Sobey Fund for Oceans

SUSTAINABLE OCEANS

INTO THE BLUE:
THE BODY CONNECTING US ALL

SEPT 30 & OCT 1, 2016

30 years MARINE AFFAIRS PROGRAM

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"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, Sept. 30 & Oct. 1, 2016

The key goal of the 2016 Sustainable Oceans Conference is to provide the basis to engage in a dialogue that provides recommendations to Canadians on how they can contribute to the targets of the UN's Sustainable Development Goal #14. This student-led conference aims to achieve this by examining the unique connections that we all have to the ocean through bringing together the public and academic sectors.

Special objectives of the conference are to:

- 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 people from all sectors of ocean study
- Promote ocean education through demonstrations and activities presented by local NGOs
- Provide an environment that stimulates discussion and problem-solving in light of current ocean issues

Dear Attendee,

On behalf of the students in the 2015-2016 Marine Affairs Program class, we would like to warmly welcome you to Sustainable Oceans 2016: Into the Blue: the body connecting us all.

Whether it be for food, employment, recreation, or simply the production of oxygen, the ocean acts as a unifying body, connecting and supporting all life on earth. This global force has the power to bring together people from a multitude of fields and backgrounds to address ocean issues. With the overarching theme of the conference being *Into the Blue: The Body Connecting Us All*, the purpose of our conference is to integrate the public and academic sectors through examining our unique connections to the ocean. We hope to bring together people and research from around the world to explore our diverse connections to the ocean, and share viewpoints on how to approach ocean issues as the pressures of climate change increase.

Our goal for the conference is to provide recommendations to Canadians on how they can contribute to the targets of the UN's Sustainable Development Goal 14: Conserve and Sustainably use the Oceans, Seas and Marine Resources.

We hope the research and ideas presented here inspire you to take positive action with our global oceans in mind.

Thank you for your support!

Sincerely,

Meghan Borland, Monica Reed, and Laurie Starr

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Program Overview

Friday September 30th, 2016

Halifax Central Library, Paul O'Regan Hall

5440 Spring Garden Road, Halifax

5:30pm - Registration

6:00pm - Welcoming Remarks

6:10pm - Sobey Fund for Oceans Scholarships

6:30pm - Keynote Address: Brian Skerry - *Luminous Seas*

7:30pm - Closing Remarks

7:35pm - Reception

8:30pm - End of Program

Program Overview

Saturday October 1st, 2016

Halifax Central Library, Paul O'Regan Hall

5440 Spring Garden Road, Halifax

10:00am - Registration

10:30am - Opening remarks

10:40am - Our Brain: Ocean Education and Literacy session

11:40am - Our Stomach: Sustainable Seafood session

12:35pm - Lunch

1:05pm - Our Heart: Marine Conservation session

2:00pm - Break

2:15pm - Our Lungs: Ocean Resources session

3:10pm - Break-out Sessions and Policy Forum session

4:40pm - Closing Remarks and Awards

5:00pm - End of Program

You, Me, and the Sea
Saturday October 1st, 2016
Halifax Central Library

Time	Activity	Library Room
10.00 - 2:00pm	• Back to the Sea Aquarium - Meet sea stars, urchins, crabs and other fascinating critters • Dalhousie Microscope Demonstration - Take a close up look at what is found in the big blue sea • Marine Debris Art with Jennifer MacLatchy	Creative Lab, 2nd floor
	• Arts, Crafts, and a Movie - Marine Affairs Students Society	BMO Room, 2nd floor
10:45 - 11:15am	Anika Riopel (1) Sharks and Rays - Teaching ecosystems through play	Lindsay Children's Room, 2nd floor
11:30 - 12.00pm	Fisheries and Oceans Canada (DFO) The Gully- A presentation about our very own Scotian Shelf	Room 301, 3rd floor
12.00 – 2.00pm	Clean Foundation - Keep it Clean, Water Pollution, the often invisible trickster	Creative Lab, 2nd floor
12.30 - 1.00pm	Anika Riopel (2) Sharks and Rays - Teaching ecosystems through play	Lindsay Children's Room, 2nd floor
1.30 - 2.00pm	Canadian Sea Turtle Network Presentation	Room 301, 3rd floor

Conference Committees

Overarching Organizing Committee

Meghan Borland (Chair)
Monica Reed (Chair)
Laurie Starr (Chair)
Liz Wilson* (Conference Coordinator)
Jordan Gardiner (Outreach Head/Summer Chair)
Catherine Schram (Submissions Head)
Emiley MacKinnon (Events Head)

Outreach Committee

Krista Bouwman (Website)
Lauren Dehens (Bake sales)
Kayla Glynn (Social media)

Fundraising Committee

Travis Aten
Kendra Moore
Peter Wessels

Submissions Committee

Augusta Lipscombe (Calendar)
Alba Garcia Rodriguez (Video)
Laura Miller

Events Committee

Teresa MacDonald
Jenny Weitzman (Catering)

*Interdisciplinary PhD Program, Faculty of Graduate Studies, Dalhousie University

Judges

Oral Presentations

Ramón Filgueira
Marine Affairs Program
Dalhousie University

Shannon Harding
Sustainability Education
Department, Clean Foundation

Christophe Herbinger
Department of Biology
Dalhousie University

Sarah Saunders
Marine Protection and
Renewables - Oceans
WWF-Canada

Danielle Goodreau
Bsc. Marine Biology,
MAP Candidate

Poster Presentations

Jenny Baechler
Faculty of Management
Dalhousie University

Suzuette S. Soomai
Faculty of Management
Dalhousie University

Amanda Goncalves
MSc. Biology,
MAP Candidate

Photography Competition

Johanna Heldebro
Photographer
NSCAD

Damian Lidgard
Photographer
Department of Biology
Dalhousie University

Becky Field
Marine Affairs Program

Keynote Speaker

Brian Skerry

National Geographic

Biography

Brian Skerry is a photojournalist specializing in marine wildlife and underwater environments. Since 1998 he has been a contract photographer for National Geographic Magazine covering a wide range of subjects and stories. In 2014 he was named a National Geographic Photography Fellow. For NGM, Brian has produced a wide range of stories on subjects such as the planet's last remaining pristine coral reefs, the plight of the right whale, dolphin cognition, the global fish crisis, sharks, marine reserves, sea turtles and squid. Brian has also worked on assignment for or had images featured in magazines such as Sports Illustrated, US News and World Report, BBC Wildlife, GEO, Smithsonian, Esquire, Audubon, and Men's Journal. His monograph, *Ocean Soul*, has received worldwide acclaim.

