine whether establishing MPAs under this Act undermines the general model of MPA development in which stakeholder participation is necessary for credible, durable, and legitimate MPAs. The timing of this discussion is important with the current Trump Administration and a push by fisheries organizations for the removal of marine monuments to allow for commercial fishing. With the potential for action to hinder not only marine monuments but the conservation and protection of the marine environment within US waters, an understanding of national marine monuments in practice is essential for understanding whether the process under the Antiquities Act supports the goals of MPAs and the future use of this approach in MPA designation.

Pursing sustainable aquaculture: a resource inventory of the global aquaculture sector

***Angela Moores**, School for Resource and Environmental Studies, Dalhousie University.*

Aquaculture is the fastest growing animal food production sector in the world and has been declared an essential component of global food security (FAO, 2011; Jones et al., 2015). The sustainability of aquaculture production has been scrutinized in part, due to seeming inefficiencies in feeding practices of intensively cultured species and their associated environmental impacts (Tacon & Metian, 2009; Teletchea & Fontaine, 2014; Welch et al., 2010). A powerful and novel way to assess the efficacy of feeding strategies is through an analysis of the total amount of photosynthetic or primary production (PP) appropriated by the sector. Hence, this study will generate a resource inventory for the global aquaculture sector based on the total amount of PP appropriated by the industry from 1970 to 2013 on national, continental, and global scales. Resource inventories attempt to provide baseline data to facilitate long-term environmentally conscious decision-making (Frankic & Hershner, 2003). The inventory generated will be representative of the global aquaculture sector as it will apply an innovative model to account for feeding practices of all cultured species. The pursuit of sustainable aquaculture practice is paramount to its future viability, as it must balance growing production demands with the need for resource conservation in ecosystems that are approaching regional and global biological thresholds (Frankic & Hershner, 2003; Jennings et al., 2016; Rockström et al., 2009). This study will be the first to quantify resource demands of the aquaculture sector at such a large temporal and spatially significant scale.

Poster Presentations
Communication

WHaLE alert: determining the vessel fleet's needs and preferences towards near real -time whale conservation in Atlantic Canada

***Ainslie McLeod**, Marine Affairs Program, Dalhousie University*

North Atlantic Right Whales are an endangered species that face many anthropogenic threats, including vessel strikes. There is an urgent need to implement a flexible method to monitor and protect these whales in Atlantic Canada. Recently, Passive Acoustic Monitoring (PAM) technology has been used to monitor and identify whales and their location in near real-time based on sound. This technology is equipped to an ocean glider that moves through the water and processes species information in near real-time. This novel technology can allow for whale conservation by linking PAM to vessel communication technology to broadcast a whale location alert. There is evidence that the vessel fleet is willing to comply with new conservation measures for endangered whales, but there is little information about the fleet's needs and limitations towards implementing this real-time conservation technology into the bridge protocol. The purpose of this project is to design and distribute a research the vessel fleet to better understand the fleet's knowledge about whale conservation, their interest in whale conservation, and their needs regarding whale conservation, such as the Whale Alert. The research survey will also determine stakeholder preference for receiving a real-time whale alert on the bridge. Once distributed to the appropriate stakeholders in the vessel-related industry, the results from the research survey should indicate the industry's receptivity, needs, and preferences towards receiving real-time whale alerts. This information will help to develop a management plan to implement this novel conservation technology into the vessel bridge protocol based on stake-holder needs and preferences. By considering the vessel fleet's needs, concerns, limitations and preferences towards this technology, it is more likely that the fleet will comply with this new conservation method in Atlantic Canada.

