Social Sciences and Humanities Lobster Research Pilot Project: Approaches, Methods and Findings

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Table of Contents

ABSTRACT

Parlee, C.E., Campbell-Miller, J., Cook, A., Pourfaraj, V., and Tam, J. 2023. Social sciences and humanities lobster research pilot project: approaches, methods and findings. Can. Tech. Rep. Fish. Aquat. Sci. 3531: v + 61 p.

In 2021 the Blue Economy Lobster Team (BELT) came together to work on a pilot project to integrate and assess natural and social science data in order to provide more comprehensive stock advice on the Maritimes Region Lobster fishery. The social science and humanities research of the BELT was guided by two principal questions: 1) How have commercial fishing practices, also referred to as fishing effort, changed over time, and how does it alter the perception of stock productivity? 2) What are the key social, cultural, institutional and economic objectives for the American Lobster fishery? As a pilot, the geographic scope of the research was limited to Lobster Fishing Areas 29, 30, 31a, 31b, 32, 36, 38. Through a participatory approach, the research engaged Mi'kmaq, Wolastoqey and Peskotomuhkati organizations and communities, and commercial associations. The engagements centered around co-creating social science and humanities questions that would, if used in data collection, help to characterize key objectives for the Lobster fisheries. They also helped the researchers to gauge the level of interest in a survey as a method to collect data on changes in commercial Lobster fishing practices over time, and the best way to deliver such a survey. The findings from the engagements provide insight and direction as to the approaches, methods and ethical considerations that could be applied to collect social science and humanities data to inform more comprehensive science advice on Lobster.

RÉSUMÉ

Parlee, C.E., Campbell-Miller, J., Cook, A., Pourfaraj, V., Tam, J. 2023. Social sciences and humanities lobster research pilot project: approaches, methods and findings. Can. Tech. Rep. Fish. Aquat. Sci. 3531: v + 61 p.

En 2021, l'équipe de Blue Economy Lobster s'est réunie pour travailler sur un projet pilote visant l'intégration et l'évaluation de données issues des sciences naturelles et sociales afin de fournir des avis plus complets à l'égard des stocks pour la pêche du homard dans la région des Maritimes. Les recherches en sciences sociales et humaines menées par l'équipe de Blue Economy Lobster ont été guidées par deux questions centrales : 1) Comment les pratiques de pêche commerciale, également appelées « effort de pêche », ont-elles évolué au fil du temps et comment cette évolution modifie-t-elle la perception relative à la productivité des stocks? 2) Quels sont les principaux objectifs sociaux, culturels, institutionnels et économiques de la pêche au homard? Dans le cadre de ce projet pilote, la portée géographique de la recherche a été limitée aux zones de pêche du homard 29, 30, 31a, 31b, 32, 36 et 38. En s'appuyant sur une approche participative, les chercheurs ont fait appel aux organisations et aux communautés Mi'kmaq, Wolastoqey et Peskotomuhkati, ainsi qu'à diverses associations commerciales. Les échanges ont porté sur la formulation conjointe de questions liées aux sciences sociales et humaines qui, si elles étaient utilisées pour la collecte de données, aideraient à caractériser les objectifs clés de la pêche au homard. Ils ont également aidé les chercheurs à évaluer le niveau d'intérêt que suscite une enquête en tant que méthode de collecte de données sur les changements liés aux pratiques de pêche commerciale du homard au fil du temps, ainsi que la meilleure façon de réaliser une telle enquête. Les résultats de ces travaux fournissent un aperçu et une orientation quant aux approches, méthodes et considérations éthiques qui pourraient être appliquées pour recueillir des données issues des sciences sociales et humaines afin de fournir des avis scientifiques plus complets au sujet du homard.

INTRODUCTION

Lobster is one of several marine species that Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples have had a long standing and important relationship with for thousands of years (Spanier et al 2015). It continues to have social, cultural and economic significance for these Indigenous Peoples in the Maritimes Region of Canada today (Chan et al 2017; Scott 2012). The commercial Lobster fishery is currently the most lucrative in North America with the landed value of Inshore Lobster in the Region being $648 million dollars (MRLAC 2021). The Lobster fishery is economically significant to the Maritimes Region, and it has been an active commercial fishery for over 150 years. Within the last 30 years, total landings in many areas have doubled. This dramatic increase in landings has led to higher profitability as well as greater reliance of fishing communities on the Lobster fishery (Greenan et al 2018; Cook et al 2019).

Indigenous and coastal communities in the Maritimes Region rely on the productivity of Lobster stocks in order to derive benefit from the fishery. In the Maritimes Region Inshore Lobster fishery, an Upper Stock Reference (USR) point, and a Limit Reference Point (LRP) are used to determine the status of stocks, to inform stock assessments and to develop science advice for management decisions aligned with the Precautionary Approach (PA) to fisheries Management (DFO 2009; Marentette et al 2021). The USR marks the boundary between the healthy and cautious zones. When a fish stock level falls below this point, the removal rate at which the fish are harvested must be progressively reduced in order to avoid serious harm to the stock. The USR can be determined by productivity objectives for the stock, broader biological considerations, and social and economic objectives for the fishery. The LRP delineates the boundary between the cautious and critical zones. When a fish stock level falls below this point, there is a high probability that its productivity will be so impaired that serious harm will occur. The LRP is established based on the best available scientific information (DFO 2009). For Lobster, a variety of approaches are used to define LRP and USR. The most comprehensive time series of data on the fishery comes from landings and combined catch rate data series from 1990 to 2016 which has been used to define the USR and LRP for many LFAs. This period represents both low and high productivity time periods and covers approximately 2 generations. The median of this time series was used as a proxy of biomass at maximum sustainable yield (B_{MSY}). Following the recommendations of Fisheries and Oceans Canada (DFO) (2009), the USR and LRP has been set to 80% and 40% of the B_{MSY} proxy (IFMP 2019; DFO 2022a).

