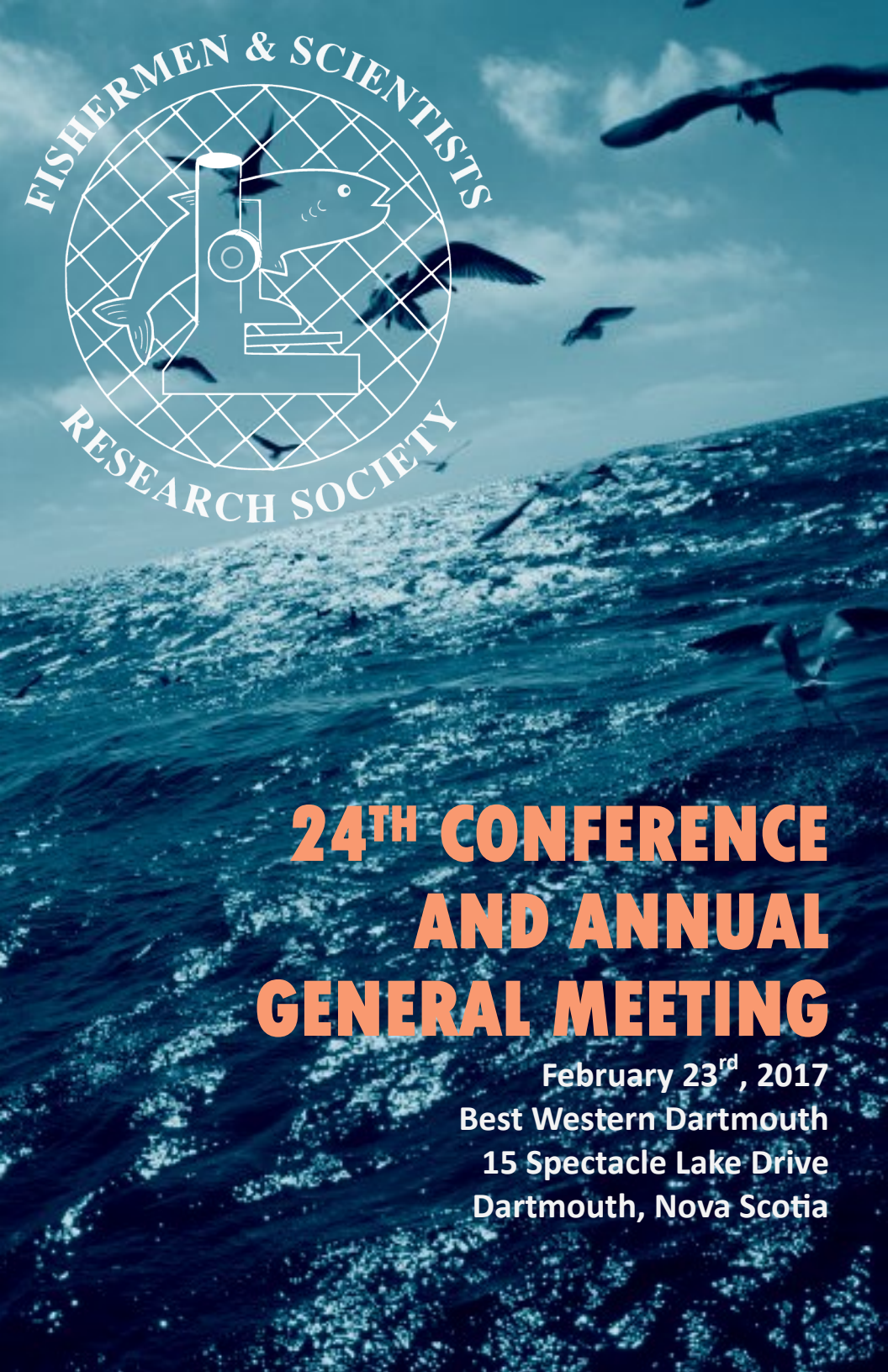

24TH CONFERENCE AND ANNUAL GENERAL MEETING

February 23rd, 2017
Best Western Dartmouth
15 Spectacle Lake Drive
Dartmouth, Nova Scotia

Welcome from the President

Hello,

I would like to thank everyone for their continued support through difficult times. We have another year under our belts. And a great team in the office who continue to bring excellence to the table. We have faced many challenges through the years but with the cooperation of the membership and core staff, we have emerged stronger than before.

