

# Making Waves 2019

Graduate Project Presentations of the Master of Marine Management Class of 2019



Thursday December 5, 2019  
9:00 am to 2:00 pm  
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Friday December 6, 2019  
9:00 am to 2:30 pm

Room 1009  
Rowe Management Building  
6100 University Avenue  
Dalhousie University, Halifax, NS

## Making Waves 2019 Schedule - Thursday December 5, 2019

Name	Title
<b>9:00</b>	<b>Coffee/Tea</b>
<b>9:30</b>	Introductory Remarks – Jerry Bannister, Acting Director, Marine Affairs Program
<b>9:40</b>	Justin Trueman <a href="#"><u>Transparency and communication in Norwegian and Nova Scotian salmon aquaculture industries</u></a>
<b>10:02</b>	Paul Kraly <a href="#"><u>Media perspectives of salmon aquaculture over time in Atlantic Canada</u></a>
<b>10:22</b>	<b>BREAK</b>
<b>10:45</b>	Hali Moreland <a href="#"><u>Information source and channel preference in marine policy development: A case study on the Nova Scotian Eastern Shore Islands Area of Interest consultation process</u></a>
<b>11:07</b>	Reanne Harvey <a href="#"><u>Remotely Piloted Aircraft Systems: A tool to support coastal climate change adaptation in Nova Scotia</u></a>
<b>11:29</b>	Emily VanInderstine <a href="#"><u>Ecotourism and marine protected areas: Case Study of perceptions of tourism operators in Nova Scotia</u></a>
<b>11:50</b>	<b>LUNCH</b>
<b>12:30</b>	Priyanka Varkey <a href="#"><u>SUP Halifax: Identifying barriers to reducing single-use plastics in the Halifax Regional Municipality</u></a>
<b>12:52</b>	Nadia Dalili <a href="#"><u>The use and value of opportunistic sightings for cetacean conservation and management in Canada</u></a>
<b>1:14</b>	Samantha Renshaw <a href="#"><u>Monitoring elasmobranchs in marine protected areas: A Canadian case study of the Laurentian Channel</u></a>

Each student is allotted 20 minutes for their presentation (13 minutes for presentation, 7 minutes for questions). There is a 2 - minute break for change-over of presenter.

## Making Waves 2019 Schedule – Friday December 6, 2019

Time	Name	Title
9:30	Holly Amos	<a href="#">Exploring the alignment of human and environmental health in Canadian fish and seafood policy</a>
9:52	Sara Vanderkaden	<a href="#">Certification and traceability in the Nunavut seal market: Implications for Inuit rights</a>
10:14	Justin Schaible	<a href="#">Investigating the certifiability of Nunatsiavut’s commercial fisheries: The case of the Marine Stewardship Council</a>
10:36	<b>BREAK</b>	
11:00	Breanna Bishop	<a href="#">Respecting ontology: Documenting Inuit knowledge of coastal oceanography in Nunatsiavut</a>
11:22	Sarah Hughes	<a href="#">A multi-stakeholder assessment on shipping risk governance: A case study on the proposed ban on the use and carriage of heavy fuel oil by ships in the Arctic</a>
11:44	Elissama De Oliveira Menezes	<a href="#">“Whose voices are not in the room?” Indigenous women’s participation in the Arctic climate crisis research</a>
12:04	<b>LUNCH</b>	
12:45	Lindsay Richardson-Deranger	<a href="#">Enhancing the marine protected area (MPA) process in the British Columbia Northern Shelf Bioregion MPA network to improve Indigenous participation</a>
1:07	Cassidy Walker	<a href="#">Exploring Ecosystems in Union Island: A Case Study for Ecosystem-based Management and Sustainable Livelihoods in Ashton Lagoon</a>
1:29	Gillian Curren	<a href="#">Evaluating the integration of cumulative effects in the management of Canada’s marine conservation areas</a>
1:50	<b>WRAP UP</b>	

Each student is allotted 20 minutes for their presentation (13 minutes for presentation, 7 minutes for questions). There is a 2 - minute break for change-over of presenter.

# Making Waves 2019 Abstracts

(in alphabetical order)

## Holly Amos

Amos, H., 2019. Exploring the alignment of human and environmental health in Canadian fish and seafood policy [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

Many people around the world rely on fish and seafood as a source of protein, fatty acids and micronutrients, but nearly a third of global fish stocks are overfished, and overfishing remains a sustainability concern. Furthermore, the global population continues to increase, and human health recommendations suggest that fish and seafood consumption is important to health. With many people already relying on fisheries to provide important nutrients, and a likely increase in fish and seafood demand in the future, it is important to ask: In what ways can seafood sustainability support human health needs? Focusing on Canada, we can begin to assess how human health and environmental health recommendations for fish and seafood intake align, and where there are opportunities for alignment of these guidelines. This question is timely given that Canada recently launched an updated Food Guide and new national food policy, boasting environmental considerations. In this research project a problem-oriented approach is used to explore the alignment of four areas of interest regarding fish and seafood consumption: human health recommendations, environmental health considerations, provenance of Canada's seafood supply, and affordability of fish and seafood. Results demonstrate little alignment between all four areas of interest; however, species commonly satisfy one or two criteria. Clams are the only group of species that satisfies all criteria. Recommendations include ensuring the availability of species level information in food labelling and in fisheries management, adapting health recommendations to emerging health concerns regarding seafood, and considering the sustainability of species listed in health recommendations.