While the USR allows the minister to consider social and economic objectives of the fishery, there is no standardized framework or methodology to include this information into a given decision. Right now, the PA suggests that the USR is synonymous with what could also be referred to as a Target Reference Point (TRP). However, currently the USR is calculated in the absence of data to consider social and economic objectives for the fishery. A more thoroughly defined TRP[1] that systematically considers fisheries, harvesters, and fishing communities would allow for more objective considerations of human dimensions. Specifically, a comprehensive TRP would provide insight into reference points of sustainability for the social-ecological system and the objectives and indicators required to assess those reference points.In 2020 funding was secured through the Deputy Results Reserve Fund to hire a team of natural and social scientists. In 2021 the team, subsequently named the Blue Economy Lobster Team (BELT), was brought together as a pilot project to undertake research, and to integrate and assess natural and social science data in order to provide more comprehensive science advice on the Maritimes Region Inshore jakejk /sak/homard/Lobster (*Homarus americanus*) fishery. The BELT is hired until March 2023 to complete the project. The social science and humanities research of the BELT was initially focused on trying to identify

[1] The target reference point (TRP) does not refer to quota or Total Allowable Catch.

major changes in commercial fishing practices over time. Stock assessment scientists within DFO are curious about the degree to which the efficiency of effort has resulted in higher total landings, irrespective of available biomass and productivity of the stock. However, the human dimensions have not been systematically examined and accounted for in fisheries stock assessments and management. Given this knowledge gap, the structured collection of social science and humanities data on changes in commercial fishing practices is of interest for DFO Science. This is because it could allow scientists within DFO to develop models to determine the degree to which changes in landings have been influenced by fishing behaviour, and how this alters the perception of stock productivity.

While this may provide some additional insight into the health of the Lobster stock, it does not capture a broader understanding of the social aspects that both impact and are impacted by harvester interactions with Lobster and the ecosystem in which they inhabit. Furthermore, it does not acknowledge the participation of Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples in the fishery for traditional purposes. Indigenous and Non-Indigenous fish harvesters, just like other members of society, are embedded within larger social fabrics which are informed by characteristics such as history, customs, traditions, beliefs, *de jure* and *de facto* rights and regulations, economic incentives, and environmental concerns. It is the value of the fishery as it relates to these characteristics that could translate into indicators and objectives to assess the sustainability of a social system. Finally, sections 2.5 and 6.3 of the Modernized Fisheries Act (R.S.C., 1985, c.F-14) place greater emphasis on the human dimensions of fisheries. In order to respond to these new considerations in science and decision-making processes, social science data, methods and methodologies are required.

Given these considerations there are two principal questions guiding this research:

1. How have fishing practices, also referred to as fishing effort, changed over time and how does it alter the perception of stock productivity?
2. What are the key social, cultural, institutional and economic objectives for the Lobster fishery? Here the Lobster fishery may include traditional harvests for commercial, Food, Social Ceremonial (FSC), and Moderate Livelihood purposes[2].

To address these two questions, *Figure 1* illustrates the step by step process, and actions within each of those steps that the researchers took to approach the project.

[2] For details on the all-encompassing use of the term fishery see section of this report titled "COMMON OR OVERLAPPING KEY SOCIAL SCIENCE AND HUMANITIES QUESTIONS".

Figure 1. Actions taken to address principal research questions.

SELF LOCATION OF THE RESEARCHERS

Prior to documenting the processes, procedures and results from this pilot project, we would like to follow Riddell et al (2017) and others and acknowledge that an important aspect of carrying out ethical research involving Indigenous People is the self-location of investigators within a research relationship. By self-locating, we have reflected on and recognize that this research relies on relationships, and that there are power disparities between us as researchers, and the participants[3] of this pilot project.

My name is Dr. Courtenay E. Parlee, and I am the lead Investigator of this social science and humanities research project on Lobster. I work from Nova Scotia, or Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People. I am originally from Stratford, Ontario and am of German, Slovakian and Acadian descent. I came to Nova Scotia in 2001, the province my grandfather is from, to attend University. I found my passion for research on fisheries and oceans, started a family, and I never left the Maritimes. I enjoy beach hikes, soccer, hockey, sewing, cooking, eating and spending time with my partner and young son. I have an interdisciplinary PhD (anthropology, sociology) from the University of New Brunswick with research experience in marine management and governance, qualitative methods, community engaged action research, and conflict resolution. Though my research has provided me with opportunities to engage with Indigenous and non-Indigenous communities and harvesters throughout Atlantic Canada, I am reminded each day of how much there is still to learn from others about the fisheries, and about life in general.

My name is Dr. Jill Campbell-Miller and I am the co-Investigator for this social science and humanities research project on Lobster. I also work in Nova Scotia, or Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People. I grew up in Northern Cape Breton (near Kt**ɨ**tnuk, or Cape North) and I am of Highland Scottish and Austro-German descent. My father grew up in Malikewe'jk, or Malagawatch, Cape Breton and my mother is from Saskatchewan.[4] I earned my PhD in history from the University of Waterloo, with specializations in Canadian history, history of international development, and race, colonialism, and slavery. I have developed expertise in the history of Canada's foreign policy and aid programs, economic and political history, health and humanitarianism, and natural resource history. Through this work, I developed skills in primary and secondary source research, ethics review applications, and interviews. My main focus outside of work is my family, which includes two young kids. I have learned a tremendous amount from this research about the Maritimes Region, the Lobster fishery, and I continue to learn about how to do research that stems from a place of respect and humility.

Throughout the remainder of this report, we will refer to ourselves in third person as "researchers".

[3] Participant here refers to those who we engaged with throughout the pilot project to co-develop a research plan including methods, and ethical considerations. It does not mean that they actively consented to formally participate in research involving data collection.

[4] These place names can be found on the Ta'n Weji-sqalia'tiek (Mi'kmaq Digital Place Names Atlas) website. https://mikmawplacenames.ca/.

STEP 0: PRELIMINARY WORK

Step 0 was completed throughout the two-year time frame of this project. It involved preliminary preparatory work that the researchers undertook in order to understand the context in which the pilot project could and should be developed. *Step 0* included a literature review, a review of historical context, advice from DFO's Indigenous Relations and Partnership Hub (Indigenous Hub), and the Partnership and Collaboration Hub (Research Hub), and training on the First Nations principles of ownership, control, access, and possession (OCAP) ®.

- LITERATURE REVIEW

In the social sciences, it is common to undertake a review of literature in order to contextualize the research within a larger body of work. The literature can aid the researcher in viewing, analyzing and organizing a project. The Principal Investigator and co-investigator of this project are members of the Blue Economy Lobster Team (BELT) which also comprises natural scientists in the DFO Maritimes Region. Together, the BELT is engaging both internally with DFO colleagues (Pourfaraj et al 2022ab) and externally with Rightsholders and stakeholders to develop research approaches to develop more comprehensive advice on the sustainability of the Lobster fishery in the context of a Blue Economy, and Ecosystem-Based Management (EBM). For this project, the researchers reviewed gray and scholarly literature on these topics. Gray literature included government policies, documents and speeches, in addition to reports and research that were not formally published, peer reviewed and distributed through an academic journal. Scholarly literature was drawn from academic, peer-reviewed journals.