An inspiring public speaker, Brian has presented at venues such as The World Economic Forum in Davos, Switzerland; TED Talks; The National Press Club in Washington, DC; The Royal Geographical Society; in London and the Sydney Opera House in Australia. Brian is a ten-time award winner in the *Wildlife Photographer of the Year Competition* and has received multiple awards in competitions such as POYi, Nature's Best, and Communication Arts. He is also the recipient of the prestigious *Peter Benchley Award for Excellence in Media*. Brian has had numerous solo photo exhibits at venues including Visa Pour l'Image in Perpignan, France; The Smithsonian National Museum of Natural History in Washington, DC; and in cities such as Geneva, Barcelona, Lisbon, and Shanghai.

About the talk:

Luminous Seas

In this presentation Brian Skerry will take the audience around the world and into the sea, sharing tales from many of his feature stories for National Geographic magazine. With Luminous Seas, Skerry will reveal rarely seen views and behaviours of marine wildlife and shed light on places never dived before. A major focus of Brian's work in recent years has been to produce stories that both celebrate the sea and raise awareness about problems. Environmental problems and solutions are illustrated and audiences are brought eye-to-eye with amazing marine animals and exotic locations from diving beneath sea ice to the world's most remote tropical coral reefs. Brian also shares tales from behind the photo, talking about how images are made and all the adventures of life in the field.

Guest Presenters

Our Brain: Ocean Education and Literacy:
Kerri McPherson

Kerri McPherson is a science and math teacher with the Halifax Regional School Board. With a background in Marine Biology, her love of the ocean and passion for education brought her to Nova Scotia where she obtained her Bachelor's of Education from Acadia University. Kerri is completing her Master's thesis from Dalhousie University on the inclusion of ocean concepts in high school science curriculum. She is currently involved with the Ocean School project, a partnership between Dalhousie University and the National Film Board, which will allow students to go on virtual ocean field trips, hopefully sparking a love for the ocean.

Our Stomach: Sustainable Seafood:
Colleen Turlo

Colleen Turlo is the Sustainable Seafood Coordinator at the Ecology Action Centre (EAC) and the SeaChoice Representative for Atlantic Canada. Her current work involves using a markets-based sustainable seafood initiative to educate Canadians, inform retailer policies, collaborate with international ENGOs, update seafood assessments, and push for fisheries policy reform. Before joining the EAC Colleen worked for Ocean Wise as the Eastern Canada Representative in Toronto, was an assistant professor at the Korea Maritime and Ocean University, and hosted a weekly marine affairs radio segment in Busan, South Korea. She also has an undergraduate degree in Aquatic Resource Management and Political Science (St. FX), and a Master's degree in Marine Management (Dalhousie).

Guest Presenters

Our Heart: Marine Conservation:
Brendal Townsend

Brendal Townsend has been an inspiration for all of those who care about the ocean. Her relentless dedication to ocean conservation is rooted in her appreciation of the fragile marine ecosystems. Her passion for conservation developed over the years as an active dive instructor in Central America, as Lab Manager for the Boris Worm Marine Conservation Biology Group, and as the Program Manager for the Transatlantic Ocean System Science and Technology program at Dalhousie University. After completing her Master of Marine Management degree with the Marine Affairs at Dalhousie in 2011, she remains active in the scientific and outreach community by instructing an undergraduate course on Sharks, Skates, and Rays in collaboration with the Ocean Tracking Network and through regular media presence on various radio and television programs across Canada.

Our Lungs: Ocean Resources
Justine McMillan

Justine McMillan is a PhD candidate in Oceanography at Dalhousie University. She has been involved in tidal energy research projects since 2007 and specializes in resource assessment and flow characterization. Her work ranges from the simulation of large-scale tidal flows to the measurement of small-scale turbulent fluctuations. Her focus is largely related to the ongoing developments in the Bay of Fundy, however, she is also well aware of international efforts to harness tidal energy. She recently spent four months working at University of Edinburgh and is an active member of the International Network on Offshore Renewable Energy.

Oral Presentations

Our Brain: Ocean Education and Literacy

Governing large marine protected areas

Lillian Mitchell*

While the governance and management requirements of smaller marine protected areas (MPAs) have been fairly well defined, what makes large marine protected areas (LMPAs) successful in terms of governance process is only just beginning to be explored. It has been argued that LMPAs have been characterized by top-down processes and that political expediency is outweighing considerations of social justice. As one of the oldest established LMPAs, the Phoenix Islands Protected Area (PIPA) has been called groundbreaking as having led the phenomenon of LMPA establishment in the Pacific. However, although inarguably a leader in LMPA conservation, delayed stakeholder engagement and lack of public consultation regarding PIPA has undermined educational opportunities. Consequently, improved conservation education is still necessary to ensure the social sustainability of PIPA.

*MA Candidate, Department of Geology, University of Guelph
lmitch07@uoguelph.ca

Education and outreach initiatives in management and control of lionfish in the Caribbean

Roxanne Graham*

As the range of the invasive lionfish *(Pterois volitans* and *P. miles)* throughout the Caribbean has grown and their abundance has increased, recognition that the lionfish poses a grave threat to the native marine ecosystems has prompted the development of lionfish management plans across the region. Eight (8) countries' response and management plans for the lionfish were evaluated using the US Environmental Protection Agency (US-EPA) Aquatic Invasive Species (AIS) Management Plan Score Sheets. The countries included Anguilla, Bahamas, Cayman Islands, Grenada, St. Eustatius, St. Lucia, St. Vincent and the US Virgin Islands. Although specific strategies differ amongst the islands depending upon needs, culture, and individual circumstances, most of the plans include three main components: education and outreach, control and monitoring protocols, and research and information management. This study highlights the education and outreach component as it plays an important role in the execution of lionfish management plans. This study discovers that not only does strong education and outreach program advances public awareness and understanding of the lionfish invasion impacts but also increases community awareness as to the value of the ocean; it also builds community support and aids development of a network of partners. However, results after using the US-EPA Score sheet indicated that most plans lack the capacity to adapt their goals and activities within their educational and awareness programs to changing conditions. It is recommended that these program modify outreach and education efforts to incorporate information about environmental changes and the effects on the lionfish and native ecosystem. This idea is another possible management response. This further engages coastal communities in the process of learning and adapting to change.

*MMM Candidate, Marine Affairs, Dalhousie University
Roxanne.Graham@dal.ca

An evaluation of the floating cage system for eastern oyster (*Crassostrea virginica*) aquaculture production in the northern Gulf of Mexico

Curtis Gamble*

Nowhere is the demand for specialty shellfish more apparent than in the growing popularity of local farm-raised oysters. Increased interest in off-bottom oyster farming along the northern Gulf of Mexico (nGOM) has provided industry leaders with significant opportunity (strong demand, stable income, longer growing season, etc.) as well as, multiple challenges (permits, start up investment, bio fouling control, etc.). With the recent advancements of cultured gulf oysters into the regional and national niche oyster market, the need for industry-based research is in high demand. This study investigates optimal production efficiency and quality control methods for oysters grown in the OysterGroTM Floating Cage System (FCS). Three factors, 1) ploidy 2) stocking densities and 3) desiccation regimes are deployed over a four-month field study (August - November 2015). The effects of these factors, and their interactions, are assessed through the response variables of survival, shell metrics, bio-fouling, mud-worm *Polydora websteri* abundance and oyster condition index. Through effective farm management techniques, this study can enable current and future oyster farmers to become increasingly competitive in the half-shell oyster market.