In closing, I would like to personally congratulate each and every member, our staff, and our collaborators for making the FSRS the inspiration and symbol that it is to be today. Stay safe and all the best, to all.

Respectfully submitted,

Ken Snow

FSRS Board Members

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Conference Agenda

Fishermen and Scientists Research Society
24th Annual Conference

Master of Ceremonies

Magali Gregoire
Founder of the Back to the Sea Society

8:15-9:00AM	Registration Open
9:00AM	Opening & Welcome from FSRS President Ken Snow
9:15AM	**Keynote: Dr. Megan Bailey (Dalhousie)** Frontiers Were Made to be Broken: Next Generation Collaborative Research for Fishermen and Scientists
10:00AM	**Dr. Alain Barnett (UNB)** Marine Debris Mitigation and Fishermen Engagement
10:30AM	Nutrition Break (Poster Viewing)
10:45AM	**Dr. Melanie Wiber (UNB)** Fishermen/Scientist Collaboration in Risk Assessment of the Impact of Aquaculture on American Lobster
11:15AM	**Dr. Greg Puncher (UNB)** Genetic Tools and Their Use in Modern Canadian Fisheries
11:45AM	**John Paterson (NS Nature Trust)** Trialing Mitigation Devices to Reduce Seabird Bycatch in Namibia Fisheries
12:15PM-14:00PM	Lunch (Provided)

12:30pm-14:00pm	FSRS AGM (Poster Viewing)
14:00PM	FSRS Projects Update
14:45PM	**Chelsey Karbowski & Amanda Barney** Electronic Video Monitoring
15:15PM	Community Groups: **Jessica Seward & Jamie Knill**, Maritime Aboriginal Peoples Council **Danielle Pernette**, Bluenose Coastal Action Foundation **Darlene Norman-Brown**, Fundy North Fishermen's Association
16:15PM	Student Poster Session
17:15PM	Poster Awards & Closing Remarks
18:00PM-20:00PM	Evening Reception with Auction and Munchies

A special thanks to Shannon & Staff
at the Best Western Plus Dartmouth!

Conference Venue

Best Western PLUS®

Presentation Abstracts

Each presentation is 20 minutes with 10 additional minutes for discussion. Timing will be closely monitored.
(Indicates Presenting Author)*

Keynote:

Frontiers Were Made to be Broken: Next Generation Collaborative Research for Fishermen and Scientists

Dr. Megan Bailey
Dalhousie University/ Ocean Frontier Institute

9:15am-10:00am

In September of 2016, Dalhousie, Memorial, and UPEI announced the creation of the Ocean Frontier Institute (OFI), a collaborative research initiative to work through scientific discovery in an effort to meet the ecological, economic, and societal challenges of the future. While the ocean is used for many things, in Canada the fisheries sector is a key stakeholder in ocean use and in ocean governance. Increasingly, though, the fisheries sector is not just interested in being a part of the policy process, but also a part of the research process that feeds into policy. What does this mean for researchers, that is, how do academics and government scientists see the evolving collaborative relationship between the fisheries sector and the research community? Day by day the complexity of sustainably governing the ocean becomes more obvious, yet solutions to manage and respond to that complexity remain elusive. The time is now for cooperation to be prioritized, not just in how we use the oceans, but in how we study them. Who is part of that process? Who has access to the information generated through scientific inquiry? And who benefits from innovations in oceans research? In this talk, Dr. Bailey will discuss her views in promoting 'next generation' collaborative research, research that can push the frontiers of status quo science and policy processes, and the status quo of industry participation.

Using Participatory Mapping to Locate and Mitigate Marine Debris in the Bay of Fundy

***Allain Barnett (A), Melanie Wiber (A), Michael Rooney (A), Donna Curtis Maillet (B)**

(A) Anthropology, (B) Interdisciplinary Studies, University of New Brunswick

10:00am-10:30am

From nano-plastics to large sunken vessels, marine debris presents a threat to humans and ecosystems worldwide. Fishermen's knowledge of the sources of, and risks posed by medium to large debris derived from fishing, aquaculture, and other marine industries provides important context for debris mitigation. Public participation geographic information systems (PPGIS) can address these risks by integrating subjective and objective spatial data on human and environmental impacts and risks. We integrated fishermen's perceptions and experiences with marine debris with spatial data using PPGIS. We developed a georeferenced database of fishermen's experiences with marine debris, collected during focus groups and at various other meetings in Southwest New Brunswick. This layer was used to integrate baseline data with subjective perceptions of the ecological, economic, and navigational risks associated with marine debris in the Bay of Fundy,

Canada. We also documented the physical, technical, political, and regulatory challenges to marine debris mitigation. These challenges highlight the social and environmental processes that complicate any projects that attempt to develop uncontested spatial representations of marine debris. Finally, we discuss the potential of PPGIS to address these challenges by fostering communication, coordinating various marine activities, helping stakeholders set priorities for clean-up, and implementing collaborative clean-up projects.