EBM was the dominant lens through which the research was theorized, communicated and organized. EBM is broadly understood as an interdisciplinary method that balances ecological, social, cultural, economic, and governance principles at appropriate temporal and spatial scales in a distinct geographic area in order to achieve sustainable resource use (Daly et al. 2020: 1; Wilson 2006; Gavaris 2009; Stephenson 2012; Long et al. 2015). A crucial component of this method is the development of a framework, including management objectives or goals, and indicators in order to assess progress towards meeting EBM (Cobb et al. 2005). This links to another key feature of EBM, which is the ability to adapt to change through meaningful stakeholder participation so that decisions reflect societal choice, integrated management, and an interdisciplinary approach to science (Bundy et al. 2008; Leslie and Kinzig 2009; Long et al. 2015). Fisheries and Oceans Canada (DFO) has a mandate to take an ecosystem approach to fisheries and oceans management (Oceans Act 1996; Fisheries Act 1985; Rudd et al. 2019; Daly et al. 2020). DFO Maritimes is currently working towards establishing a full spectrum EAM framework, with the explicit inclusion and articulation of the human dimension to operationalize this approach. The DFO EBM Framework is being guided by a full spectrum sustainability framework developed by the Canadian Fisheries Research Network (Stephenson et al. 2018; 2019; Foley et al 2020). These initiatives reflect international interest and progress in integrated approaches to oceans management (Daly et al. 2020). With increasing awareness that human-in-nature systems are complex and unpredictable, Bundy et al. (2008) propose an "inverted pyramid" which portrays an ecosystem that is inherently unsteady with humans at the bottom. To prevent it from toppling and to enable the implementation of EBM, they suggest three supporting concepts: corporate responsibility, social justice, and ethics. These concepts are reflected in the literature on Blue Economy/ Blue Justice. EBM can offer principles to the Blue Economy as an ocean strategy for Canada to develop balanced objectives across pillars of sustainability (Pourfaraj et al 2022ab; Bundy et al 2021).

In 2019, the Minister of DFO was mandated to lead the development of a comprehensive blue economy strategy to enable Canada to grow its ocean economy in order to create jobs and opportunity for coastal communities, while advancing our conservation objectives. In 2020, the Federal Government of Canada committed to growing the blue economy both domestically and around the globe (DFO 2020a; DFO 2020c). The 2020 Speech from the Throne reiterated the importance of this initiative and its connection to reconciliation with Indigenous peoples. In 2021 DFO published an engagement paper to guide how input from the public on the BE would be received. In 2022 DFO released a document titled "Engaging on Canada's Blue Economy Strategy: What We Heard" which summarized discussions with provincial, territorial and Indigenous partners and a wide range of Canadians involved in ocean industries, environmental and social justice initiatives, academia, science, and research and development.

As a relatively new phrase being used in the global environmental governance arena, the literature on Blue Economy suggests competing expressions of the term (Silver et al 2015; also see Eikeset et al 2018). They identify the broader discourses as: a) oceans as natural capital, b) oceans as good business, c) oceans as integral to Pacific Small Island Developing States, and d) oceans as small-scale fisheries livelihoods (Silver et al 2015: 137). These discourses differ in terms of the problems identified, preferred solutions and governance actors (ibid: 150). The oceans from a small-scale fisheries livelihood perspective are arguably aligned with the social justice approach to Blue Economy. A social justice position also referred to as Blue Justice takes a critical approach to blue economy and emphasizes concerns such as human and Indigenous Rights, food security, human well-being, distribution of access and benefits, the livelihoods of small-scale fishers, social and cultural impacts, women and other marginalized groups, and governance and management structures (Bennett et al 2018; Silver et al 2015). McKinley et al (2020) suggest that Blue Economy/Blue Justice should be a research priority for marine social sciences.

- HISTORICAL CONTEXT

In addition to a literature review, this pilot project examined the historical background of the Lobster fishery. By undertaking a review of the key elements of the history of Lobster in the region, the researchers were able to prepare themselves adequately to undertake the exploratory phase. It provided the context for the complexities that the Lobster fishery faces at present and gave the researchers an awareness of how challenges in the fishery were confronted in the past. This in turn helped prepare the researchers to understand who needed to be involved in the project and for the types of issues and topics that might arise during the engagement sessions. Finally, understanding the history informed the researchers' choice of methodologies to use, in this case, a participatory approach. The following will give a very brief overview of this history to help set some of the context for this research.

Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples have fished for Lobster for thousands of years. Lobster was one marine species among many that comprised the rich aquatic diets of Indigenous peoples in Atlantic Canada since time immemorial. Mi'kmaq, Wolastoqey, and Peskotomuhkati peoples lived a migratory lifestyle that saw them living on the coast during warmer months and taking advantage of the shellfish and other marine species that populated the coast (Hoffman, 1955; Hall, 2004; Spanier et al 2015; Peskotomuhkati First Nation, 2021). The abundance of shellfish and use among the local Indigenous peoples with whom they interacted is noted among many early Europeans to visit the area (Hollingsworth 1787; Lescarbot 1907; Denys, 1908). Moreover, the Indigenous worldview of the Nations of the Wabanaki Confederacy sees all living things within a kinship relationship, including humans (for a description of the Mi'kmaw perspective on this, see Robinson 2014). The Mi'kmaw principle of *Netukulimk* guides "individual and collective beliefs and behaviours in resource protection, procurement, and management

to ensure and honour sustainability and prosperity for the ancestor, present and future generations" (Prosper 2011).

Following European contact and settlement, Indigenous Nations in the Maritimes also were among the first, if not the first, commercial Lobster fishers in the region within the context of the small, local markets that then existed (Hollingsworth 1787, 63). The consensus among scholars is that by the end of the 19th century, several major shifts took place that affected Indigenous peoples in the Maritimes Region. Wolostoqey, Mi'kmaq, and Peskotomuhkati peoples had already seen large displacements from their land in the eighteenth and early-to-mid nineteenth centuries, as European settlers searched for suitable farming and fishing opportunities (Hall 2014, 265-318; Reid 2018; Peskotomuhkati First Nation 2021).