*University Center of the Westfjords, University of Akureyi
curtisgamble91@gmail.com

Stakeholder perceptions to aquaculture eco-certifications and ecolabels in Nova Scotia's finfish aquaculture industry

Jenny Wetizman*

Aquaculture is developing rapidly throughout the world, and now contributes nearly half of the world's production of fish. It is an important industry to feed growing populations, and can help relieve pressure on vulnerable wild fish stocks and ocean ecosystems. However, concerns related to environmental impacts, health issues and social concerns have accompanied aquaculture's rapid growth. In Nova Scotia, finfish aquaculture development is controversial and suffers a poor public image. It is thus important that aquaculture commit to developing industries that are sustainable and socially acceptable. In recent years, seafood ecolabels and eco-certifications have been increasingly used to provide market-based incentives to industries to adopt more sustainable practices. However, the ability of ecolabels to effectively communicate sustainability to the public, consumers and stakeholders is not well understood. This study seeks to identify the opinions and attitudes of stakeholders within Nova Scotia's finfish aquaculture industry towards ecolabels with the aim to determine the challenges of and opportunities for eco-certification within a controversial industry. This research was divided into two sections. To determine factors that can influence the potential uptake of eco-certifications, the first section used qualitative and mixed-qualitative survey methodologies to assess the willingness of aquaculture producers, as well as explore the attitudes and perceptions towards ecolabels by a range of stakeholders. The second section explored whether eco-certifications could address major stakeholder concerns by analytically comparing ecolabelling schemes against key issues identified through a literature and media analysis. By determining how major stakeholders in Nova Scotia's finfish industry perceive and understand ecolabels and eco-certifications, this study's results can contribute to a better understanding of how ecolabels could be used within the aquaculture industry to improve sustainability and address stakeholder concerns.

*MMM Candidate, Marine Affairs, Dalhousie University
Jenny.Weitzman@dal.ca

Queen conch *(Lobatus gigas)* in the Grenadine Islands: A preliminary assessment on its abundance and current management needs

Alba Garcia Rodriguez[1,2]; S.Jind[2]; O. Joseph[2]; & K.Williams[3]

The queen conch (*Lobatus gigas*) is a very important fisheries resource among Caribbean countries due to its cultural and economic value. But, currently queen conch has been overexploited in many areas of the Caribbean. In Union Island, St. Vincent and the Grenadines, the conch fishery has been an essential part of local livelihoods for the past century. Despite the importance of conch in the area, knowledge of the current status of the population is limited. Therefore, an abundance assessment was conducted to contribute data on conch density and distribution. In addition, the effectiveness of current conch conservation measures was assessed. Conch density was determined following the underwater survey methods of a study conducted in 2013 in the same study area. Surveys were completed within the Tobago Cays Marine Park (TCMP), as well as outside the marine protected area. Results showed higher conch abundance inside the TCMP, and a reduced ind/ha conch abundance in comparison to results from the 2013 study. Multiple factors could have influenced these findings and, therefore, further research is required to better understand the current density of this species. The results and recommendations of this study, combined with continued monitoring, could contribute to better-informed conch fishery management in St. Vincent and the Grenadines.

[1]MMM Candidate, Marine Affairs, Dalhousie University, Alba.GarciaRodriguez@dal.ca
[2]Sustainable Grenadines Inc (SusGren)
[3]Tobago Cays Marine Park

Spatial protection for Porbeagle sharks (*Lamna nasus),* in the Northwest Atlantic – the road to recovery?

Catherine Schram*

Sharks have dominated the seas as apex predators for more than 400 million years, but today they are being fished by humans at an unprecedented rate. Many of the biological characteristics of sharks, including slow growth, late age at maturity, and relatively few young, make them particularly vulnerable to overfishing. Conservation of sharks is critical, not only because they are commercially valued species that are threatened with extinction, but also because sharks are keystone species and play an important ecological role in marine ecosystems. One common mechanism being used around the world to conserve marine biodiversity is the implementation of Marine Protected Areas (MPAs).The traditional design of an MPA is limited in its capacity to protect mobile and migratory species that travel outside the boundaries of the MPA. However, the potential value that protected areas can have for pelagic conservation is becoming more widely recognized. There is currently a lack of research and understanding of the relationship between mobile species and MPA networks internationally as well as in Nova Scotia, so studying the movements and migrations of these species can allow managers to better design connected areas, ensuring that these animals are protected throughout their entire spatial and temporal range. This project examines a depleted population of endangered Porbeagle sharks, *Lamna nasus,* off the Atlantic coast of Canada and evaluates the effectiveness of incorporating sharks into the Maritimes network of MPAs to assist in the recovery of this mobile predator in the temperate Northwest Atlantic.

*MMM Candidate, Marine Affairs, Dalhousie University
Catherine.Schram@dal.ca

Small and Mighty: Why forage fisheries need better management practices to ensure sustainability for the whole ecosystem

Jordan Gardiner*

Forage fish are defined as intermediate trophic level species that are foraged upon by many top predators within their respective ecosystems. The dependence on these forage fish from top predators, makes forage fish a crucial link between the energy providing autotrophs and higher energy predators within an ecosystem. One task force group recently found that these forage fish are worth about six times more in the water acting as support for these top predators than being directly fished for. Due to the schooling nature of forage fish, they are considered to have a high catchability within fisheries making them a relatively cheap fishery to run. These forage fisheries catch fish both for direct human consumption products, as well as both bait and animal feeds. For example, many lobster fishers rely heavily on forage fish species as bait within lobster traps. A few examples of forage fish species that are used as bait include Atlantic herring (*Clupea harengus)*, mackerel (*Scomber scombrus)*, and capelin (*Mallotus villosus)* amongst others. The current management of these fish in Canada is based on single species assessments and reference points similar to other fisheries. Due to forage fish's unique interactions with both the ecosystems and other fisheries, a management plan that focuses on these interactions is crucial for the sustainability of the whole ecosystem. This project set out to assess the current management of these fish and determine if it is appropriate by using the herring stock of the Bay of Fundy and Southwest Nova Scotia (4VWX) as a case study.

*MMM Candidate, Marine Affairs, Dalhousie University
Jordan.Gardiner@dal.ca

Improving the effectiveness of marine protected areas management in Canada

Kareina D'Souza*

Canada currently has an ambitious conservation target to hit. The federal government aims to protect 5 percent of Canada's ocean by 2017, and 10 percent by 2020. Though this is an admirable target, for these areas to be effectively protected proper management and monitoring procedures must be followed. To aid international conservation efforts the IUCN created Green List of Protected Areas to act as a new global standard for protected areas . This research serves as a review of the management and monitoring frameworks of Canadian Marine Protected Areas, and assessing them against the Green List criteria to determine whether specific scientific outcomes and indicators of status demonstrate MPA management effectiveness.