*Keywords:* seafood; sustainability; nutrition; health; public health; food security; food sovereignty; food systems; fisheries; public policy; policy

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**Holly** completed her summer internship with the Ecology Action Centre, Marine Team in Halifax, NS under the supervision of Shannon Arnold and Dr. Megan Bailey. Holly worked on various projects related to the intersection between food policy and seafood sustainability, in addition to assisting in other project work. Her internship aligned well with the background research and data required to assess the alignment of human health and environmental health policy regarding fish and seafood consumption in Canada.

# Breanna Bishop

**Breanna, B.** 2019. Respecting ontology: Documenting Inuit knowledge of coastal oceanography in Nunatsiavut [graduate project]. Halifax, NS: Dalhousie University.

## *Abstract*

Climate change is having profound effects in the Arctic environment and ocean (i.e. changing sea ice thickness and timing, increasing water temperatures, changing species distributions), effects which are increasingly impacting Arctic and sub-Arctic communities. This is evident in Nunatsiavut, where focusing on oceanographic variables may be used in support of decision making and planning for future change. The Labrador Inuit Land Claims Agreement, which led to the creation of Nunatsiavut, has provisions to include Inuit knowledge in decision making, and new waves of marine research are looking to engage it alongside western science. Currently, oceanographic data derived from Inuit knowledge in Nunatsiavut is limited. Using Inuit knowledge is challenging because methods of knowledge documentation and mobilization are largely shaped by western scientific paradigms, generating ontological tensions manifested through differences in perceptions of environment and/or knowledge communication and representation. When recording Labrador Inuit knowledge of oceanographic features, this research explores the question: what practices of documentation can be used to facilitate knowledge mobilization that respects the original ontological context? Through participatory mapping and semi-structured interviews in Rigolet and Hopedale, this question is addressed through two parallel approaches. First, through documenting Labrador Inuit knowledge of oceanographic features, this work identifies oceanographic trends and changes that Nunatsiavut communities are experiencing. Second, this research offers a case study to identify practices that marine researchers can incorporate when documenting Labrador Inuit ocean-knowledge. This work proposes a series of considerations including place names, narratives, seasonality, mobility, and relationality which can be represented in or attached to data derived from Inuit knowledge so as to respect the original ontological context.

*Keywords:* Inuit knowledge; Nunatsiavut; coastal oceanography; participatory mapping methodology; sea ice; ocean currents; Indigenous mapping; knowledge systems

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**Breanna** completed her internship at Dalhousie University, under the supervision of Eric Oliver and Claudio Aporta, who are also her graduate project supervisors. During her internship, she travelled to Rigolet and Hopedale in Nunatsiavut to facilitate participatory mapping sessions documenting Inuit knowledge of coastal oceanographic features. After returning, she digitized the resulting maps, and transcribed and analyzed participant interviews. This internship allowed Breanna to develop valuable skills in facilitating participatory mapping and working with resulting data in ArcGIS, while greatly contributing to the development of her graduate project.

## Gillian Curren

**Curren, G.** 2019. Evaluating the integration of cumulative effects in the management of Canada's marine conservation areas [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

One of the most prevalent threats to the persistence of coastal and marine ecosystems is the cumulative effects of human and natural stressors. Marine conservation areas can help mitigate and manage for cumulative effects; however, several challenges remain including inconsistent definitions and management approaches as well as a limited understanding of socio-ecological interactions. To examine how ocean managers in Canada assess and manage the impacts of cumulative effects on marine conservation areas, a study of the federal departments that administer these areas was conducted. Specifically, this research focused on the extent to which social-ecological factors are considered in assessing cumulative effects on marine conservation areas. It was found that managers appear to favor ecological indicators and considerations over socio-economic ones. Managers also indicated a need for additional data to improve their assessment and management approaches. Finally, the lack of a cumulative effects assessment framework limits managers in their ability to adequately address and manage these effects in marine conservation areas. Research suggests that understanding how stressors interact and accumulate in the environment as well as their impact on oceanic ecosystems will require the coordination and collaboration of multiple disciplines to elicit effective management responses. Maintaining the health and integrity of the world's oceans requires long-term management plans guided by well-informed decision-making. Therefore, the insights gained here into how ocean managers in Canada evaluate cumulative effects should help to increase the effectiveness of incorporating them into Canada's marine conservation area management, thereby contributing to the increased effectiveness of these zones.