Legal scholar Thomas Isaac and historian J.R. Miller describe how Indigenous peoples in the Maritimes made peace and friendship treaties with the British in the early 18th century that promised to respect "lands, liberties and properties...also the privilege of fishing, hunting, and fowling as formerly" (Isaac 2001, 24-27; quotation from Miller 2009, 62). As Miller points out, the British position strengthened as the French lost ground in the region, and respect for these treaties weakened. The advent of the Indian Act of 1876, now under the new Canadian state, allowed the government a large degree of control over the lives and assets of Indigenous peoples in Canada, with the ultimate goal of assimilation. Indigenous peoples were relocated to reserves, often on marginal lands, and students were placed in Residential Schools or day schools, with ensuing traumatic and multi-generational impacts (Miller 1996; Benjamin 2014; Paul, 2022). This had the overall effect of marginalizing many Indigenous peoples from what was becoming mainstream Canadian society, and distancing them from traditional foods, lifeways, and markets.

Concurrently, in the mid-19th century, the evolution of canning technologies allowed the creation of a commercial market for Lobster outside of what was fished for local consumption. As international demand for the product grew, further technological advancements such as Lobster traps (instead of older methods such as hoop fishing or spears), canning techniques, gasoline engines, and eventually, refrigeration, all made the development of a larger commercial Lobster fishery possible (Morton 2019). By the early twentieth century, Lobster made up one of the most valuable fisheries in the region, though much of this revenue ended up in the US due to the capital control of the cannery business outside the country (Morton 2019). The history of many Acadian communities has also been tightly tied to the Lobster fishery, and some communities such as Cheticamp famously resisted the tendency for capital to leave the community by participating in the Antigonish movement, which helped communities form cooperatives to resist outside corporate capture (Ross and Deveau 1992, 108-112). Though the characteristics of Lobster fishing was highly regional and localized, its fortunes were tightly tied to those of global markets.

This Lobster fishery, almost from the beginning, has been characterized by a highly regulated environment. This was due both to influence from similar regulations in the United States, and the economic importance of Lobster within Canada. Even before the Canadian government was able to effectively enforce its regulations, politicians and officials were highly invested in the conservation of the stock, as reflected by the large number of commissions and reports by the federal and provincial governments focused partially or solely on Lobster throughout the 20th century (e.g. Prince 1899; Prince 1912-13; Maclean et al 1928; Bates 1944). Not all conservation measures have been driven by DFO, however. Some fishing associations have been very active in fisheries science with the aim of improving the Lobster stock. For example, the Guysborough Inshore County Fisherman's Association has an active science program for many years (Guysborough County Inshore Fisherman's Association (2014). Lobster has historically kept small communities economically viable.

Economically based policies and programs influenced other aspects of the Lobster fishery as well. Prior to 1968, Lobster fishing was often carried out as a supplementary activity in addition to farming and other subsistence activities and as a way to participate in the cash economy. Access to fishing could be viewed as a form of income support in rural areas, and fishers even received direct relief and loans partly from the federal government during difficult times in the interwar years which reflected its economic importance within rural communities (Morton 2019; Gough 2007, 181). In 1967 and 1968 however, the federal government introduced limited-entry licensing for the provinces of the Maritimes. In 1976 Category A licenses were created for those fully dependent on the fishery, while Category B licenses were established for those not fully dependent but with a historical attachment to the lobster fishery since 1968 (DFO 2018; also see Lobster Fishery Regulations 1969; DFO 1996). As a result, the fishery moved to a specialized, professionalized fishery, particularly following the collapse of the cod fishery.

Since the Marshall and Sparrow Decisions in the 1990s, Mi'kmaq and Wolostoqey communities have increased their participation in the Lobster fishery operating under Commercial Communal, Food, Social and Ceremonial, and Moderate Livelihood fisheries. This period has also occasionally been characterized by conflict between Indigenous and non-Indigenous fishers and communities but has also helped to bring financial benefits to some Indigenous communities (Scott 2012, Coates 2019; Fanning and Denny, 2022; Williams 2022).

Today the commercial Lobster fishery is the most profitable in North America, and all Lobster Fishing Areas in the Maritimes Region are considered by DFO to be in the healthy zone (DFO 2021; DFO 2022a). The market for Lobster is driven by live Lobster exports to the United States, and China, with a smaller proportion going to Europe. There continues to be a market for processed and frozen products as well (MRLAC 2021). There are approximately 3,000 commercial Lobster licenses active during the Lobster season, and in 2019 it was estimated that the inshore Lobster fishery employed 7,983 people in the harvesting sector (IFMP 2019; MRLAC 2021). In 2016 it was estimated that Lobster was landed in over 300 communities in the Maritimes Region therefore providing a broad distribution of benefits linked to revenues and profits for license holders and wages for crew. It also has onshore benefits through the processing transportation, handling and packing, and activities such as vessel construction and maintenance, gear manufacture and maintenance, fuel and bait, transportation (IFMP 2019).

Lobster has been an important market item for at least a century. It has been woven into the economic, social, and cultural fabric of coastal communities as a source of income. As a food item, its centrality has varied for both Indigenous and non-Indigenous communities, but it has been and continues to be a source of food in the Region. It is also part of the region's cultural life. And, as a highly regulated species, how communities experience the fishery is tightly tied to the decisions of government. These factors make understanding this historical background crucial to understanding the current economic, social, cultural, governance, and ecological context of the Lobster fishery. By understanding this history, the researchers were able to have an informed conversation about the issues that arose in our engagement sessions.

- ADVICE FROM FISHERIES AND OCEANS CANADA'S "HUBS"

Given the history of the Lobster fishery, and that social science and humanities research is new to DFO, the researchers needed to understand the context in which the research could and should be undertaken within the department. Specifically, the researchers needed information on how DFO engages with Indigenous and non-Indigenous organizations, communities and associations, and how DFO approaches ethics in research involving humans. To do this, the researchers reached out to the Indigenous Hub, and the Research Hub.

The dialogue with the Indigenous Hub helped the researchers understand Indigenous Governance in the Maritimes Region. A key aspect arising from those discussions was that in order to recognize and respect the inherent and constitutional Rights of the Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples, that the researchers should engage with them first prior to reaching out to commercial fishing associations. The researchers accepted this advice and created an engagement plan accordingly.