Poster Presentations
Creativity

The use of direct marketing of Cape Breton lobster to fund local fishery science

***Becca Aucoin**, Marine Affairs Program, Dalhousie University.*

The lobster industry is the largest and most valuable fishery in Canada. It has generated revenues exceeding $1 billion annually. Although it is an economically rich industry, there are many actors within the seafood supply chain and the earnings are not distributed equitably. There is also a high degree of price volatility in the market which trickles down to fish harvesters. Lobster fishers have very little control over where their catches are sold and what price they fetch at market. Critical to the sustainably of the lobster industry is the ecological status of lobster stocks. Due to the nature of natural resources, they must be closely monitored and responsibly harvested to ensure the prosperity of the fishery moving forward. The Cape Breton Fish Harvesters Association have taken it upon themselves to conduct their own fishery science to better monitor their lobster stocks. Unfortunately, scientific research is expensive to undertake, and funders do not view ecological monitoring as a responsibility of industry. For this reason, the CBFHA have very limited financial resources to conduct this important research. A solution that has been proposed to solve both the issue of lack of control over landings and lack of funding to conduct science is through the use of direct marketing of Cape Breton lobster. This study will examine the feasibility of this recommendation through three lenses, known as the "triple bottom line" of fishery performance; ecology, economy, and community.

Underwater community gardens: exploring community-based mariculture as a coastal resource management strategy

***Jessica Bradford**, Marine Affairs Program, Dalhousie University*

Marine aquaculture, or "mariculture", is on the rise globally. While this increasing trend is seen on a global scale, it is being carried out on a local level, resulting in changes to shared ocean spaces within coastal communities. This presents both challenges and opportunities for communities to sustainably manage their marine ecosystems to support human well-being into the future. In the case of understanding mariculture development, it may be applicable to consider a community-based management approach, that is, one that engages communities in planning and decision-making for shared resources. While studied extensively and utilized in other resource sectors, in the context of both freshwater and marine aquaculture, community-based management appears to be understudied. Furthermore, the effectiveness and long-term viability of community-based management initiatives can be dependent on local socio-economic conditions and, therefore, also requires investigation. A key consideration that emerges is for the potential of community-based mariculture (CBM) to present a viable solution for sustainable coastal resource management. This research will explore this idea in the context of Nova Scotia (NS), Canada, where mariculture development is being promoted, but community management opportunities have not been studied. A mixed qualitative and quantitative (Q-squared) method will be employed to gain insight into CBM as a potential coastal resource management strategy. With a specific focus on small-scale mariculture of bivalves and macroalgae, it will include semi-structured interviews with stakeholders on a provincial-scale and surveys conducted on a municipal-scale. This study will contribute to growing literature on CBM and may inform future opportunities that could bring sustainability and well-being benefits to rural coastal communities in NS and, perhaps, elsewhere in the world.

Poster Presentations
Creativity

Critical assessment of the effectiveness of MPA networks for endangered pelagic migratory species in the North Atlantic in a context of climate change

Jamie Callan, *School for Resource and Environmental Studies, Dalhousie University*

A variety of cetacean, sea turtle, and shark species have been identified and listed as endangered under both COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and SARA (Species at Risk Act). While Atlantic waters comprise a vital component of the habitat for many of these species, such as the Blue Whale, Right Whale, and Leatherback seaturtle, their long life spans and wide ranging migrations make these species particularly vulnerable to threats and difficult to monitor. One key strategy in the recovery of such species is the development of well-connected coastal and marine protected areas, and as a party to the Convention on Biodiversity, Canada has committed to having 10% of its marine and coastal areas protected by 2020. However, Canada's protected area jurisdictions have identified a lack of tools for such planning, and connectivity planning for such wide-ranging, long-lived pelagic species is conceptually and technically challenging. There is also the added complexity of impending climate change, which is projected to cause a shift in the core areas of habitat for many species. The aim of this research is thus to assess the effectiveness of MPAs as a conservation tool for wide ranging pelagic species in the North Atlantic using a spatial analysis approach for marine and coastal protected area planning in a context of climate change.