*Keywords:* Cumulative effects, ocean management, marine conservation, socio-ecological systems, Canada

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**Gillian** completed her internship with Fisheries and Oceans Canada in Nanaimo, British Columbia at the Pacific Biological Station. Under the supervision of Dr. Thomas Therriault, Gillian was responsible for updating a database of non-indigenous aquatic species that have been introduced to British Columbia waters. While completing this work, she identified the date that a species was first observed or sampled, the year that it became established, and the potential vector(s) of introduction (e.g., ship fouling, ballast water, aquaculture, etc.). During her internship, Gillian also had the opportunity to participate in field work. She assisted with the assembly and deployment of settlement plates that were installed at various docks and marinas around Vancouver Island and in Vancouver's harbour to help detect and identify non-indigenous species present on the West coast of Canada. With guidance from Dr. Therriault, Gillian also developed and finalized the online survey that was used to collect data for her graduate project. Although the work Gillian completed for her internship was not directly related to her graduate project, this experience allowed her to refine her research skills, improve her networking abilities, and provided support for the completion of her research.



## Nadia Dalili

**Dalili, N.** 2019. The use and value of opportunistic sightings for cetacean conservation and management in Canada [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

Twenty-six marine mammal species are designated under the Species at Risk Act (SARA) in Canada. When species are designated under SARA, management plans, recovery strategies, and action plans are outlined to prevent wildlife species from being extirpated or becoming extinct. In these plans, monitoring and outreach are often key recovery objectives for the species. Opportunistic sightings (OS) can help support the monitoring and outreach of species at-risk and can provide an important source of information on the presence of a species when systematic surveys are impractical or costly. To better understand the use and value of OS for cetacean conservation and management, marine mammal experts in Canada were interviewed (n= 15). A thematic analysis was used to examine the qualitative data of the interviews. OS are being used in a variety of different ways, from filling in data gaps, creating species distribution maps, informing management measures and being used as education and outreach tools. The reliability of a sighting was reported as key to being able to use the data. One main limitation of OS is the potential for poor data quality. Recommendations on how to improve OS for cetacean conservation and management include improving the quality of OS data by adding pictures or video of cetaceans when reporting and using mobile applications to help record data, create a centralized database where open-source data is shared across the country, and improve education and outreach programs to increase cetacean identification training sessions for stakeholders on the water.

*Keywords:* opportunistic sightings, citizen science, cetaceans, marine mammals, whales, conservation, management, species at risk, Canada, community-based monitoring.

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**Nadia** completed her internship with WWF-Canada in Halifax, Nova Scotia. During her internship, she worked with the Oceans team under the supervision of Dr. Aurelie Cosandey-Godin, Senior Specialist in Marine Ecosystems and Sustainable Shipping. She worked as a research assistant as part of WWF-Canada's National Shipping Initiative, looking at lessons learned on mitigating ship strikes and underwater noise to at-risk whales. Nadia initiated and managed a research project and created interview questions for interviews with stakeholders involved in working groups on mitigating shipping impacts on whales. She was also part of WWF-Canada's 3-year project focusing on stewardship of the marine industry for cetacean conservation in the Northwest Atlantic through her graduate project research.

## Elissama De Oliveira Menezes

**DeOliveira, E. M.** 2019. “Whose voices are not in the room?” Indigenous women’s participation in the Arctic climate crisis research [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

The climate crisis is the new black with thousands of documents published on the topic every year with significant input from the Inuit, knowledge holders of the dynamic of the Arctic environment. This study reports on a systematic literature review that examines the participation of Inuit women from Nunavut in climate crisis research. Here, the recruitment approaches and research methodologies were explored, finding that Indigenous women's participation is different for different fields within the climate crisis research. Women were not represented in the policy field, well represented in medical-science and natural hazards, and less represented in climate and natural sciences. The findings discussed through a relational lens, places the scientists within the research process, and through examples of meaningful and diverse methodologies, methods, and frameworks to engage with communities. The study concludes with management recommendations for researchers and policymakers on how to challenge themselves, the framework and data.

*Keywords:* Indigenous women, Arctic, climate change research, research framework, Nunavut

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**Elissama** completed her internship at WWF-Canada, Arctic Shipping Division, in Ottawa, Ontario, under the guidance of Andrew Dumbille. During her tenure with WWF-Canada, she worked to gain a better understanding of how shipping discharges impact Arctic waters and communities. Working closely with the Arctic shipping team, they aimed to showcase how Exhaust Gas Cleaning System (AKA scrubbers) effluents and dumping of pollutants from vessels configure a threat to healthy oceans and coastal communities in Canada. The internship provided a platform for professional growth and development within the field of shipping and understanding of the inner working of an NGO. While with WWF-Canada, Elissama published blogs on scrubbers, dumping from vessels, and the lessons that Canada can learn from the oil spill in Brazil.