*SMREM Candidate, School for Resource and Environmental Management, Dalhousie University
kareina.dsouza@dal.ca

Poster Presentations

Our Brain: Ocean Education and Literacy

A Canadian policy framework to mitigate plastic marine pollution

Shauna Pettipas*

Marine pollution from plastic debris is a global problem causing negative impacts in the marine environment. Plastic marine debris as a contaminant is increasing, especially in Canada. While the impacts of macroplastics are well known in the literature, there are relatively few policy studies related to mitigating microplastic toxicity in the environment. Despite overwhelming evidence of the threat of plastic in the marine environment, there remains inadequate or limited policies to address their mitigation, particularly microplastic debris. Existing policies for waste management, marine debris monitoring and awareness campaigns were evaluated from other jurisdictions. Policies and recommendations were developed for the Canadian context. Recommendations include improved practices for: (1) law and waste management strategies; (2) education, outreach and awareness; (3) source identification; and (4) increased monitoring and further research.

*SMREM Candidate, School for Resource and Environmental Management, Dalhousie University
shauna.pettipas@gmail.com

An initial assessment of the pathways and geographical areas of highest risk for the introduction of invasive species due to the movement of aquaculture products and gear in Atlantic Canada

Emiley MacKinnon*

Aquatic invasive species (AIS) can generate negative ecological impacts and trigger trophic cascades, disrupting normal ecosystem functions. Atlantic Canada has been particularly sensitive to aquatic invasions within the last decade, however the vectors for dispersal of these species are not well understood. The distribution and movement of aquaculture products is thought to be one of the major dispersal methods of AIS. In 2014, Nova Scotia transported over 39 million live aquatic organisms of 19 different species. Of these movements, 30% of products originated from another province and 47% of products were moved inside the province. These pathways or vectors of dispersal create areas of risk for AIS introductions. This study will aim to quantify the geographical areas and pathways of highest risk within Atlantic Canada. The study will focus on quantifying product details including species, age and quantity as well as movement factors such as shipping destination, time of year of shipments and shipping method. These variables will be determined by distributing surveys to aquaculture farms and facilities throughout Atlantic Canada. Collecting this information and identifying areas and pathways of highest risk for AIS introductions can help in creating mitigation and control plans for use by aquaculture managers. Further, this information could be used to help improve current policies for the movement of aquaculture products and antifouling practices.

*MMM Candidate, Marine Affairs, Dalhousie University
efmackinnon@dal.ca

Navigating the complex seafood certification landscape

Larissa Goshulak*

In response to widespread demands for market-based mechanisms for seafood governance, third-party seafood certifications have emerged and proliferated to an extent that is thought to confuse consumers and producers alike. This research aims to understand the strategies that lobster harvester organizations on the east coast of North America use when navigating this complex seafood certification landscape, and to assess the relationship between these strategies and complex seafood supply chains. Through semi-structured interviews with representatives of lobster harvester organizations and other industry professionals, the research explores how and why these groups engage in certification processes and respond to the pressures and conditions that shape certification and market demands for sustainable seafood. Based on preliminary research and discussions with interview participants, it seems that the role of the harvester group in selecting the most suitable certification may be constrained by the demands of the retailer and the international seafood marketplace.

*Masters of Geography Candidate, Department of Geography, University of Guelph
lgoshula@uoguelph.ca

The IUU toolbox: How breaking up the components of IUU fishing can contribute to their effective management

Laurie Starr*

Fish stocks are declining on a global scale. Part of this decline is because of illegal, unreported, and unregulated (IUU) fishing practices. Such practices are particularly prevalent in developing countries and contributes to the loss of billions of dollars every year. This is a concern as Canada imports many fish and seafood products from countries that have known IUU fishing problems. Currently there are several approaches to combating IUU fishing yet all of them identify IUU as a single problematic unit despite their three components. Developing a toolbox of approaches that indicate which aspect of IUU fishing they target can help countries more effectively manage their fish stocks. Having more fisheries that are legal, regulated, and reported (LRR) can contribute to the economy of developing countries and food security on a global scale. This study focuses on the anti-IUU approaches and techniques that are currently employed in the small-scale handline yellowfin tuna fishery in North Maluku, Indonesia.

*MMM Candidate, Marine Affairs, Dalhousie University
Laurie.Starr@dal.ca

A tale of two standards: A case study of the Fair Trade certified Maluku handline yellowfin tuna (*Thunnus albacares*) fishery

Meghan Borland*

Concern surrounding the sustainability of global fish stocks has led to the emergence of seafood certification programs and ecolabels. Seafood certification programs incentivize environmental improvement within the production sector; whereas, ecolabels seek to improve sustainability by promoting awareness and enabling consumers to identify seafood products that were responsibly caught. It is imperative to gain an understanding on how to best utilize seafood certification in developing countries in order to promote the sustainability of global fish stocks and maintain livelihoods as sixty percent of internationally traded volume of seafood products originates from developing countries. The Marine Stewardship Council (MSC) certification program is considered the largest, most recognized seafood certification program, providing ecolabels to seafood products across the globe. New to the seafood industry is Fair Trade USA's Capture Fisheries program. This program was developed to provide the benefits of Fair Trade to small-scale fishermen and their communities. Currently, three fisheries are Fair Trade USA certified however, the role of Fair Trade in relation to MSC is not yet understood. In order to the understand the role of the Fair Trade USA Capture Fisheries Program in relation to the MSC certification program, this project focused on the Fair Trade certified handline caught yellowfin tuna (*Thunnus abacares*) fishery in Maluku, Indonesia. This research is of particular interest in Indonesia, as it is a nation with a Fair Trade certified tuna fishery that is also working towards achieving wide-scale MSC certification across tuna fisheries. The results from this project provide considerations for Fair Trade and MSC as they expand within the small-scale fishery sector of developing countries.

*MMM Candidate, Marine Affairs, Dalhousie University
Meghan.Borland@dal.ca

Using Fair Trade Fisheries Programs to Decrease Vulnerability to Climate Change in Small-Scale Fishing Communities

Laura Miller*

Total global aquaculture production is now nearly equal to capture fisheries, and the sector continues to grow at a rate of 8.8% each year—faster than all other food sectors. With this expansion, significant research has been carried out that investigates the environmental impacts of production. However, the social implications of the capture fisheries-aquaculture transition remain poorly understood, especially for aquaculture workers in the global South. As the incidence of forced labour in fisheries becomes increasingly apparent, it is important that the current landscape of worker's rights in aquaculture is understood so that policy can respond accordingly as the sector is positioned to surpass capture fisheries in seafood production for an ever-expanding global population. This paper seeks to explore labour in aquaculture production in the global South and identify areas where changes in policy can help to secure positive benefits for aquaculture workers and their communities.