Fishermen/Scientists Collaboration in Risk Assessment of the Impact of Aquaculture on American Lobster

***Melanie Wiber, Donna Curtis Maillet, Allain Barnett**
University of New Brunswick

10:45am-11:15am

Joint Production of Knowledge (JPK), where scientific and experience based knowledge come together, has gained popularity in resource management and risk assessment in recent years. But lack of consensus on both when it is happening and the exact mechanisms of sharing knowledge has precluded the development of an effective implementation framework. Those seeking to include experience-based knowledge into risk assessment inevitably struggle to produce knowledge that is credible, salient and legitimate. This presentation reports on the collective efforts of fishermen and scientists to develop a research protocol to study the abundance of ovigerous female lobsters (Homarus americanus) near Atlantic salmon (Salmo salar) finfish aquaculture sites in the coastal waters of Southwest New Brunswick (SWNB), Canada. We argue that five key actions of knowledge must be negotiated between project participants, including theorizing relationships, agreeing on key concepts, specifying and interpreting required data, identifying principles and making evaluations. In the lobster/aquaculture project, we use these five actions of knowledge to explore how different knowledge sets came together to contribute to JPK, and also to identify several factors that facilitate or inhibit the joint production of knowledge.

Genetic Tools and Their Use in Modern Canadian Fisheries

Dr. Gregory Neils Puncher
Department of Biological Sciences, University of New Brunswick

11:15am-11:45am

Molecular techniques are increasingly being used by fisheries scientists to reveal the mysteries of fish behavior, movements and population structure that have until now been hidden beneath the waves. Catch-and-release and tagging programs have advanced our knowledge of the movements of particular species; however, genetic tools can reveal many more details critical for responsible management of fish stocks. At the Canadian Rivers Institute Centre for Aquatic Genomics (CRI Genomics) in New Brunswick, researchers are analyzing DNA extracted from various commercially important marine and freshwater species (Atlantic cod, Atlantic bluefin tuna, American eel, striped bass), with state-of-the-art equipment to employ a suite of investigative tools ranging from DNA barcoding to high resolution genotyping with Next Generation Sequencing. We are providing fishery stakeholders with information concerning the spatial dynamics of populations, the recovery status of over-exploited stocks and hybridization of sub-

groups. By analyzing historical samples we also plan to reveal the evolution of species (size, growth rate, fecundity, protein synthesis) in response to fisheries pressure (net size, size selection, exploitation rate) and changing climatic conditions (temperature, pH, salinity). CRI Genomics provides customized genomics services for many fisheries applications throughout Atlantic Canada.

Trialing Mitigation Devices to Reduce Seabird Bycatch in Namibia Fisheries

Dr. John Paterson
Land Stewardship Coordinator, NS Nature Trust

11:45am-12:15pm

This presentation will be reviewing John's work with industrial fishermen in Namibia, while conducting accidental seabird bycatch estimates and trialling mitigation devices to reduce the bycatch levels. The fisheries involved in this project work were bottom trawl and bottom longline for Cape Hake.