The communication with the Research Hub was centered around how the DFO 2019 Policy on Science Integrity statement in section 7.8.1 is being operationalized:

> Scientific integrity involves the application of concepts of transparency, openness, high quality work, avoidance of conflict of interest and ensuring high standards of impartiality and research ethics. Employees involved in science or research shall conform to the standards of responsible research. Such standards include but are not limited to ensuring that: research involving humans [or animals] conforms with the Tri-council principles and procedures as specified in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans...

While DFO has this policy in place, like other departments who do not conduct social science research, it does not currently have a departmental process for research ethics. In order to comply with the DFO policy, we collaborated with the Research Hub to facilitate a courtesy ethics review for the social science and humanities research on Lobster by Health Canada and the Public Health Agency of Canada's (HC-PHAC) research ethics board. HC-PHAC's research ethics board is an independent ethics review board that helps ensure research involving human participants or communities meets the highest ethical standards. It reviews applications in accordance with considerations set forth by the Tri-Council Policy Statement on Ethical Conduct for Research Involving humans, in addition to other policies and norms. The REB then makes recommendations to the relevant department on whether the proposed research meets ethical requirements or not (Government of Canada 2023). The HC-PHAC research ethics board agreed to coordinate with Mi'kmaw Ethics Watch and other similar Indigenous led ethics review bodies to undertake ethics review if appropriate and required. In the context of this project, the HC-PHAC Research Ethics Board agreed to provide recommendations to DFO, and DFO would then issue approval for the research.

Based on the preliminary discussions with the Indigenous Hub and Research Hub, the researchers designed a table of broad topics that they wanted to ensure that they touched on with each organization, community or association (Appendix I). Additionally, a science communication tool was developed (Appendix II) to provide participants and others with a brief description of the project. The science communication tool was a two-page handout which included the title of the research project, the purpose for the research, a map of the research area, some important points highlighting the value of the fishery, steps to the research, and a coral image reflecting the four dimensions of ecosystem-based management.

- OCAP® TRAINING

To further our consideration of ethical aspects of the project, the researchers undertook training on the First Nations Principles of Ownership, Control, Access, and Possession (OCAP)® as it relates to the collection, analysis and dissemination of data. This helped us prepare for conversations and concerns that may be expressed by Indigenous research participants about the historical violations against them due to the collection and use of data imposed by outside authorities (Royal Commission on Aboriginal People 1996). Furthermore, it allows the researchers to consider how the OCAP® Principles could be respected and applied in the context of research on Lobster involving Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples.

STEP 1: ENGAGEMENT

Step 1 was completed during the two-year timeline for this project. This section outlines the research methodologies that were taken to engage with Indigenous and Non-Indigenous organizations, communities and associations. They include approaching the project as a pilot study, selecting a participatory approach to the research, and the exploratory phase which did not involve data collection, but rather it focused on co-developing a research plan to collect data should funding be extended beyond a March 2023 deadline.

- RESEARCH METHODOLOGIES
    - PILOT STUDY

Methodologically, this project was framed as a pilot (active from 2021-2023) that would seek to involve Indigenous organizations and communities, and commercial fishing associations. Pilot studies are smaller studies that can be used to assess the feasibility and design of a subsequent study that is intended to address the same research questions (TCPS 2 2018: 14). For the purposes of this pilot project, the geographic scope of this research is limited to Maritimes Region Lobster Fishing Areas 29, 30, 31a, 31b, 32, 36, 38 and it excludes LFAs 27, 28, 33, 34 and 35 due to time and funding constraints. The social science and humanities research for this project is novel to DFO Science branch. As in other countries, information about social and economic aspects of the fishery has been included in decision-making by political actors and has been used to inform short-term political choices. There has been no proactive or explicit attempt to systematically integrate social sciences and humanities with natural science and utilize such full-spectrum information for management advice or policy development. A significant challenge is that most nations have structured fisheries institutions around assessments that have elaborate technical processes and they predominantly focus on producing biological advice (e.g. the Canadian Science Advisory Secretariat (CSAS). Another impediment is that contemporary management approaches remain dominated by natural and physical sciences (Parlee et al 2021; also see Breslow et al 2016; Stephenson et al 2017; Stephenson et al 2018). As a result, the human dimensions have historically not been examined and accounted for alongside natural science in fisheries assessments and providing management advice. Therefore, this project is an opportunity to conduct a preliminary study to lay the groundwork for more large-scale and long-term research, analysis, and integration of social science data into science processes such as stock assessments.

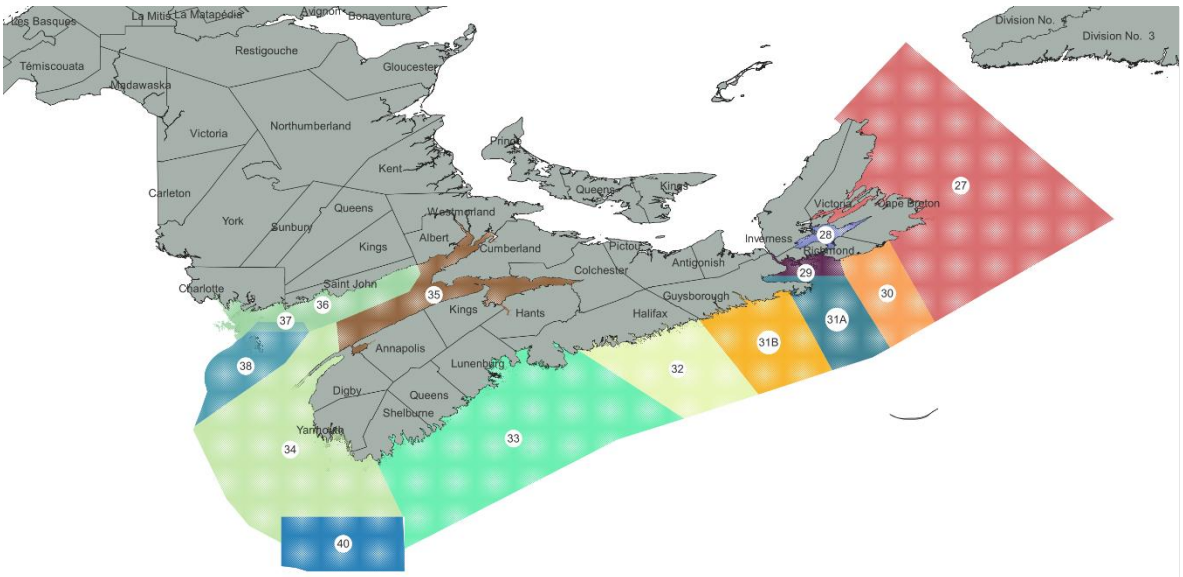

Figure 2. Lobster Fishing Areas (LFA) in the Maritimes region. Map developed by Vahab Pourfara..