## Reanne Harvey

**Harvey, R.** 2019. Remotely Piloted Aircraft Systems: A tool to support coastal climate change adaptation in Nova Scotia [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

Remotely Piloted Aircraft Systems (RPAS), more commonly known as “drones”, are being increasingly utilized to assist with civilian tasks. The rapidly developing technology offers a host of current and potential applications at lower costs than other forms of hyperspatial data collection. This research investigates the uses of RPAS as a tool to support coastal climate change adaptation strategies in Nova Scotia. Whilst anthropogenically induced climate change is a ‘wicked’ problem on the global scale, localized impacts affect natural and social systems across the region, necessitating adaptive strategies and tools. A RPAS was used to create Digital Surface Models (DSMs) of two coastal sites in the Port Mouton region of Queens County, Nova Scotia: a working wharf and a sandy beach within a Provincial Park. The data was displayed as 2D and 3D maps and used to support interviews with a variety of stakeholders, including community members, non-governmental organisations (NGOs), academia and government. Findings suggest that compared to imagery from Google Maps™, the RPAS maps provide high-quality visualizations that can enhance public perceptions of the risks posed by climate change. This paper presents a holistic perspective of the use of RPAS imagery so that the resulting visualizations can be used not only to communicate the impacts of climate change, but also to support management decisions and adaptation measures and policies. If the technical and legal limitations associated with RPAS operations are carefully considered and incorporated into pre-flight plans, RPAS can be used for various site-specific applications, providing a tool to assist with coastal adaptation strategies.

*Keywords:* Remotely Piloted Aircraft Systems; climate change visualizations; adaptation strategies; coastal management; Nova Scotia

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**Reanne** completed her internship with Oceans North, under the guidance of Colleen Turlo, and the supervision of Dr. Claudio Aporta and Dr. Danika van Proosdij. She worked closely with the MAP Vis Lab and Maxime Lapierre, who provided technical support. During her internship, she engaged with a variety of local stakeholders in order to facilitate RPAS flights and conduct interviews. In addition, she was able to experience the inner workings of an NGO and assist with research for various projects and campaigns. Following her internship, she has had the opportunity to continue her work for Oceans North, including supporting citizen science workshops. Reanne wrote about the findings from her project in a blog post and will be presenting the RPAS maps to the local community next spring.

## Sarah Hughes

**Hughes, S.** 2019. A multi-stakeholder assessment on shipping risk governance: A case study on the proposed ban on the use and carriage of heavy fuel oil by ships in the Arctic. [Graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

Global interest in Arctic shipping is increasing as a result of melting sea ice and climate change. The potential risks of increased emissions, oil spills, and noise pollution can substantially affect coastal communities and commercial entities living and working in the Arctic. The International Maritime Organization (IMO) is the intergovernmental body that enables regulations on international shipping activities and is working on banning Heavy Fuel Oil (HFO) in the Arctic. The IMO uses the Formal Safety Assessment (FSA) as a systematic cost-benefit assessment process to evaluate the risks associated with maritime safety and marine environmental protection and the cost-effectiveness of risk control options. The aim of the study is threefold: to assess the application of guiding principles, as described by the International Organization of Standardization 31000 Guidelines, in the IMO risk management process on marine environmental protection issues; to understand the rationale behind developing the ban on HFO in regards to the FSA; and to assess how stakeholders frame the risk problem of an HFO spill in the Arctic. The research analyzes and evaluates these three components of risk management (principles, method, and pre-assessment framing) to give an assessment on how they might affect high-level risk governance of shipping issues. Results show variance in application of principles in the IMO risk management process, befuddlement about the HFO ban development and methods used, and variance in how the risk problem is framed. In order to proactively govern for emerging marine and environmental risks due to increased shipping in the Arctic, this study discusses recommendations to address the resulting issues.

*Keywords:* maritime shipping, Arctic, heavy fuel oil, IMO, Formal Safety Assessment, risk governance, risk management

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**Sarah** completed her internship with the Ocean Frontier Institute (OFI) at Dalhousie University, specifically Module N: Safe Navigation and Environmental Protection, under the supervision of Dr. Floris Goerlandt. Thanks to the Highly Qualified Personnel Training Award she received through MEOPAR, she spent a month at the International Maritime Organization (IMO) in London, UK where she attended the 74<sup>th</sup> Marine Environmental Protection Committee meeting. During her time at the IMO she spoke with delegates, IMO personnel, and analysed policy documents that pertained to her research on shipping risk governance on the proposed ban of Heavy Fuel Oil in the Arctic. Sarah has presented her research at the Module N Lunch Seminar Series, the Arctic Research Symposium at Dalhousie, and at the topical session on Arctic Shipping, IMO, and Inuit at the 2019 ArcticNet Conference. The internship and research allowed Sarah to understand the realistic achievements of an intergovernmental organization and how the decisions made at this level affect national and regional governance on shipping risk management and governance issues.