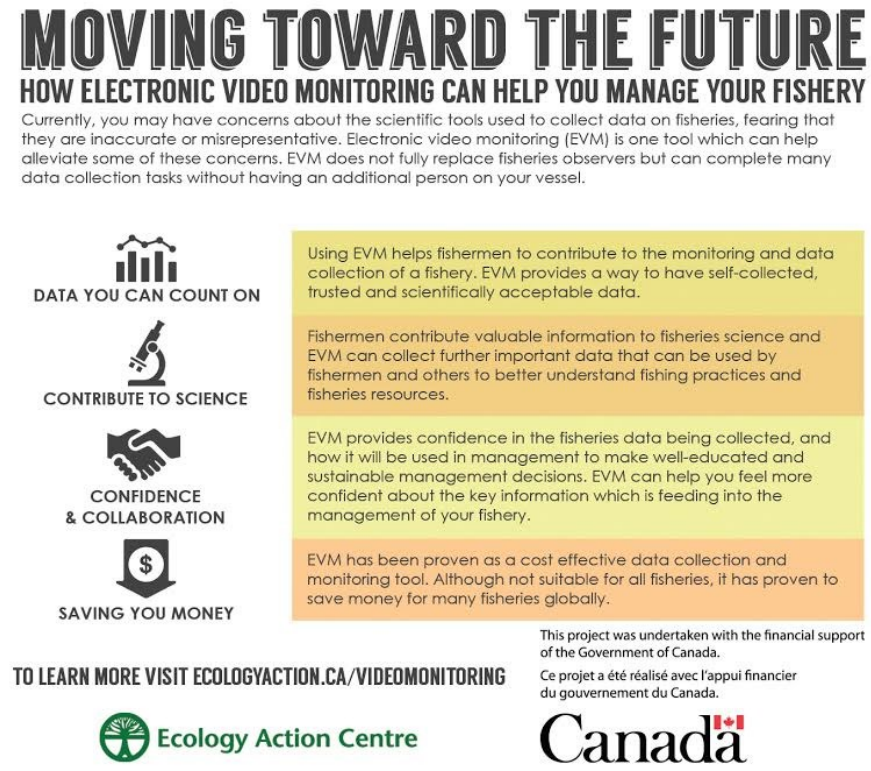
Electronic Video Monitoring

***Chelsey Karbowski (A) & Amanda Barney (B)**
(A) Ecology Action Center & (B) Nature Trust

14:45pm-15:15om

Atlantic Canadian fishermen are increasingly responsible for the data collection for at risk species or depleted species caught as part of normal fishing operations, either as target species or as bycatch. Data is often required for species listed under the *Species At Risk Act (SARA)* and those assessed by *COSEWIC* but not-listed. Increased data requirements are being driven by eco-certifications, international agreements and federal fisheries policies. Currently, fishermen and the Department of Fisheries and Oceans (DFO) rely primarily on the at-sea observer program and logbooks for this data collection, however this program has been recently assessed as insufficient, flawed and challenged to meet current monitoring and data collection needs. Electronic video monitoring (EVM) and electronic logbooks have been used as a supplement or replacement of the at-sea observer program

in numerous countries globally, collecting data on fisheries catches and interactions. In British Columbia EVM has been used as a fully implemented monitoring and data collection tool since the early 2000's. EVM relies on the use of sensors and cameras to monitor fishing activities throughout the vessel, collecting valuable data including but not limited to bycatch, discards and interactions with species at risk. EVM can be a valuable resource for fishermen by providing reliable data, increasing fishers contribution to science and building confidence in collaboration with resource management. EVM can also be a cost effective alternative, whether used in its own or in addition to observer coverage, dock side monitoring and paper logbooks.



Student Poster Abstracts

Incorporating Genomics into Fisheries Management: Whole-Genome Resequencing for the Study of Spawning Herring (Clupea harengus) Populations in the Atlantic Coast of Canada

***Angela P. Fuentes-Pardo, D.E Ruzzante**
Dalhousie University, Department of Biology

Herring is an abundant and highly migratory schooling fish of ecologic and economic importance in the North Atlantic. In Canada herring fish stocks were established in the 70's using body measurements, otolith shape, and tagging data. These methods, however, are limited in the detection of genetic population structure. Ignoring such structuring can affect long-term viability of a species by disturbing source-sink population dynamics that help them recover from fishing pressure, and can compromise their evolutionary potential by removing genetic diversity that allows them to survive in changing environmental conditions. Only one study has been conducted in herring in Canada

and found low population structure at nine neutral positions in the DNA. New sequencing technologies are providing more power to assess genetic variation and structuring in species that were thought before have no differentiation. In this study, we sequenced pools of DNA from 15 locations distributed throughout the Atlantic coast of Canada, from the south of Labrador to the Scotian Shelf. We found thousands of single base changes (SNPs) were significantly different between spring and fall spawners, being the most significant ones related with a gene involved in timing of reproduction. Further, we will evaluate if such genetic patterns are associated with oceanographic variables like temperature, primary productivity, among others. We will select the most informative genetic changes for mixed stock identification. Our results constitute an important finding for the genetic identification of herring stocks that can now be applied for stock monitoring.