*MMM Candidate, Marine Affairs, Dalhousie University
LauraMiller@dal.ca

Assessing the current and future risk of ballast-sourced aquatic invasive species introduction and establishment in Canada's eastern Arctic under a climate change scenario

Augusta Lipscombe*

The use of ballast water is an important and globally accepted method for achieving vessel stability. However, ballast water poses a threat to the environments where it is discharged, as it is a major vector for aquatic invasive species (AIS) introduction. In response, Canada has implemented the *Ballast Water Control and Management Regulations* which require all international vessels to perform ballast water management before discharging ballast in Canadian waters. However, no regulations apply to domestic vessels, and regional imbalances within the regulations leave areas such as the Arctic vulnerable to ballast-sourced species introductions. This is an issue, as accelerated rates of climate change in the Arctic may increase the risk of AIS introduction and establishment. Declining sea ice is expected to facilitate a growth in the volume of Arctic marine vessel traffic, which may increase the probability of AIS introduction. Furthermore, warming waters and other physicochemical changes associated with climate change may make the Arctic a more suitable habitat for non-indigenous species, thus increasing the probability of the establishment of introduced species. This project will use a vector-based approach to assess the present and future risk level of ballast-sourced AIS introduction and establishment in Canada's eastern Arctic. Present risk will be calculated using current environmental and vessel traffic data, and future risk under a climate change scenario for the years 2050 and 2100 will be estimated by modeling environmental patterns, vessel trends, and evolving management regimes. This project will enable assumptions to be made regarding the most at-risk regions and the most threatening types of vessel traffic, both currently and in the future. The results in combination with a thorough policy analysis of Canada's ballast water regulations will reveal management gaps, allowing recommendations to be made on how Canada's eastern Arctic can be better protected from the threat of AIS.

*MMM Candidate, Marine Affairs, Dalhousie University
Augusta.Lipscombe@dal.ca

Evidence-based conservation: Mitigating whale watching vessel noise pollution in grey whale foraging habitats

Kendra Moore*

Anthropogenic noise is increasing within our oceans from growing human use. This rise in the ambient soundscape of the marine environment is increasing pressure on the life processes and health of marine animals. Cetaceans predominantly use sound for their life processes, and are thereby particularly susceptible to anthropogenic noise, like that from boats and other vessels. Whale watching vessels are directly exposing whales to their noise output. Literature postulates that baleen whales are less susceptible to smaller vessels, like whale watching boats, as smaller boats emit high frequency sound out of the range of baleen whale low frequency communication. This interaction is analyzed within the foraging habitat of the Eastern Pacific grey whales in Clayoquot Sound, British Columbia. An Autonomous Multichannel Acoustic Recorder was deployed at 20 meters depth from May 6, 2015 to September 15, 2015, continuously recording for 133 days during the peak of whale watching season. Recordings in the presence of grey whales, as confirmed from surface observations, were analyzed to determine vessel noise contribution to the background sound levels (BSL), and to compare grey whale vocalizations in the presence and absence of vessel noise. It was found that vessel noise dominates the peak frequency of BSL within grey whale vocalization range. This evidence of acoustic disturbance is coupled with an analysis of the current policy regime and characterization of the Tofino whale watching fleet to recommend future management and policy adoption to minimize cumulative impacts of vessel noise on grey whales. The enablers and barriers to evidence use within policy and management implementation are identified to ease amendments to the current strategies for effective whale conservation in B.C. This evidence-use approach supports strengthening acoustic protection of cetaceans, which assists in safeguarding the local tourism activities of whale watching.

*MMM Candidate, Marine Affairs, Dalhousie University
Kendra.Moore@dal.ca

An analysis of the vessels on the Scotian shelf and how they will aide in future conservation of the North Atlantic right whale

Krista Bouwman*

The North Atlantic right whale is protected under the *Species at Risk Act* and therefore its protection is of the utmost importance. In Canada, conservation efforts have caused the change in policy and regulation; a voluntary area to be avoided in Roseway Basin was implemented and the shipping lanes have been altered in Grand Manan Basin in hopes to conserve the North Atlantic right whale. Changes made have been due to known feeding grounds of the right whale. Despite the measures in place there is still non-compliance from vessels. In the past, a study was done by Reimer et al, through the Canadian Shipping Federation, in order to understand why non-compliance occurs. Fleets were questioned about their knowledge of right whale management and if they would be receptive to future conservation measures. As this survey was conducted through a single association, it only represents a sample of a larger population of vessels. In order to obtain a representative survey of the vessels on the Scotian Shelf, an analysis of these users must be conducted. This study analyses all vessels using the Scotian Shelf. The primary analysis used vessels' MMSI number, obtained from the vessels' Automatic Identification System (AIS), as their primary identifier and then calculated how many days each vessel was present on the Scotian Shelf for the year 2015. The top 20% most frequent vessels were extracted and underwent further analysis. From the second analysis, various vessel characteristics were revealed such as average speed, size of vessel and vessel type. The characteristic obtained in the second analysis helped to further predict the likelihood of the most frequent vessels colliding with whales.

*MMM Candidate, Marine, Affairs, Dalhousie University
Krista.Bouwman@dal.ca

What counts in making MPAs count? The role of legitimacy as a contributor to perceived MPA success in Canada

Lauren Dehens*

Marine protected areas (MPAs) are one of the most powerful marine management tools used worldwide for conserving species and habitats, maintaining ecosystem functioning, and ensuring sustainable use of marine resources. Despite this, many MPAs globally fail to achieve their management objectives due to a lack of "legitimacy", or acceptance, afforded by stakeholders towards an MPA. Because MPAs are highly social institutions with the potential to alter people's livelihoods, accurately understanding public opinions is a crucial component of a successful MPA. The purpose of the study was to explore factors that shape stakeholder's perceptions on MPA effectiveness, and the extent to which these factors contribute to the level of legitimacy they give to an MPA. In-person interviews were conducted with various stakeholders (i.e. fisherman, land-owners, NGOs, scientists etc.) from two case study sites, Musquash Estuary MPA in New Brunswick and Basin Head MPA in Prince Edward Island. Participants were asked their opinions on what they feel constitutes an effective MPA, as well as to assess the effectiveness of their local MPA. Participants were also asked their opinions on the importance of a series of governance-related factors, or "indicators" for MPA effectiveness. The results of this study yield an increased level of understanding about how stakeholders perceive MPA effectiveness, as well as what factors influence their decision to give an MPA legitimacy. Valuable recommendations are made on how managers can better recognize and measure legitimacy as an important element of assessing MPA effectiveness. The better managers understand stakeholder's perceptions, and vice versa, the easier it will be for them to establish legitimate, and ultimately more effective MPAs in the future for the protection of Canada's precious marine ecosystems.