Exploring consumer-facing traceability as a risk mitigation strategy for seafood producers in Nova Scotia

Christina Callegari*, Marine Affairs Program, Dalhousie University.*

Seafood is the most traded food commodity in the world, and with the rise of globalization, seafood supply chains are continuing to increase in complexity. Recent studies on seafood fraud, illegal, unregulated, and unreported (IUU) fishing, and slave labour within the fishing industry have led to a push for change in the way seafood supply chains operate. This world-wide, highly complex seafood industry leads to elevated informational demands for supply chain actors. Globally, but specifically in the United States and the European Union, regulatory requirements along the seafood supply chain are shifting towards increasing traceability and consumers are demanding more transparency. The seafood industry and its economic benefits are important for the fishing industry and growing aquaculture sector in Nova Scotia, but these industries may not be prepared to satisfy these new regulations and demands. This creates a significant amount of risk for the industry in Nova Scotia. It is possible that Nova Scotian fishermen and aquaculturalists, may reduce this risk and increase accountability if they are engaged in consumer-facing traceability (CFT) systems. However, producers may not have a clear sense of the risk for mislabelling and fraud within the seafood sector and they usually have no control over this process once their fish is sold. Fortunately, mid-chain actors that buy and sell seafood may have more control over seafood products, and thus can play a key role in mitigating regulatory and market risks for producers. This research project will conduct a feasibility study to analyze the potential for CFT in Nova Scotia to mitigate regulatory and market risks. It is hoped that this research will provide a deeper understanding of the perception of the regulatory and market risks buyers and producers in Nova Scotia may face, as well as the benefits CFT may bring.

Poster Presentations
Creativity

Improved spatio-temporal polycyclic aromatic hydrocarbon (PAH) characterization and assessment in small craft harbour sediments in Nova Scotia

***Emily Davis & Tony R. Walker**, School for Resource & Environmental Studies, Dalhousie University*

School for Resource & Environmental Studies, Dalhousie University, Halifax, N.S. Small craft harbours (SCHs) are crucial for the fishing industry which is vitally important for the Canadian culture and economy. Nearly 90% of all fishing landings in Canada (worth $1.6B CAD), occur at SCHs. Sediments in these SCHs regularly require maintenance dredging for navigation, but are often contaminated from various anthropogenic activities. Disposal of contaminated sediments from these sites poses serious problems for harbour managers. In terms of pollutant inputs, polycyclic aromatic hydrocarbons (PAHs) represent one class of contaminants commonly found in marine environments globally. PAH compounds can accumulate in both aqueous and sediment fractions of harbour systems, creating "hot spots" for sediment contamination. PAHs are produced from various sources, which differ in ecological impacts on the marine environment. Current assessment of PAHs in SCHs (sediment sampling), relies heavily on bulk sediment PAH concentrations to determine the inherent risk to organisms, water, or sediment quality, with source apportionment often neglected. This study aimed to understand how PAHs find their way into SCHs and to determine primary sources. Source apportionment may provide useful background information for SCH decision makers with respect to source control and remedial options for harbour systems. This research focused on PAH diagnostic ratios, which represent one of the many tools that can assist in distinguishing emission sources of PAH compounds. In the application of PAH diagnostic ratios to historical sediment data from SCHs, PAH emission sources were assessed in SCHs across all regions of Nova Scotia.

Small and mighty: why forage fisheries management could benefit from an ecosystem based framework. A case study on Bay of Fundy/Southwest Nova Scotia herring stock component

***Jordan Gardiner**, Marine Affairs Program, Dalhousie University.*

Forage fish are defined as low to mid-trophic level species that are preyed upon by many top predators within their respective ecosystems. The dependence on these forage fish from top predators makes them a crucial link between autotrophs and predators within an ecosystem. It has been suggested that forage fish species are more valuable in the water, acting as support for these top predators, than being directly fished for other uses such as human consumption, bait or fish meal/oil. In Nova Scotia (Canada), many lobster fishers rely heavily on forage fish species as bait within lobster traps. Forage fisheries within Atlantic Canada include Atlantic herring (Clupea harengus), mackerel (Scomber scombrus), and capelin (Mallotus villosus). The current management of these fish in Canada is based on single species assessments. However, due to forage fish's unique interactions with both their ecosystems and other fisheries, a management plan that focuses on these interactions is crucial for ecosystem sustainability. Accordingly, this project assessed the current single species management of these forage fisheries using a holistic analysis on a case study of the Southwest Nova Scotia/Bay of Fundy herring stock component. This holistic analysis assessed factors within a political, economic, socio-cultural, technological and environmental framework through a PESTE analysis. From this analysis, the strengths, weaknesses, opportunities and threats within the current management regime were determined. Using these opportunities and threats, a gap analysis was conducted to identify the feasibility of alternative ecosystem based management frameworks for forage fisheries.