An Early Assessment of Sweden's Proposal for a European Union Import Ban of Live American Lobster (*Homarus americanus*)

Candace Nickerson
Dalhousie University, School of Resource and Environmental Management

The North American lobster industry contributes to the economic, social and cultural well-being of both Canada and the United States. International trade in live product has made the industry even more valuable. A significant portion of American lobster imports are destined for European states. However, in recent history European conservationists have become concerned about findings of wild *Homarus americanus* in EU waters and the species potential to become invasive. Consequently, in 2016, Swedish scientists proposed an EU wide import ban of live *H. americanus*. This proposal prompted widespread concern from industry stakeholders, as well as responses from both North American and European scientists. However, the European Union has rejected the import ban proposal on the grounds that it did provide strong scientific evidence or clearly identify pathways of entry. This assessment examines the EU criteria for assessing non-native species and how they apply to *H. americanus*. Based on the current criteria, it seems unlikely that *H. americanus* will be considered an invasive alien species. However, it is possible that another risk assessment may be developed with stronger evidence. Furthermore, it

seems that nations could benefit from developing their capacity to manage invasive alien species, to avoid misidentification of benign alien species and to promote effective management of those that become invasive. IUCN has recently announced they intend to develop an Environmental Impact Classification for Alien Taxa, which could be used to inform any future assessments of potentially invasive species.

Innovations in Seafood Supply Chains: Consumer-facing Traceability and Community-Supported Fisheries

***Christina Callegari, Rebecca Aucoin, Megan Bailey**
Dalhousie University, Marine Affairs Program

Canadian fish harvesters and consumers are continuously faced with the complexity of global seafood supply chains. Recent studies on seafood mislabeling and fraud, and the newly uncovered issue of slave labour within the fishing industry, have led to a push for change in the way seafood supply chains operate. The seafood supply chain is constantly evolving due to increased globalization and seafood exports,

however at the same time, the escalated appeal for local catches has shifted fisher harvesters' practices. Subsequently, fish harvesters have expressed concerns over the lack of control over their catches and have begun to seek alternative marketing strategies. New innovative approaches are critical in order to mitigate risks for fish harvesters and simplify the seafood supply chain. The aim of this project is to examine the relevance of two seafood governance approaches, namely consumer facing traceability (CFT) and community supported fisheries (CSF), for the Canadian fish and seafood sector. Firstly, through collaboration with fish harvesters and stakeholders along the seafood supply chain in Atlantic Canada, this project will involve supply chain mapping to obtain an understanding of its complexity and identify areas available for improvement. Secondly, Canadian fish harvesters will be interviewed to obtain their views towards the proposed strategies. Finally, the feasibility of introducing CFT and CSF will be determined and suggestions for moving forward will be addressed. This study will provide insights into the seafood supply chain in Atlantic Canada and provide ways we can shift toward a transparent seafood industry benefiting fishermen and consumers.

Critical Assessment of the Effectiveness of MPA Networks for Endangered Pelagic Migratory Species in the North Atlantic in a Context of Climate Change

Jamie Allan
Dalhousie University, Killam Scholar

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 sea turtle, 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.

Local Ecological Knowledge of Atlantic Cod and Cusk Bycatch in Lobster Fisheries Management

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 and are currently under consideration for registry on the federal Species at Risk Act (SARA). The decline of these groundfish species is exacerbated by natural and fishing-related ecosystem changes, directed fishing, and bycatch from fisheries for other bottom-dwelling species, such as

lobster. There is a limited understanding of the extent of the bycatch threat on cod and cusk within Nova Scotia's lobster fishery due to a history of low, intermittent observer coverage and data. Current Marine Stewardship Council (MSC) certification is conditional upon the improvement of the threat of bycatch to cod and cusk. To ensure a viable future for both groundfish stocks and Canada's lobster harvesters, existing knowledge gaps which preclude stakeholders and policy-makers from informed decision-making must be filled. This project seeks to determine bottom-up approaches to mitigate cod and cusk bycatch in lobster fishing using the local ecological knowledge of lobster harvesters in Lobster Fishing Area (LFA) 34. The primary foci of the research will be determining: (1) high threat areas for groundfish bycatch based on species range and fishing locations within LFA 34; (2) potential for improvements to gear modifications or fishing practices; and (3) the barriers, advantages, and limitations of integrating experiential knowledge into fisheries management. This research will consist of interviews, mapping exercises with lobster harvesters, and a comprehensive literature review.