## Paul Kraly

**Kraly, P.** 2019. Media perspectives of salmon aquaculture over time in Atlantic Canada [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

In Canada, Atlantic salmon (*Salmo salar*) aquaculture has been growing rapidly and is consistently being promoted for its potential to support economic growth and employment opportunities. However, salmon aquaculture is a controversial topic in Canada, making maintaining and acquiring social license an enduring challenge. The factors that drive acceptance by neighbouring communities and wider society, however, are poorly understood and are likely highly place-specific, due to different environmental, economic and social contexts. Through a media analysis and literature review, the aim of this research was to understand the relations between how aquaculture is portrayed and the evolving environmental, socio-economic, and political dimensions of the industry. New Brunswick, Newfoundland and Nova Scotia were compared to identify any potential similarities or differences among the factors that drive social acceptance in areas that have different histories of aquaculture development. Results suggest that acceptance may be due to the age of the industry as areas with a longer history of aquaculture activity face fewer obstacles to development and encounter less negative media. Additionally, beliefs about how environmental risks are managed may result in a lack of trust in industry and government. Finally, the way neighbouring communities view the industry's potential contribution to local benefits and risks may be more of an influencing factor than the perceived or actual environmental impacts of the farm. This study concluded by providing recommendations on potential ways to increase social acceptance of the industry, such as including the community more in the decision-making process and increasing transparency of the industry.

*Keywords:* aquaculture, social acceptance, social licence, media analysis, Atlantic Canada, history, case studies

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**Paul** completed his internship at the Aquaculture Association of Nova Scotia (AANS). During his time at the AANS, he built a timeline of important historical events that have occurred thus far in the development of the aquaculture industry in Nova Scotia. He did this by drawing from online literature, both grey and primary, as well as having discussions with people who work in, or have worked in the Nova Scotia aquaculture industry in one capacity or another. The timeline is now publicly available online, through the AANS website at [www.seafarmers.ca](http://www.seafarmers.ca)

## Hali Moreland

**Moreland, H.** 2019. Information source and channel preference in marine policy development: A case study on the Nova Scotian Eastern Shore Islands Area of Interest consultation process [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

On March 22, 2018, the Department of Fisheries and Oceans Canada (DFO) announced the first large, coastal MPA in Atlantic Canada. The Eastern Shore Islands Area of Interest (ESI AOI) was targeted for marine conservation due to its vibrant marine life and thriving aquatic ecosystems. However, the Eastern Shore has tumultuous history with government agencies. Due to the complexity of the marine conservation initiative, DFO was committed to facilitating an open and transparent consultation process that prioritized stakeholder involvement, which included the creation of a 35-member Advisory Committee. The Advisory Committee was designed to provide feedback and advice throughout the consultation process.

Given the fact that the ways in which environmental information is communicated to people can change their behaviour or attitude about a particular issue, this study examined the information-related activities of stakeholders within the ESI AOI consultation process. Semi-structured interviews with Advisory Committee members and government representatives were conducted to elucidate which information sources and channels they used most frequently, who they trusted during the process, how they dealt with conflicting or misinformation, and whether their information needs were being met within this context.

Overall, results from this study show that information source and channel use is context dependent, and can be influenced by a myriad of factors, including historical circumstances, political will, and interpersonal relationships. This study recommends that a greater emphasis be placed on combatting misinformation and prioritizing space to build trust among stakeholders in current and future marine conservation policy processes and in environmental decision-making more broadly.

*Keywords:* information use, marine protected areas, marine policy, consultation, communication, source, channel, trust, misinformation, context, stakeholder engagement, advisory committee, Department of Fisheries and Oceans

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**Hali** completed her internship under the supervision of Dr. Bertrum MacDonald as a member of the Environmental Information: Use and Influence (EIUI) research program. During her time at EIUI, Hali conducted research relating to the science-policy interface, in addition to creating blog posts, managing social media use, and participating in weekly team discussions. With help from fellow EIUI members, Hali developed her methodology and organization for her graduate project, which improved immensely from their input. Hali's time at EIUI was incredibly valuable and instrumental in the successful completion of her graduate project.

# Samantha Renshaw

**Renshaw, S.** 2019. Monitoring elasmobranchs in marine protected areas: A Canadian case study of the Laurentian Channel. [graduate project]. Halifax, NS: Dalhousie University.