Poster Presentations
Creativity

A cultural perspective on sperm whale dialect evolution in sympatry

***Taylor Hersh**, Biology, Dalhousie University*

Although culture is often regarded as an exclusively human characteristic, many animals exhibit their own versions of culture. For example, sperm whales (Physeter macrocephalus) have an intricate vocal culture that maps onto their hierarchical social structure. Approximately 10-12 individuals live in stable, mostly matrilineal social units, and units with similar acoustic repertoires interact to form vocally-distinct and socially-segregated clans. In social contexts, sperm whales communicate using stereotyped combinations of 3-12 clicks, called codas; approximately 60 different coda types are assembled into socially-learned dialects that vary by unit and clan. These dialects appear to be particularly relevant at the clan level, as whales from different clans never associate. However, while much is known regarding coda structure and general dialect features, the question of how sperm whale dialects may (or may not) be evolving today remains enigmatic. My research looks at both unit- and clan-level dialects in areas with different degrees of clan sympatry, in order to determine if dialects are evolving and if the number/proximity of additional clans impacts evolution patterns and rates. Given that sperm whale populations appear to be much more clearly structured by dialect than geography, a better understanding of dialect evolution could facilitate a better understanding of underlying changes in population structure. This work directly support a recent Convention on Migratory Species resolution encouraging research that improves management unit designation for socially-complex species, with the understanding that some species are best delineated by cultural behavior. Through my research, I aim to provide further support in favor of a clan-based approach to sperm whale population management, while also filling a critical research gap concerning sperm whale dialects. Indeed, proper management of sperm whales is crucial given their role in top-down control of marine ecosystems, nutrient cycling, biodiversity maintenance, and carbon sequestration.

Social cost benefit analysis of the Fair Trade certification in seafood markets underprovided and undervalued

***Emilie Normand**, Marine Affairs Program, Dalhousie University.*

There is an increasing recognition in global seafood markets that social sustainability is becoming the imperative of the day. Emergence of the Fair Trade USA Capture Fisheries Standard (CFS) is one solution to incentivize and reward good social practices in the fishing industry by ensuring social and environmental responsibility throughout seafood supply chains. The Fair Trade CFS presents an opportunity to promote these practices in small-scale fishing operations around the world, which are largely excluded from alternative certification schemes due to limited financial capacity. The gains from achieving Fair Trade certification can manifest as the profit gains to a fishery from the emergent market opportunities and product differentiation otherwise unavailable to the individual fisheries, along with potential future returns by conforming to sustainable fishing practices. Firm-level figures under-estimate the possible social impact that may accrue in compliance with the criteria of the CFS. As the CFS addresses social injustices that are prevalent in the fishing industry, attaining Fair Trade certification may have a positive impact on society on a greater scale. This study conducts a social cost benefit analysis on adherence to the CFS criteria in order to encapsulate not only firm-level benefits, but also to demonstrate the benefits Fair Trade certification has on society. Estimates of social benefits will then be used to assess whether or not there is a market failure in the form of a positive production externality that accrues from compliance with the CFS. A general methodology to quantify selected indicators of social benefits associated with the criteria is demonstrated on a Fair Trade Certified^{TM} yellowfin tuna fishery in Indonesia and a shrimp fishery in Mexico. The role of the government in correcting for such a market failure is then discussed regarding the provision of certified products.