*MMM Candidate, Marine Affairs, Dalhousie University
Lauren.Dehens@dal.ca

Adaptive mooring management to mitigate yachting impacts in marine protected areas in the Grenadines

Monica Reed*

Marine protected areas (MPAs) are often popular tourism destinations, and therefore, must be managed to accommodate tourism while protecting marine ecosystem health. The Tobago Cays Marine Park (TCMP), St. Vincent and the Grenadines, and the Sandy Island Oyster Bay Marine Protected Area (SIOBMPA), Grenada, are of great cultural, ecological, and economic value to the region (Baldwin et al., 2006). These MPAs are amongst the most popular yachting destinations in the Eastern Caribbean. To mitigate the impacts of yachts, notably, anchor damage, this study supported the development of adaptive mooring management plans for both MPAs. The plans are intended to guide the management of new mooring systems, and recommend approaches to mitigate the impacts of yachts mooring overnight in the MPAs. In-water assessments of the current mooring systems were conducted in each MPA. The data (location, depth, system components, condition, bottom type) was used to create mooring databases. Google Earth was used to map the current locations and identify sites for the new mooring systems. The new sites were selected based on bottom type, depth, currents, and proximity to significant features. Historical visitation data from the MPAs was analyzed to provide insight on park usage (number of yachts, people per boat, time spent in MPA, size of boats, regulatory violations). A review of literature and management documents allowed for the identification of mooring management best-practices, as well as the threats associated with yachts mooring within MPAs. The recommendations consider the required resources and supporting activities, as well as the timeline and potential to inform management adaptations. Recommendations include mooring system designs and locations, mooring management and maintenance activities, sewage waste mitigation measures, water quality monitoring programs and awareness-raising strategies. Implementation of the management plans will enhance the understanding of the MPAs carrying capacities, which will be crucial in achieving a level of tourism that does not compromise the areas' ecosystem health.

*MMM Candidate, Marine Affairs, Dalhousie University
Monica.Reed@dal.ca

The application of the ecosystem approach and future directions for the international management of migratory sharks in the Northwest Atlantic

Travis Aten*

Sharks have existed on Earth for millions of years. However, shark populations are in decline and show no signs of recovery. Many sharks are apex predators and therefore play crucial roles in maintaining ecosystem stability. The decline of shark populations is especially true for the large migratory sharks of the Northwest Atlantic. Anthropogenic factors such as overfishing and bycatch are the top causes pushing these shark populations into decline. Recently, sharks have gained more attention within the international realm. New frameworks are attempting to improve shark management on the high seas by incorporating the ecosystem approach. Sharks within the high seas are the responsibility of RFMOs. Two RFMOs in the Northwest Atlantic, NAFO and ICCAT are attempting to manage shark populations from an ecosystem approach; however, populations are still in decline. Therefore, this project has attempted to answer whether or not ICCAT and NAFO have been applying the ecosystem approach towards international shark management. A policy analysis was conducted of all relevant international frameworks that govern the high seas, indicators for the ecosystem approach were created to determined whether shark measures within NAFO and ICCAT follow the approach, a comparative analysis of how other RFMOs manage sharks was completed to determine if NAFO and ICCAT are on par with other RFMOs, and recommendations were provided for international shark management. Solutions to successful shark management are possible and perhaps simple in the Northwest Atlantic. The evidence suggests that NAFO and ICCAT have only partially been applying the ecosystem approach even though international frameworks have been calling and continue to call for the application of the approach. Furthermore, NAFO and ICCAT are not leaders compared to other RFMOs when it comes to international shark management. International shark management has to make great strides in the near future if shark populations are

*MMM Candidate, Marine Affairs, Dalhousie University
Travis.Aten@dal.ca

Assessing damage to the marine environment for the practical purpose of compensation

Kayla Glynn*

The objective of this study has been to evaluate how marine environmental damage caused by a ship-source oil spill is assessed intergovernmentally, internationally, and in Canada for the practical purposes of determining compensation. A comparative analysis of five case studies involving environmental damages caused by specific ship-source oil pollution incidents was performed. In order to complete the comparative analysis, the strengths, weaknesses, opportunities and threats (SWOT) method was applied to each case study, which then informed a gap analysis resulting in recommendations for improving Canada's existing regime. The results of the comparative case study analysis concluded that assessing marine environmental damage is a challenging practice and different jurisdictions have developed vastly distinct approaches. Results indicated that further scientific study, including baseline monitoring of ecosystem services and their projected monetary values, are require in order to advance the practice of assessment both internationally and domestically. Results also revealed significant gaps in Canada's current regime in terms of assessing marine ecosystem goods, services and functions in a comprehensive way that would enable appropriate compensation. The gaps identified within Canada's regime include having no assessment guideline in place for polluters and having no government agency appointed the task of performing consistent environmental damage assessment. Recommendations for addressing these gaps and strengthening Canada's regime include enforcing guidelines for assessment of environmental damage after pollution incidents and implementing mandatory cooperative assessment between the polluter and the government. Canada's existing regime for assessing damage to marine environment for the practical purpose of compensation is under-developed, and could be improved by incorporating measures that would more comprehensively assess ecosystem goods, services, and functions.

*MMM Candidate, Marine Affairs, Dalhousie University
Kayla.Glynn@dal.ca

Increasing the participation of women through the sustainable livelihoods approach

Peter Wessels*

In recent decades, there has been increased attention devoted to fisheries management and a reevaluation of the fundamental concepts that have historically driven fisheries management. This trend has been in response to increased acknowledgement that prevailing fishery management strategies have been largely unsuccessful. Unfortunately, most of this increased attention has been disproportionately focused on large-scale, industrial fisheries. Consequently, despite some estimates that up to 90% of fishers work in the small-scale sector, an understanding of the role of small-scale fisheries and their impact on the environment, poverty alleviation, food security and the like, remains unclear. Furthermore, as a result of this trend in research, applied management strategies have been overwhelmingly unsuccessful in small-scale fisheries worldwide. There are several reasons why small-scale fisheries remain so poorly understood and mismanaged. There is the perception for instance, that small-scale fisheries are obsolete and merely a stage preceding a transition to the more lucrative, commercial fishing scale, and therefore, not worth a more robust examination. The most notable cause underlying this issue however, is a lack of data pertaining to almost every aspect of small-scale fisheries. This is particularly evident when examining the role of women is small-scale fisheries, where qualitative data are limited and quantitative data are all but non-existent. Despite the absence of this vital information, policy makers continue to apply ill-conceived management strategies, and in so doing, contribute to the marginalization of women participating in small-scale fisheries. The objective of this research is to develop social indicators for social monitoring programs that will advance the understanding of the contribution of women in small-scale fisheries. This research will examine how the perceptions of women can contribute to marine policy strategies and also how policy has impacted women in these communities.