## *Abstract*

Scientific support for the application of Marine Protected Areas (MPAs) for shark and ray (herein elasmobranchs) conservation varies widely in current literature. Several MPAs around the globe have been created with the purpose of protecting elasmobranch species, however, their suitability and effectiveness are often questionable. Telemetry (electronic tagging) is widely used to better understand shark ecology and behaviour, yet the application of insight gained through these studies for conservation and management, particularly with respect to MPA efficacy, is inconsistent. A systematic literature review was conducted to determine how telemetry has been used to monitor and evaluate MPAs for elasmobranch species. Several aspects of telemetric MPA monitoring were investigated including the study area, duration, species, MPA restrictions and methodology. Results of the review are useful to inform the newly designated Laurentian Channel MPA (LCMPA) and its proposed conservation objectives to protect three species of elasmobranch: Porbeagle shark (*Lamna nasus*), Black Dogfish (*Centroscyllium fabricii*) and Smooth Skate (*Malacoraja senta*). Recommendations for an elasmobranch monitoring plan are discussed to inform management of the LCMPA. Carrying out these recommendations will serve to bridge the current gaps in knowledge of these species' movements and distribution and aid elasmobranch species conservation in Canada.

*Keywords: Telemetry, elasmobranch, MPAs, monitoring, evaluation, Laurentian Channel, species tracking.*

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**Sam** completed her internship with the Ocean Tracking Network (OTN) at Dalhousie University. During her internship, she researched the applications of telemetry devices for marine protected area monitoring, focusing on shark, skate and ray species, working within a world class organization for telemetry data collection and management. Sam also worked closely with OTN communications performing outreach activities and lectures aimed at showcasing OTN's work with species tracking, and ocean literacy. Her internship further provided Sam the opportunity to gain valuable field experience by joining shark tagging trips throughout the summer, where she assisted with surgical implantation of acoustic transmitters and species data collection.

# Lindsay Richardson-Deranger

**Richardson-Deranger, L.** 2019. Enhancing the marine protected area (MPA) process in the British Columbia Northern Shelf Bioregion MPA network to improve Indigenous participation. [graduate project]. Halifax, NS: Dalhousie University.

## *Abstract*

The development of marine protected areas (MPAs) in Canada is increasing in order to maintain and conserve important fish and marine mammal species and habitats. However, with protection comes certain regulations that affect the use of marine spaces. Regulations can restrict access and use of the marine environment, including certain fishing practices or the harvesting of specific species and some are designated to be no-go and no-take areas. While MPAs are important for the conservation of marine ecosystem it is important that the rights and values of Indigenous peoples are not being violated with their implementation. This study examines the British Columbia Northern Shelf Bioregion (NSB) MPA network to identify potential gaps in the current process. Interviews were conducted with First Nations staff and individuals, and federal and provincial government representatives to understand the perception of Indigenous participation in the MPA network process. Analysis of the interviews, along with evaluations of current MPA network strategies being used the NSB have identified limitations to the current process, including the difference in the level of participation between partnered Nations and non-partnered Nations. These findings have been used to inform management recommendations.

*Keywords:* Marine protected areas, marine protected area networks, British Columbia Northern Shelf Bioregion, First Nations, Indigenous participation, governance

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**Lindsay** completed her internship with the First Nations Fisheries Council (FNFC) of British Columbia, under the supervision of Deana Machin. FNFC works with and on behalf of BC First Nations to protect, reconcile and advance First Nations title and rights as they relate to fisheries and the health and protection of aquatic resources, including access for food cultural and economic purposes. During the internship she gained a better understanding of how First Nations organizations operates with Nations and federal government departments. Even though the internship did not directly relate to her graduate project, it did provide valuable networking opportunities and insight into multi-organizational relationships.



## Justin Schaible

**Schaible, J.** 2019. Investigating the certifiability of Nunatsiavut's commercial fisheries: The case of the Marine Stewardship Council [graduate project]. Halifax, NS: Dalhousie University

### *Abstract*

Marine Stewardship Council (MSC) certification uses market-based incentives to promote the development of sustainably managed fisheries and has brought benefits to fisheries worldwide. However, the MSC is criticized for not being appropriate for small-scale and data-poor fisheries. This study examined the potential for MSC certification to benefit the small-scale fisheries in Nunatsiavut, NL, by investigating the ability for the Arctic char, snow crab, and Greenland halibut fisheries to become MSC certified and the trade-offs that certification may bring. The OSMI Rapid Assessment Tool was used to evaluate each fishery against the MSC fisheries standard. The results suggest that the snow crab and Greenland halibut fisheries could likely achieve certification, though, the data-deficient Arctic char fishery would require management system improvements before becoming certified. Using a scoping literature review, the implications of MSC certification were identified and compared against the Nunatsiavut Government's governance principles to evaluate if pursuing certification would be recommended. It was determined that the resources and capacity required for certification would significantly impede these governance principles, though, they could be offset by benefits arising from potential market access and job creation, especially for Arctic char. However, these benefits would not be guaranteed. As well, the requirement of Western-style management and lack of inclusion of traditional knowledge in the MSC process may negatively impact the self-determination of Labrador Inuit. Hence, it is not recommended any species pursue MSC certification, though, conducting a pre-assessment of the Arctic char fishery may be a low commitment alternative that can still provide benefits.