Poster Presentations
Creativity

Environmental effects of marine transportation: international collaborative solutions for a Global Problem

Sanam Zomorodi, Nameeta Sharma, Olubukola Adebambo, Monica Del Aguila Feijoo, Elias Elhaimer, Stuart Johnston Edwards, Courtney Morrison, Jessica Romo, Stephanie Taylor, & Tony R. Walker*, School for Resource and Environmental Studies, Dalhousie University.*

Marine transportation is an integral component of the global economy with over 90% of world trade being carried by sea, resulting in approximately 10 billion tonnes of goods being transported over the world oceans annually. These goods can be divided in three main cargo groups: containers, liquid bulk cargo, and solid bulk cargo. Historically, marine transportation has been operated by ports and shipping companies with little regard for environmental impacts. In the 1960s, accidental oil spills caused widespread coastal contamination and seabird mortality. These incidents triggered the International Convention for the Prevention of Pollution from Ships (MARPOL), the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. Currently marine transportation still results in multiple stressors on the marine environment. The main environmental effects include air pollution; greenhouse gas (GHG) emissions; releases of ballast water containing aquatic Invasive species (AIS); historical use of chemical-based antifoulants on ships; releases of cargo residues; oil spills and dry bulk material releases; garbage management and marine based sources of plastic debris; underwater noise pollution; ship-strikes on marine megafauna; risk of ship grounding or sinkings; and widespread sediment contamination in ports and harbours during transshipment or ship breaking activities. This study describes and summarizes environmental effects of marine transportation and documents mitigative measures and legislative tools currently available to address this global issue. Scholarly and international convention guidelines are reviewed and recommendations are made on how best to manage this significant source of marine pollution.

Photo: Simon Ryder-Burbidge

The Sobey Fund for Oceans

Made possible by a generous and innovative gift by Donald R. Sobey, a unique partnership has been formed by the Marine Affairs Program (MAP) 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.

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2017-2018

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Photo: Jenny Weitzman

Scholarship Recipients 2017-2018

Emma Carmichael

"With the support from the Sobey Fund for Oceans and Dalhousie's Marine Management program, I am looking forward to pursuing my interests in global and local fisheries and their effect on at-risk species, marine biodiversity and ecosystem health. During my time at Dalhousie, I hope to study successful sustainable fisheries around the globe, and determine how aspects from these fisheries, such as improved product transparency and reduced by-catch mortality, could be implemented in local maritime fisheries, benefiting our sustainability and conservation needs. I am so excited to work alongside Dalhousie and the Sobey Fund for Oceans in my research, and am eager to gain new interests through the interdisciplinary nature of the Marine Management program."

Curtis Martin

"I am so grateful to receive the Sobey Fund for Oceans scholarship, which will allow me to pursue a graduate degree in the Marine Affairs program. Furthering my education in this field is not only a career goal of mine, but also what I am most passionate about. Climate change poses a huge threat to the future of our biosphere, and one of the biggest issues today is implementing policy that is based on scientific evidence. Without support from the public, scientific policy is difficult to achieve. Because of this funding, I will be able to research how to best educate and inform the public on the science behind climate change and the dangers that come with it. This will help link the public with policy makers so that we can all work together to protect our beautiful planet and its future."

Marine Affairs Program

The Marine Affairs Program at Dalhousie University provides an inquiring and stimulating interdisciplinary learning environment to advance the sustainable use of the world's diverse coastal and ocean environments. In education, research and outreach, MAP seeks to develop outstanding marine management professionals by building on extensive global-to-local marine management networks.

MAP works with other educational, governmental, NGO and private sector organizations to promote and conduct timely and relevant interdisciplinary research in a broad array of scholarly topics that is attractive to students and conducted by a team of world-class researchers. Through its worldwide network of faculty, graduates, and associates, the research and expertise developed in the MAP program influences marine policy decisions around the globe.

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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. www.wwf.ca

Acknowledgements

We would first like to give our sincere thanks to all the presenters, participants, chairs, judges, and guest speakers who have contributed their time and expertise to make Sustainable Oceans 2017 a very special event.

This would not have been possible without our 2017 sponsors and supporters: MEOPAR, Dalhousie University's Faculty of Science, Oland Brewery, the Marine Affairs Student Society, Ocean Tracking Network, SeaSpace Associates Ltd., Nova Scotia Fisherman, and SEA Change Clothing Co. Thank you also to those who donated to our ocean-themed raffle basket fundraisers: Call of the Ocean (Danielle Goodreau), Laughing Whale Coffee Roasters, Just Rooted (Virginia Bradford), Amos Pewter, Jessica Bradford, Kevin Squires, and Becky Field. We are grateful for the in-kind support of the CRMBA program for providing meeting rooms and printing for us.