This limited set of LFAs has been chosen for this project because it is manageable to undertake a study by March 2023, rather than trying to engage the entire Maritimes Region. The LFAs chosen are among the smaller ones and have a high degree of representation of Lobster fishers by fishing associations in their respective areas. This has made it easier for the researchers to conduct engagements in these areas.

This project also acknowledges that LFAs do not reflect the entire geographical range, historical significance or traditional territory accepted and practiced by Indigenous Peoples throughout the Maritimes Region.

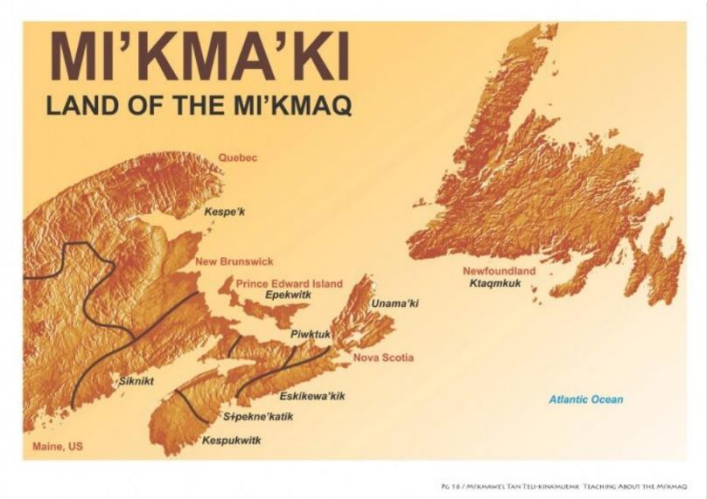

Figure 3. Map courtesy of the Mi'kmawey Debert Cultural Centre.

- PARTICIPATORY RESEARCH

This project was also approached using a Participatory Approach to research. Participatory research is an iterative process whereby researchers and participants collectively undertake inquiry and self-reflection so that they can understand and improve upon the research practices they are engaged in and help solve

problems that confront them. The researchers made the methodological decision to use participatory approach (Baum et al 2006; Chevalier & Buckles 2019; Maund et al 2021) with the rationale being that it can allow the researchers to recognize and to reflect on previous problems with research involving Indigenous Peoples on issues around sustainability. A participatory approach enabled us to approach this project with the acknowledgement of the harmful and immoral history of colonization on communities (Riddell et al 2017), perpetrated in some cases through research. This 1996 Report of Royal Commission on Aboriginal People (Vol 3., p.498) articulates some of these destructive tactics:

> Aboriginal people have not been consulted about what information should be collected, who should gather that information, who should maintain it, and who should have access to it. The information gathered may or may not have been relevant to the questions, priorities and concerns of Aboriginal peoples. Because data gathering has frequently been imposed by outside authorities, it has met with resistance in many quarters.

However, a participatory approach simultaneously also allowed the researchers to create relationships founded on open and honest communication (Riddell et al 2017). Additionally, the Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (2018), also highlights the importance of developing and maintaining respectful relationships, collaboration, engagement and co-creating between researchers and Indigenous communities and their members (Riddell et al 2017).

Finally, Singh et al (2022) discuss shortcomings in research on sustainability:

> In short, much sustainability-based research neglects the agency of people and proposes wide-ranging interventions which end up ignored...what is needed is a science that can not only assess the maintainability of resources, but also do so according to the desirability of the people affected in practice.

This critique articulated by Singh et al (2022) rationalizes the use of participatory research with non-Indigenous organizations, individuals and communities as well where sustainability is concerned. Ultimately, participatory research allows researchers and participants to consider the historical, cultural and localized context of the research, and the social relationships of those that are involved with regards to sustainability under EBM. A participatory approach is meant to be responsive in that it requires researchers to be perceptive and reactive to how participants want to engage and what they want to research. This context can then inform decisions around what type of science action should be taken, and what methodologies and analyses should be used to address the research questions.

- EXPLORATORY PHASE

To develop research relationships and to co-develop a research plan, this project included an exploratory phase involving Mi'kmaq, Wolastoqey and Peskotomuhkati organizations and communities, in addition to commercial fishing associations. The TCPS 2 (2018: 77) Article 6.11 states:

> A research Ethics Board (REB) review is not required for the initial exploratory phase, which is intended to establish research partnerships and to inform the design of a research proposal and may involve contact with individuals or communities.

Accordingly, data was not collected during the exploratory phase. Alternatively, the researchers sought information on the type of social science research questions, data collection methodologies, analytical

approaches, dissemination of information, ethical considerations, and the capacity to undertake social science and humanities research on Lobster. Based on results from the exploratory phase, the researchers are planning to collect data on changes in fishing practices in the next phase of the research. This will be further discussed in the next section on *Step 2: Data Collection*.

- CO-DEVELOP SOCIAL SCIENCE AND HUMANITIES QUESTIONS TO UNDERSTAND KEY OBJECTIVES FOR THE LOBSTER FISHERY

The exploratory phase began by first engaging with Mi'kmaq, Wolastoqey and Peskotomuhkati organizations and communities, and then commercial fishing associations to understand key objectives for the Lobster fishery through the development of social science and humanities questions. After some initial conversations the researchers realized that it was somewhat difficult for participants to articulate the types of social science and humanities questions they have about the Lobster fishery. In order to address this, the researchers developed an Ecosystem-Based Management Engagement tool (F*igure 4*). The themes in the tool are based on the four dimensions of full spectrum sustainability (see Stephenson et al 2018; Foley et al 2020).