*Keywords:* Nunatsiavut, Inuit co-management, small-scale fisheries management, Marine Stewardship Council, sustainable management, implications of certification, Arctic char

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**Justin** completed his internship with Fisheries and Oceans Canada (DFO) Fisheries Management Division. With DFO, Justin conducted a review of the Fixed Gear <45' groundfish community-based management system to determine how the system was operating in relation to the original policies and objectives set out over 20 years ago. This project required designing and conducting a survey with community-based management representatives in the groundfish fishery across the Maritimes region. The information collected from the interviews was used to determine the strengths and weaknesses of the management system from the perspective of the industry representatives. Although this internship was not related to his graduate project, the experience provided valuable insight into fisheries management in Canada.

## Justin Trueman

Trueman, J. (2019). Transparency and communication in Norwegian and Nova Scotian salmon aquaculture industries [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

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

*Keywords:* aquaculture; Atlantic salmon; stakeholders; transparency; communication; social licence to operate; Q methodology

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**Justin** completed his internship through the Institute of Marine Research (IMR) in Austevoll, Norway supervised by Dr. Tore Strohmeier. IMR is one of the biggest marine research institutes in Europe, taking part in research, advisory work, and monitoring. Justin worked with PhD candidate and MMM alumnus Laura Steeves on her bivalve feeding physiology research project. Although his internship was not directly related to Atlantic salmon aquaculture, the experience provided valuable insight into the related industry of bivalve aquaculture, as well as the opportunity to complete half of his own field work in Norway.

## Sara Vanderkaden

**Vanderkaden, S.** 2019. Certification and traceability in the Nunavut seal market: Implications for Inuit rights [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

As recognized in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), to which Canada is a signatory, Inuit have the right to food, culture, and economic opportunities. Seal hunting is a long-standing cultural practice for Inuit, and is therefore at the centre of these rights. However, anti-sealing campaigns targeting the commercial seal hunt in Newfoundland have resulted in international bans that have collapsed the market for sealskins and imposed hardships on communities across Inuit Nunangat. To improve market access for Inuit seal products, the Canadian Government established the Certification and Market Access Program for Seals (CMAPS), which is creating certification and tracking systems for Inuit seal products in European Union markets. In 2015, the Government of Nunavut became an Attestation Body under the EU Indigenous Communities Exemption, which enables the Government to certify Nunavut seal products for export into EU markets. As such, this research explored the suitability of certification and traceability in supporting the Nunavut seal market and Inuit rights. Through an assessment of the existing traceability system and focus group discussions (n=5) with value chain actors in Iqaluit and Qikiqtarjuaq, this research has demonstrated that while many opportunities remain in supporting the seal hunt, there are limitations when servicing a global market. Some limitations come from the influence of government, some are trade-offs in supporting the local economy, and others are in retaining Inuit values in a certification or traceability system. Collectively, these findings have revealed the need to reconcile retaining cultural value in an economy so heavily influenced by external factors.

*Keywords:* seal market, traceability, certification, Inuit rights, credence, values

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**Sara** completed her internship with Nexus Coastal Resource Management Ltd., where she worked with the Fisheries and Sealing Division of the Government of Nunavut. During her tenure in Iqaluit, she documented the existing value chain for Nunavut sealskins and assessed the traceability system in place for tracking sealskins. In addition, she conducted an open house in Pangnirtung to engage with community members on current strengths and opportunities in current seal-related government programs, as well as focus group discussions in Iqaluit and Qikiqtarjuaq to better understand shared perspectives on the role of market tools in supporting the Inuit seal hunt.

# Emily VanInderstine

**VanInderstine, E.** 2019. Ecotourism and marine protected areas: Case Study of perceptions of tourism operators in Nova Scotia [Graduate Project]. Halifax, NS: Dalhousie University.

## *Abstract*

As “Canada’s Ocean Playground” Nova Scotia relies on a healthy ocean to support its economy and citizens livelihoods. The province is seeking to significantly increase its tourism industry from \$2 billion CAD to \$4 billion CAD by 2024. An increase in tourism will result in more pressure being put on coastal and marine ecosystems. With the government of Canada recently announcing the protection of 13.8 per cent of its ocean, the creation of marine protected areas (MPAs) may provide the opportunity for growth in ecotourism. As stakeholders, the view of tourism operators regarding marine protected areas and ecotourism are important to understand because they conduct their business in coastal areas that could become MPAs in the future. A case study method was used to describe tourism businesses perceptions of ecotourism and MPAs. Perceptions were derived from interviews with five tourism operators. Each case provided unique insights to the potential opportunities and concerns of MPA designation in Nova Scotia. Although there are concerns about restricting regulations and the need for proper management and planning, ecotourism in MPAs provide a unique opportunity to advance conservation objectives and support the local economy of communities simultaneously through using MPAs as a marketing tool, increased employment, cultural exchange, and environmental education.