The Cost of Ocean Acidification in Atlantic Canada

***Tyler Wilson(1), Peter Tyedmers(1), Sarah Cooley(2), Travis Tai(3), William Cheung(3)**

(1)Dalhousie SRES; (2) Ocean Conservancy; (3) University of British Columbia (UBC) - Changing Ocean Research Unit (CORU)

Ocean acidification (OA) is an aspect of climate change driven by increasing carbon dioxide (CO2) concentrations in the atmosphere. CO2 dissolves from the atmosphere into the ocean where it reacts with water molecules to form carbonic acid (H2CO3), thereby lowering pH. The ocean naturally buffers pH changes through a reaction between carbonate ions (CO32-) and carbonic acid, forming bicarbonate (HCO3-). However, this reaction reduces the concentration of CO32-, which is a component in shells and hard parts for a variety of marine invertebrates. Scientific literature expects the biological impacts of OA to generally be negative, however experiments show a wide range of impacts between species groups. Additionally, it is difficult to determine OA's specific impacts in the broader context of climate change, where other variables (eg. temperature) change concurrently. Nonetheless, trends indicate that many species will be negatively impacted, therefore

it is likely that some commercially important species will be affected. While precise impacts are unclear, estimates of the effects on commercial harvest can be made to assist with future policy and management decisions. This project aims to investigate the potential economic impacts of OA in Atlantic Canada using future distributions of commercially relevant species as predicted by a Dynamic Bioclimate Envelope Model, run by the University of British Columbia's Changing Ocean Research Unit. Preliminary analysis of spatial patterns in the model outputs suggest that in Atlantic Canada, temperature will be a stronger driver than OA in future species distributions, and will therefore be a more relevant factor for management decision.

Community Group Abstracts

Each presentation is 12-15 minutes with 5-7 additional minutes for discussion. Timing will be closely monitored.

Projects Past, Present, and Future

Jamie Knill & Jessica Seward
Maritime Aboriginal Peoples Council

3:15– 3:35pm

The Maritime Aboriginal Peoples Council (MAPC) is a regional Aboriginal Peoples Leaders Institution, established by the Native Council of Nova Scotia, the Native Council of Prince Edward Island and the New Brunswick Aboriginal Peoples Council. MAPC represents the Traditional Ancestral Homeland Mi'Kmaq, Maliseet, and Passamaquoddy Aboriginal Peoples of Canada. Under the umbrella of MAPC, the Maritime Aboriginal Aquatic Resources Secretariate (MAARS) manages information, developments, and new opportunities related to fisheries and oceans management. IKANAWTIKET, a regional Aboriginal focused charity, promotes the protection and recovery of species at risk and respect for Mother Earth. Currently, MAPC is working with partners at DFO, Transport Canada, Confederacy of Mainland Mi'kmaq, and Unama'ki Institute of Natural Resources to develop a map of traditional coastal resource use to be used for the Government of Canada's Oil Spill

Response Planning Initiative. IKANAWTIKET is also working with partners on the recovery of the wood turtle, a species at risk. Past projects include monitoring and characterization of the Shubenacadie River, research on the Lake Utopia Rainbow Smelts Speciation, collection of Aboriginal Traditional Knowledge on species at risk, development of educational materials such as signage, brochures and booklets, critiques on government policies. Future projects include further work on the Shubenacadie River and gathering knowledge on use of traditional medicinal plants.

Bluenose Coastal Action Foundation

Danielle Pernette
Bluenose Costal Action Foundation

3:35– 3:55pm

The Bluenose Coastal Action Foundation is a non-profit organization based out of Lunenburg, NS that addresses environmental concerns in the South Shore region of Nova Scotia. Coastal Action's goal is to promote the restoration, enhancement, and conservation of our ecosystem through research, education, and action. Coastal Action is involved in many environmental projects including species at risk, invasive species, watershed-based, and environmental education projects, just to name a few!

Fundy North Fishermen's Association

Darlene Norman-Brown
Fundy North Fishermen's Association

3:55– 4:15pm

The FNFA will briefly introduce their organization and their mandate, with a focus on their Ghost Gear project and the next phase of the project - the Old Gear Disposal Project. Resources related to this project will also be presented and ways to become more informed/involved with the project.

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