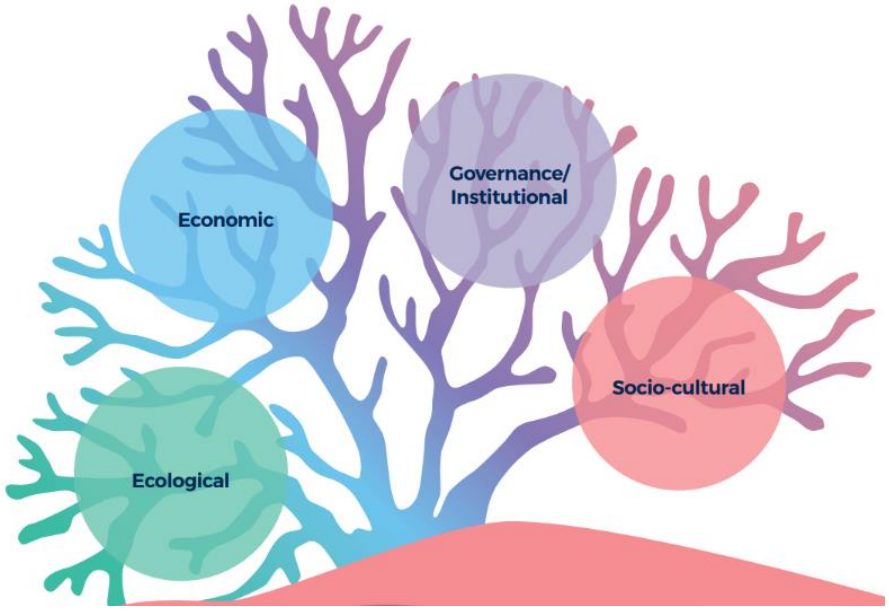

Figure 4. Ecosystem-Based Management Tool.

Engagement sessions generally followed the same format with each organization, community and association. The first meeting was devoted to general introductions and a brief description of the project which included showing the EBM tool, and a table with broad operational considerations that we wanted to discuss with each organization, community and associations (Appendix I). The first meeting also provided an opportunity for potential participants to ask questions regarding engagement in additional conversations. Subsequent conversations were driven by participants who would raise issues and topics in the Lobster fishery that were of relevance and interest to them. In these, the researchers asked prompting questions to elicit the most pressing issues related to the fishery on the minds of those with whom we engaged. Occasionally the researchers asked for elaboration or details on a topic if required. Following the engagement session, the researchers met internally to identify themes, to categorize them using the above depicted EBM tool, and then developed example social science and

humanities research questions based on the themes that emerged, and the context in which they were presented. Once the researchers established example SSH questions, they returned to the next meeting and reviewed the questions in the EBM engagement tool to ensure that they accurately reflected the needs, interests and values of those that the researchers engaged with. Throughout the engagements the researchers also took note of other topics that arose that could not be modified into an SSH question, but were relevant to the research nonetheless. We engaged with each organization, community and association between 1-5 times over the period of approximately 1 year, and each engagement session lasted approximately 1-2 hours.[5]

Identifying SSH questions was both inductive and deductive. It was inductive in that the issues and topics emerged from the bottom up, by people with knowledge of and experience in the Lobster fishery. They are developed deductively in that the issues and topics were categorized according to the four dimensions of full spectrum sustainability. It is through these procedures that social science and humanities questions were co-developed by the researchers, and those that they engaged with.

- COMMON OR OVERLAPPING KEY SOCIAL SCIENCE AND HUMANITIES QUESTIONS

The resulting SSH questions reflect key objectives for the Lobster fishery which have arisen as a result of the design, and specifically in the way that we have organized the themes using the EBM engagement tool. Common or overlapping questions are detailed in Appendix IV.

Throughout the engagements Indigenous participants suggested that the questions be designed to *not* separate out harvesting types including commercial, commercial communal, Food, Social Ceremonial and Moderate Livelihood. This suggestion was rationalized with two dominant explanations. The first was that the distinction among harvesting types is a colonial construct. The second was that methodologically, during data collection, Indigenous research participants may be reluctant to speak directly about a specific harvest type. Participants suggested that only certain, well-respected members internal to these communities would be authorized to directly ask questions about topics such as treaty fisheries, and that DFO representatives or another external researcher would not receive answers to these questions. As such, the exercise would be futile.

At the request of Indigenous participants during the engagement process, the subsequent questions refer to “fishery” which can be interpreted to include commercial, commercial communal, FSC, and Moderate Livelihood. They have also been designed to ask permission and elicit information that participants are comfortable providing.

After social science and humanities questions were co-developed with interested organizations, communities, and associations, the researchers entered the entire body of questions into an Excel spreadsheet. Each tab represented a different organization, community, association, or management body. A member of the Lobster Ecology and Assessment Team then wrote a macro to collate the questions into the four dimensions of ecosystem-based management (Ecological, Economic, Social-Cultural, and Governance). The researchers then spent time determining which questions were overlapping among various organizations, communities, and associations.

Here, “overlapping” did not necessarily mean that the original questions identified were identical among groups. Frequently, questions were not identical, but the theme and context that the question hoped to

[5] At the time of the preparation of this technical report, the researchers had not had the opportunity to finalize meetings with all groups that participated.

provoke were so close that they became part of the “overlapping” questions group. Sometimes, the questions were nearly identical, but merely had different wording (e.g. “particularly” vs. “especially.) Sometimes, questions were identical, particularly as we entered the latter stage of the co-development and began to recognize common questions and repeat them in our question-writing phase.

The researchers then undertook a “winnowing” process for conciseness. Questions were sometimes edited to improve clarity. We also occasionally combined two or more questions into a single query that addressed the meaning of the originals. Sometimes, similar questions were found across two or more dimensions. In this case, the researchers put the final version under the theme that was most relevant but identified the other dimension they appeared in to allow insight into which issues were cross-cutting across the EBM spectrum.

Through this process, the researchers found that three major themes dominated the questions:

1) The most common overlapping questions that appeared among groups were those related to safety and security, either on the water or at the wharf. These we classified as social-cultural. It is interesting to note that among Indigenous organizations and communities, questions of safety more frequently, though not exclusively, referred to concerns about violence directed at Indigenous fishers. For commercial associations and management bodies, questions around safety more frequently referred to workplace safety and safety around infrastructure (e.g., overcrowded or decaying wharves).
2) Another common theme which is classified under both social-cultural and economic has to do with values arising from the Lobster fishery. These commonly referred to the economic value that fishers and their communities obtained (or had the potential to obtain) from Lobster fishing. However, they also referred to the social and cultural values that arise from Lobster fishing as an activity rooted in history, culture, shared experiences, and identity.
3) The final theme that commonly arose centred on issues of trust, transparency, and accountability in science, policy, and decision-making. These appeared across the four dimensions of the EBM spectrum. The results of the overlapping questions are somewhat misleading. It may appear that there are only very few questions related to issues of trust, transparency, and accountability. In actuality, though, there were a great many questions that touched on these issues among the entire set of questions. However, given that these questions often related to a specific topic, the researchers were unable to classify them as "overlapping."