*Keywords:* ecotourism; marine protected area; perceptions; opportunities; concerns; Nova Scotia

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**Emily** completed her internship at WWF-Canada in Halifax, Nova Scotia where she served as a research intern under the supervision of Sarah Saunders, the specialist for Marine Protection and Renewables. During her internship she conducted literature reviews on marine protected areas and ecotourism. She also attended meetings for the ENGO working group for marine protected areas in the Gulf Region and participated in community outreach events such as the Kids Run for Nature and Great Canadian Shoreline Cleanup. Her experience was a great opportunity for learning and professional development and provided valuable insight and direction towards the completion of her graduate project.

## Priyanka Varkey

**Varkey, P.** 2019. SUP Halifax: Identifying barriers to reducing single-use plastics in the Halifax Regional Municipality [graduate project]. Halifax, NS: Dalhousie University.

### *Abstract*

Plastics are ubiquitous in the marine environment with up to 90 percent of marine debris being composed of plastic. Plastic debris poses a serious threat to the marine environment killing millions of seabirds, thousands of marine mammals and turtles, and countless fish annually. Up to half of all plastic produced is thrown away after a single use. Single-use plastics (SUPs) are persistent in the environment, breaking down into microplastics over time, and constitute most of the top items found during shoreline and community cleanups. The food service industry is a major consumer of single-use plastics (SUPs). Due to its coastal proximity, overuse and improper disposal of SUPs in the Halifax Regional Municipality (HRM) lead to many SUPs ending up in the ocean. Using a mix of quantitative and qualitative methods, this pilot project aimed to identify the main barriers to reducing SUPs in the HRM. Two sets of online surveys gauged interest in reducing SUP usage among community members and food-based businesses in the HRM. Follow up interviews with interested businesses aimed to understand concerns and challenges faced by business owners in their attempt to reduce SUPs. Results indicate overwhelming public interest in SUP reduction as well as concerns among businesses about sourcing alternatives that are appropriate for the HRM. Recommendations include increasing the accessibility of alternatives, a best practices guide for the HRM, and public education. This study can be used as a framework to adapt the Ocean Friendly Nova Scotia (OFNS) initiative for the HRM.

*Keywords:* SUPs, marine plastics, BIDs, businesses, community, HRM, barriers, interests, community, OFNS

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**Priyanka** completed her internship at World Wildlife Fund (WWF) Canada, Atlantic Region office located in Halifax, under the supervision of Sarah Saunders, Specialist, Marine Protection and Renewables – Oceans. Following a report created for WWF-Canada, strategies to reduce plastic pollution, such as bans, or voluntarily plastic reductions, have been identified, but there was a need to determine which would be best suited to local realities. Working in collaboration with Coastal Action, the Clean Foundation, and the Business Improvement Districts of the Halifax Regional Municipality, Priyanka conducted outreach and gathered information to adapt the Ocean Friendly Nova Scotia (OFNS) initiative for Halifax. This tiered recognition program, developed by Coastal Action, recognizes businesses that have or are willing to eliminate three or more single-use plastic (SUP) items from their regular use. She conducted community surveys to gauge how interested the Halifax community is in reducing its SUP use and interviews with local businesses to determine their interest in the program and to identify what supports they would need.

# Cassidy Walker

**Walker, C.** 2019. Exploring Ecosystems in Union Island: A Case Study for Ecosystem-based Management and Sustainable Livelihoods in Ashton Lagoon [graduate project]. Halifax, NS: Dalhousie University.

## *Abstract*

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

*Keywords: ecosystem-based management, ecotourism, sustainable livelihood, Marine Protected Area, sustainable development, community engagement community-based ecotourism*

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**Cassidy** completed her internship through the Queen Elizabeth Scholarship (QES) Program with Sustainable Grenadines Inc. (SusGren), located on Union Island in St. Vincent and the Grenadines. SusGren is a transboundary NGO with projects throughout St. Vincent, the Grenadine Islands, and Grenada that aim to empower communities to sustainably manage their resources. Cassidy worked on the Ashton Lagoon Restoration Project, an initiative to develop sustainable and resilient infrastructure and livelihood opportunities in an ecologically degraded lagoon. Cassidy spent the first half of her internship reviewing SusGren documents of the previous marina development project in Ashton Lagoon that left the area severely damaged and the subsequent restoration activities. The second half of her internship was spent interviewing community members, SusGren staff, government employees, and tourism operators about their thoughts on the Ashton Lagoon Restoration Project to date and where they would like to see the project go in the future.