We also thank Mr. Robert Sobey for his remarks and presentation of the Sobey Scholarship awards that financially support educational opportunities for our future ocean leaders. Special thanks to the Halifax Central Library and their staff for generously donating their beautiful learning space for the Saturday portion of the conference.

Thank you to our two keynotes—Dr. Julia Baum and Nick Hawkins—for their inspirational and insightful talks. Thank you to our marine pollution panelists—Ashley David, Peter Wells, and Cameron Deacoff—for lending their expertise to help inform the public and address this major issue for our world's oceans. We would also like to recognize our three subtheme guest speakers: Dr. Suzuette Soomai, Dr. Fred Whoriskey, and Anika Riopel.

For the second year in a row, the conference has included the YMS family programming, which allows us to engage younger audiences in learning about the ocean. This program was made possible by: Back to the Sea Society, Canadian Sea Turtle Network, Department of Fisheries and Oceans, Paul McNab, Dalhousie University, Aquatron Laboratory, Ecology Action Centre, Anika Riopel, Jennifer MacLatchy, and Alexandra Vance.

Next, we give our sincere thanks to the conference coordinators, Liz Wilson and Jordan Gardiner, for their passion, patience and wisdom in planning and delivering the conference from start to finish. They are the backbones of the conference and have helped to show the students the path to success!

This is a student-led conference and would not be possible without the hard work of the subcommittees made up of the 2016/17 Master of Marine Management students. Every single student is thanked for the hours they have put in to make this conference a reality! Special thanks goes out to our subcommittee heads for the extra time dedicated to organizing the conference and leadership they have demonstrated: Ainslie McLeod (fundraising), Kalene Eck (submissions), Mikaila Bickford (communications), and Becca Aucoin (logistics).

We would also like to recognize Simon Ryder-Burbidge, Noah Eisner and The Lowlander Media for creating the conference trailer and video. Thank you to Ainslie McLeod for her hard work and perseverance in making the raffle basket fundraiser possible and for her attendance at all of the Oceans Week events! Thank you to Mikaila Bickford for her dedication on not one, but TWO websites for this year's conference, as well as representing our class at many Oceans Week events. Thank you to Kalene Eck for all of her hard work in making the poster and oral presentations come to life! Thank you Becca Aucoin for her dedication to the conference events and logistics in ensuring YMS planning was moving smoothly and planning Oceans Week activities. Thank you to Emma Marotte for organizing the judges. Thank you to Weishan Wang for organizing and coordinating the YMS volunteers. Last, but certainly not least, thank you to Changxia Wu for organizing the many bake sales that took place for fundraising.

The entire MAP Faculty, including Sobey Fund for Oceans Committee members Dr. Claudio Aporta, Dr. Lucia Fanning, and Becky Field, are all thanked for the tireless guidance and support in making this a success. We would also like to welcome and thank the incoming 2017/18 Master of Marine Management students for getting involved and supporting this year's conference and wish them luck for Sustainable Oceans 2018! If your name is not listed here, but you have supported the conference in some way, please know your contribution is greatly appreciated.