*MMM Candidate, Marine Affairs, Dalhousie University
Peter.Wessels@dal.ca

Socioeconomic impacts of ocean acidification in Atlantic Canada

Tyler Wilson*

Ocean Acidification (OA) is an aspect of climate change and is caused by the intake of atmospheric carbon dioxide by the oceans. While studies on specific effects are currently limited and long-term impacts are uncertain, it is likely that organisms that produce calcium carbonate ($CaCO_3$) hard parts – such as shellfish and corals – will be the first to feel the effects as the stability of $CaCO_3$ is directly related to pH. Coastal communities that rely on these species could therefore be economically and socially affected by changes in ocean pH. Understanding how stocks of economically important species are likely to be altered in the future can be used to predict how coastal communities' revenues might be affected, ultimately allowing for policy to be developed to adapt to, and mitigate the socioeconomic impacts of OA.

*MES Candidate, School for Resource and Environmental Studies, Dalhousie University
tjbwilson@dal.ca

Breakout Discussions

Leaders across the globe have adopted the United Nations 2030 Agenda for Sustainable Development. This agenda is comprised of 17 Sustainable Development Goals, which strive to eradicate poverty, fight inequality and injustice, and combat climate change by 2030. Sustainable Development Goal 14, "Life Below Sea" addresses the conservation and sustainable utilization marine resources. During the breakout sessions we invite you to explore the four subthemes of the Sustainable Oceans Conference and how they relate to Sustainable Development Goal 14, "conserve and sustainably use the ocean, seas, and marine resources".

By approaching this session with an open and interdisciplinary mind, together we can explore long-term sustainable solutions for achieving Sustainable Development Goal 14 at each the individual, community, national, and global level.

The Sobey Fund for Oceans (SFO)

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.

Sobey Fund for Oceans Advisory Committee

Dr. Bettina Sair
Vice President, Oceans,
WWF-Canada

Dr. Claudio Aporta
Director, Marine Affairs Program,
Dalhousie University

Dr. Jon Grant
NSERC, Cooke Industrial Research Chair in Sustainable Aquaculture,
Dalhousie University

Ms. Becky Field
Administrator, Marine Affairs Program, Dalhousie University

Dr. Lucia Fanning
Professor, Marine Affairs Program,
Dalhousie University

SFO Scholarship Recipients

Leah Beveridge: "I am very thankful to the Sobey Fund for Oceans for their support of my research on multi-stakeholder and cross-cultural governance of Arctic marine spaces. I am drawn to the Canadian Arctic because I believe it provides the unique opportunity to be proactive and to find balance between environmental protection, economic development, and human well-being."

Kelly Fretwell:"I am grateful for the support of the Sobey Fund for Oceans for facilitating my studies with the Marine Affairs Program. Through the interdisciplinary approach of the program, I aim to gain an understanding of the ways that ecosystem science informs policy in marine and coastal management. I am especially interested in examining how the study of cross-boundary linkages between marine and terrestrial systems can inform policy and management"

Laurenne Schiller:"I fell in love with the ocean for its incredible creatures. But, like many people, I have come to realize the significant impacts humans are having on fish stocks around the world. Although civil society is now taking a prominent role in promoting sustainable fisheries through private certification programs, little work has been done to understand the interplay between these initiatives and traditional public management bodies. I am incredibly grateful to the Sobey Fund for Oceans for supporting my research. on this topic."

Laura Steeves "With the support of the SFO Scholarship I hope to further my understanding of the ecology of our waters so that we may better manage the way that we harvest resources from the ocean. I believe that the MMM program, will assist me in gaining the skills required to both conduct original research, and to present the research under the broader lens of our society and economy. I am grateful to have the support of the Sobey Fund for Oceans as I pursue my research over the course of my program."

Marine Affairs Program

Vision: To be the foremost provider of interdisciplinary education for marine management professionals, thereby advancing sustainable ocean uses and healthy marine environments.

Mission: The MAP Mission, with its emphasis on education, research and service, is to create an inquiring and interdisciplinary learning environment that leads to the training of professionals who will be at the forefront of understanding, promoting and implementing sustainable and peaceful uses of the oceans.
MAP's purpose is directed towards:

EDUCATION

Develop outstanding marine management professionals, through promotion of synergies among the humanities, social sciences, natural sciences, and professions who will demonstrate broad awareness of the need for interdisciplinary knowledge and understanding, as well as the skills and tools needed to make informed decisions;

RESEARCH

Catalyze interdisciplinary marine-related research by advocating the rigorous pursuit of knowledge in a broad array of scholarly topics that are relevant to MAP students and researchers, in addition to other educational, governmental, NGO and private sector organizations;

SERVICE/OUTREACH

Share marine management expertise, and related skills, within the Dalhousie community and worldwide, through a network of faculty, graduates, associates, and institutions.

Tel. (902) 494-3555
Fax. (902) 494-1001

WWF-Canada

World Wildlife Fund Canada ("**WWF-Canada**") 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 that promotes the adoption of low-impact fisheries for community prosperity, high standard marine protection, and nature-friendly renewable energy.

Halifax Public Libraries

The Halifax Public Libraries comprises 14 branch libraries, a website, and Borrow by Mail and Home Delivery services. The Library serves a population of approximately 400,000 spread over 5,889 sq. km. Programming is an integral part of the service provided by the Halifax Public Libraries and is key to the achievement of the library's commitment of "connecting people, enriching communities, inspiring discovery" (Halifax Public Libraries, Mission Statement, 2010). The organizers for the Sustainable Oceans 2016 are very pleased to be partnering with the Halifax Central Library to host this year's conference. The Halifax Central library is a wonderful space for families, community, industry and academia to come together and explore our unique connections to the ocean. We hope this student-led conference will add a unique contribution to the libraries ongoing rich and diverse education programs.

You, Me, and the Sea:
Participating Organisations

Back to the Sea Society

The Back to the Sea Society invites you to their final Touch Tank Day of the season! 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!

Dalhousie Biology Department and the Dalhousie Aquatron Laboratory

There is more to the big blue sea than the naked eye can see! Using high quality microscopes, check out some microscopic organisms that inhabit coastal and ocean environments around the world. This activity is made possible by the Department of Biology and Aquatron Laboratory at Dalhousie University. The Department of Biology is dedicated to providing high quality biology and marine biology undergraduate and graduate programs. The Aquatron Laboratory, a world-class research facility, is one of the largest and most versatile aquatic research laboratories in Canada.

Marine Affairs Student Society, Dalhousie University

The students of the Dalhousie Marine Affairs Program have organized the 2016 Sustainable Oceans Conference. The Marine Affairs student body is comprised of a diverse group of individuals with a passion for the conservation and sustainable use of global coastal and ocean environments. Share your creativity and love for the ocean with us by enjoying ocean themed arts and crafts.