Photo: Jessica Bradford

NOTES

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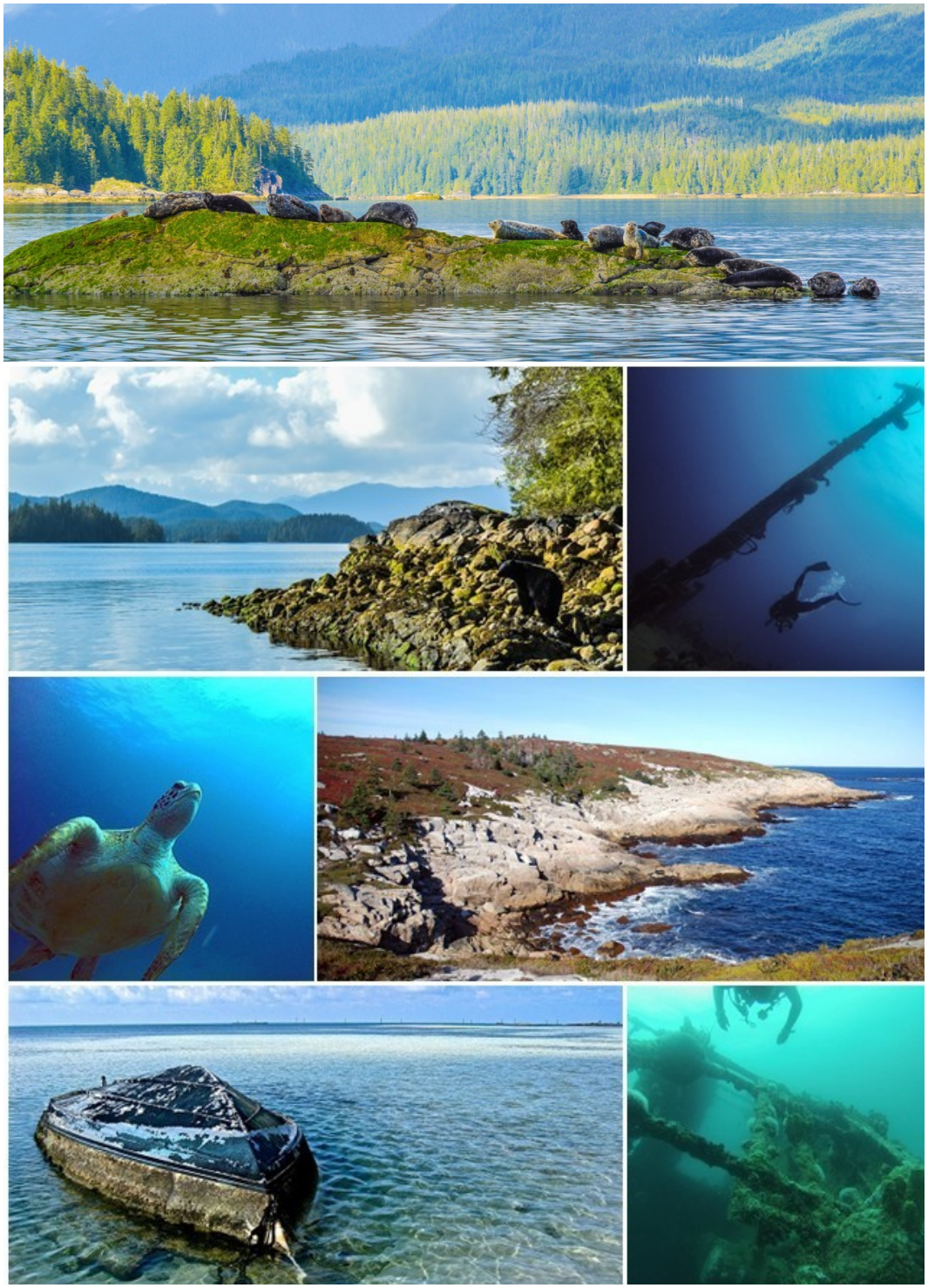
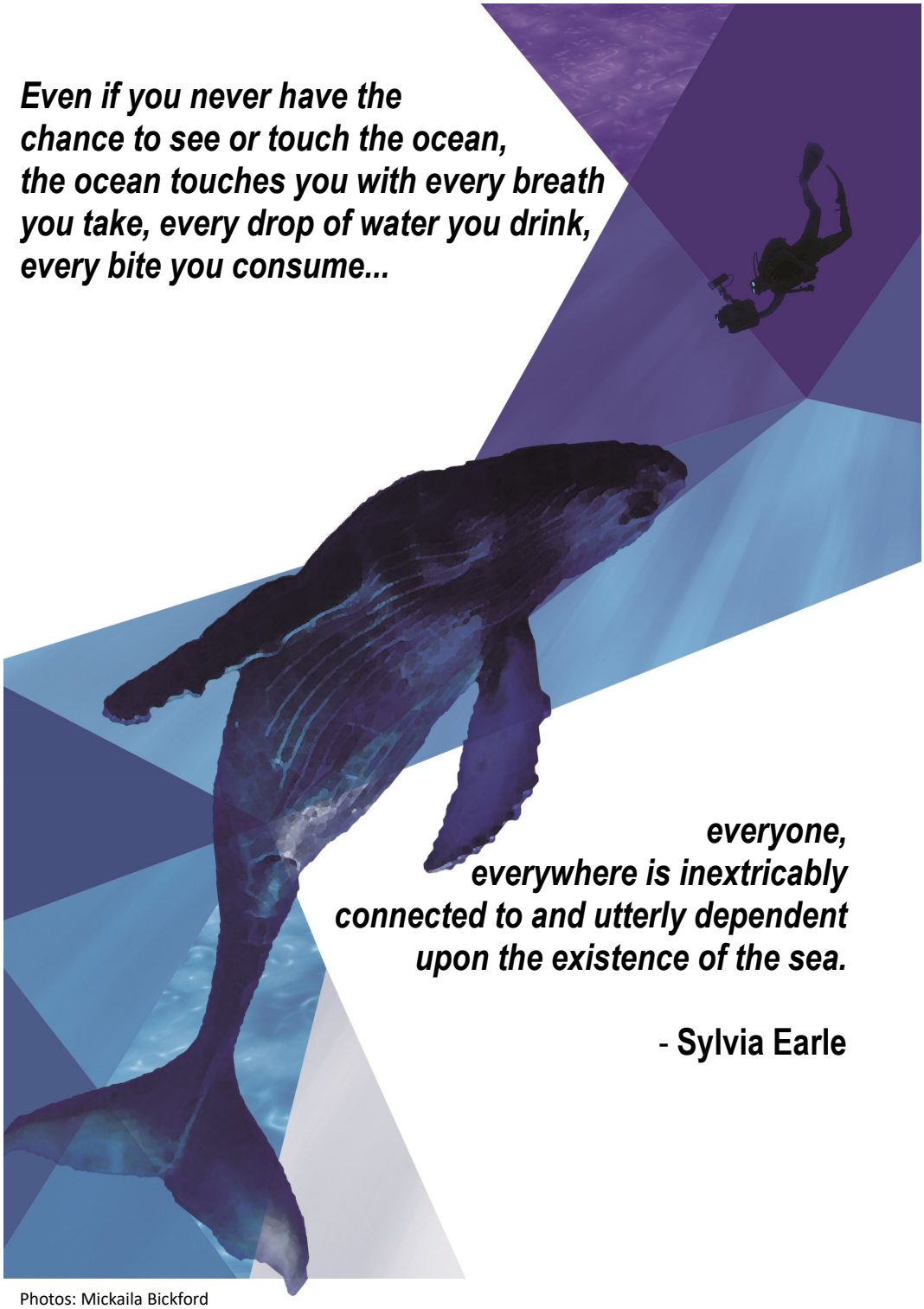


Photos:
(Top) Simon Ryder-Burbidge
(Second from top left) Simon Ryder-Burbidge
(Second from top right) Mikaila Bickford
(Third from top left) Burnett
(Third from top right) Kelly Fretwell
(Bottom left) Schram
(Bottom Right) D'Souza

Even if you never have the chance to see or touch the ocean, the ocean touches you with every breath you take, every drop of water you drink, every bite you consume...



everyone, everywhere is inextricably connected to and utterly dependent upon the existence of the sea.

- Sylvia Earle

Photos: Mickaila Bickford

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Thank you to all our volunteers and participants!

We would like to acknowledge the Halifax Central Library for generously hosting the Saturday program. The conference is a key activity of the Sobey Fund for Oceans. The Fund is a unique partnership between the Marine Affairs Program (MAP), Dalhousie University and WWF Canada.