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 environmental issues and conservation. Her untitled ongoing sculpture was started in 2011 when she began crocheting rope found on various Nova Scotia shores, and the sculpture now includes rope found in British Columbia and Newfoundland as well as Nova Scotia. MacLatchy works as a kayak guide in Lower Prospect NS, and as she paddles she collects whatever garbage she encounters. Any rope found in the ocean while guiding is crocheted into the sculpture. The sculpture can change shape depending on how it is displayed, and is intended to mimic the form of coral, jellyfish, or the fluid movement of waves and swimming sea creatures. The use of reclaimed rope is partly a way of taking direct action towards addressing the excess of plastic garbage and fishing debris in the oceans that is harmful to sea life. Fishing debris such as rope and netting can entangle and kill sea animals, and this project aims to reclaim some of this dangerous debris by transforming it into a form that mimics the shape and form of that which it threatens.

The 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.

Anika Riopel - Dalhousie University

How do we engage youth in learning? How do we teach a sense of agency and optimism for the environment? This workshop will explore the use of experiential learning as a teaching method. Specifically, learning through games, play, and role-playing. How can ocean minded educators use this approach to effectively teach ocean literacy? This question drove the development of Sharks and Rays, an ocean ecosystem game. Sharks and Rays is a physically active tag-like game in which students take on the roles of rays and sharks sharing an ecosystem. Great for children and adults alike! Sharks and Rays was developed with the objective of teaching ecosystem connectivity and how different human activity can impact the balance of said ecosystems. Subtopics included predator and prey relationships, ray and shark diets, and forms of fishing. This game can be modified for younger and older youth by introducing further subtopics or complexity. Participants of this workshop will have the opportunity to become 8 year olds once more and experience firsthand the game and its learning objectives! As well, participants will be able to discuss and reflect on different teaching methods as educators.

Fisheries and Oceans Canada | Pêches et Océans Canada

Fisheries and Oceans Canada (DFO)

The Gully, a large underwater canyon on the edge of the Scotian Shelf, was designated as a Marine Protected Area (MPA) in 2004, making it Atlantic Canada's first MPA. The Gully MPA protects a one-of-a-kind canyon ecosystem that is home to a rich diversity of marine habitats and species, including cold-water corals and the endangered population of northern bottlenose whales. Since initial conservation interest in the Gully in the early 1990s, the management of this canyon ecosystem, and the supporting science activities, have evolved. Great strides have been made to understand the canyon ecosystem, to develop and report on ecosystem indicators, and to address key conservation priorities. Even after decades of research in the Gully, many mysteries remain, making it a place of great interest for continued research, monitoring, and conservation efforts. 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.

Clean Foundation

Keep it Clean – Water Pollution: The Often Invisible Trickster!

Join us and explore the ways by which we impact our watershed and the beautiful ocean surrounding Nova Scotia. Watch how we send pollutants into our watershed, see if you can spot the invisible pollution and learn how garbage disguises itself when it lands in the sea. Experience our interactive activities and leave with a better understanding of how we can help our oceans and the creatures that live in them.

Chris Harvey-Clark, Manuel Bureuil and Alexandra Vance - Dalhousie University

Sharks are critical for maintaining the health of our oceans' ecosystems -- they do so much for the world around them, but did you ever wonder what's in them? Join us for an engaging and educational look at one of our ocean's most fascinating creatures -- from the inside, out!

Acknowledgements

Our sincere thanks to the guest speakers, participants, chairs, photographers, local organizations, and volunteers who have contributed their time and talent to make this a memorable event Special thanks to our presentation, poster, and photography judges!

The Halifax Central Library deserves a huge thank-you for generously donating their space and collaborating with us to make this event so special.

We would like to thank and recognize those who made our opening program so unique and who set the tone for the rest of the event. Special thanks to our keynote speaker, Brian Skerry. Thank you to Dr. Claudio Aporta, Director of the Marine Affairs Program, for his opening remarks. Another thank you is due to Becky Field, Lucia Fanning, Bettina Saier, Jon Grant, and the rest of the SFO Committee for their guidance and support in helping us plan for this conference. We would also like to thank Mr. Robert Sobey for his remarks and presentation of the Sobeys Scholarship awards that are generously providing educational opportunities for future ocean leaders.

We are very grateful to all of our sponsors and supporters: the Sobey Fund for Oceans, the Marine Affairs Program, NEXUS Coastal Resource Management, Dalhousie Association of Graduate Studies, Marine Affairs Student Society, the Sobey Fund for Oceans Steering Committee, Cicada Design, The Oakville Dental Health Centre, the Halifax Port Authority, Patrick Bohan, Labatt Brewing Company, Terra Cotta Clothing Design, Scotiabank, Face of Grenada, and Cooke Aquaculture.

We would also like to thank Rob Gardiner and Stahl's Canada for help with the conference swag and Barbara Starr and Angela Thomas for donating the speaker's gifts. Thank you to the CRMBA for providing us with meeting spaces during the planning stages of this conference, and the Dalhousie Print Centre for printing the calendar and outreach material, and Campus Copy for printing this booklet.

Thank you to Damon Hayes Couture for designing this year's logo and the majority of our outreach material. Thanks also to Nicole LeBlanc for helping us develop our website and communications materials.

The organization and support of the sub-committees made this conference a reality. Thank-you to the entire class for all of your hard work and perseverance. Without you this event would not have been possible. In particular, we would like to acknowledge Jordan Gardiner for being our Summer chair, spearheading all of our outreach events, heading the outreach sub-committee, and for continuing to hold down the fort in Halifax. And additional thanks goes to our sub-committee heads: Emiley MacKinnon (events) and Meghan Borland for making the YMS program a reality, Roxanne Graham (fundraising) and the rest of her team for additional pre and post conference tasks, and Catherine Schram (submissions) and Monica Reed for additional help with logistics. Special shout-outs go to Lauren Dehens for organizing all of our bake sales, to Augusta Lipscombe for designing this year's calendar, to Kayla Glynn for maintaining our social media presence, to Krista Bouwman for keeping our website up to date, to Laurie Starr, Meghan Borland, Liz Wilson, and Augusta Lipscombe for putting together this abstract booklet, and to Alba Garcia Rodriguez for putting together our promotional "Into the Blue" video and designing the outreach posters for the YMS program.

In particular, we would like to acknowledge Liz Wilson, our conference coordinator. Without her organization, patience, energy, dedication, and support throughout every stage of conference planning, this event would not have been remotely what it is today.

We also extend our thanks to those from the incoming 2016-2017 Marine Affairs class for volunteering their time during this conference!

This conference reflects the dedicated teamwork of the students of the Marine Affairs Program 2015-2016, under the leadership of the conference co-chairs, Meghan Borland, Monica Reed, and Laurie Starr. We hope you enjoy yourself!

Notes

Notes

A Very Big Thank You To Our Sponsors

We would like to acknowledge the Halifax Central Library for generously hosting the conference. 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