Some of those with whom the researchers engaged had experience solely in fishing. Others had a combination of fishing and management and/or advocacy experience, while some had experience solely in management and/or advocacy. The common themes identified did change based on the experience of the individuals involved. Those who had more experience in management and/or advocacy tended to focus more strongly on issues of governance, while those who had more experience directly in fishing tended to focus primarily on social-cultural and economic issues.

Should these questions be used in a focus group or workshop environment, researchers would have to first undertake a field-testing process (Creswell 1994; Bhattacherjee 2012) where they would be rewritten to ensure their accessibility and relevance to potential research participants, then tested with a small group to ensure their comprehensibility. Questions should be easy to understand yet appropriate to the expertise of those involved. Though these questions are targeted toward fishers themselves, it may be worth doing a separate focus group or workshop with those involved in the management and advocacy issues around fishing, given their separate interests and experiences.

- CO-DEVELOP SURVEY ON CHANGES IN COMMERCIAL FISHING PRACTICES OVER TIME

While the majority of the time during engagements focused on key social science and humanities research questions about the Lobster fishery, the researchers also discussed the use of a survey as a method to collect data on changes in commercial Lobster fishing practices over time.

The temporal scope of the research to address the question on changes in commercial fishing practices is from the 1970s until the present. DFO commercial lobster landings can be tracked through reports from the 1970s based on the available information from DFO commercial landings. However, changes in fishing practices have not been consistently studied. As a result, there are gaps in research that need to be addressed by employing qualitative and quantitative approaches to research in order to contextualize Lobster landings. Additionally, significant changes to policy, legislative, and management were made in the Lobster fishery during this period. Those changes need to be considered when studying the evolution of fishing practices over time.

The researchers designed the survey, but it was informed by previous surveys conducted on effort in the Maritimes region Lobster fishery (Pringle and Duggan 1984; Miller & Rodger 1996). While these surveys serve as a foundation to build from, they are now out of date and do not capture the breadth of information that is required to understand how fishing effort alters perceptions of stock productivity. The researchers began developing the survey by combining the questions posed in the surveys administered by the aforementioned. Then, the questions were mapped to an Access Theory Framework (Parlee et al 2021; also see Ribot & Peluso 2003) in order to identify gaps in the types of questions being asked, and to develop new questions where required. The draft list of questions was then circulated among DFO natural science colleagues on the Lobster Ecology Assessment Team to identify which were relevant, and to address any additional gaps.

Then, the researchers reviewed a draft of the survey with the participating commercial associations to determine whether the question would indeed solicit the type of information that we were interested in attaining, to ensure that the language was accessible and relevant to commercial fishing captains, that it was not too burdensome or lengthy, and to include questions that associations were interested in researching. In total, three commercial fishing associations representing harvesters in four LFAs chose to work with the researchers to co-develop the survey. It was determined that the researchers could not rely on a single method of delivering the survey because commercial lobster fishing captains rely on and prefer different types of communication. As such, the choice was made to deliver the survey in 3 ways – online, paper, phone -- depending on the preference of the captain. To deliver the survey, the researchers decided that they would assemble a small package containing:

- Postcard with website link and QR codes in English or French.
- Formal letter requesting participation in the survey.
- Letter of informed consent.
- Paper copy of the survey.
- Pre-stamped and addressed envelope to return the paper copy of the survey.

Throughout the research the researchers considered the possibility that this type of research may inappropriately raise expectations about what they are able to accomplish by March 2023, and changes that may arise as a result of this exercise. The researchers mitigated the first concern by being transparent

at the outset about the timeline, risks involved in investing time into the project if it is not funded beyond that date. They also outlined projected outputs for this pilot phase of the project which include this Technical Report, and a Science Report outlining common or overlapping social science and humanities research questions, proposed methods to investigate those, a proposed budget, and other considerations. We mitigated the second concern by ensuring the research questions we develop are broad and rarely address DFO as an institution directly, and by carefully explaining that this research is intended to inform science advice, and not to directly influence policy or resource management. It was determined that it was feasible to collect data on changes in fishing practices from commercial lobster fishing captains through the delivery of a survey. In the absence of an ethics process for research involving humans within DFO, the HC-PHAC REB agreed to review the survey and recommended that it meets ethical requirements. The survey is outlined in Appendix V.

- ORGANIZATIONS, COMMUNITIES AND ASSOCIATIONS ENGAGED THROUGHOUT THE PILOT PROJECT

Several Indigenous and non-Indigenous organizations, communities and associations participated in this pilot project (*Table 1*). Though they cannot be considered official collaborators, the researchers' positive experiences with them allows the researchers to anticipate that some or all would be interested in continuing to collaborate on the proposed research. In total the researchers engaged with 25 individuals.

Table 1. *Type and number of organizations, communities and associations we engaged with.*

Indigenous Organizations (Aboriginal Aquatic Resource Oceans Management Boards (AAROM) Consultation Bodies)	5
First Nation Communities (Leadership, Resource Managers, Harvesters)	3
Fishing Associations (Senior Operating Managers)	3
Fisheries and Oceans Canada (Bedford Institute of Oceanography, St. George Office, St. Andrew's Biological Station)	3

Not all organizations, associations or communities that were contacted to participate in this research chose to participate. In some cases, the researchers did not hear back after several points of contact. We interpreted this as a subtle form of refusal (see Liboiron et al 2018). In another case, explicit refusal was communicated without rationale. In situations where the researchers did have an opportunity to meet with organizations, associations or communities for an introductory conversation about the project, some expressed that while the project sounds interesting, they do not have the capacity (e.g. time, people) to dedicate to the project. In total, 6 groups chose not to participate in the study.

There was one exception to this approach. Engagement with one organization evolved differently because of the way that the researchers were initially introduced to them. The principal investigator of this project was invited to participate in a working group jointly comprised of the organization and other DFO employees due to a common interest in the overarching theme of the group, and in approaching

research from a participatory perspective. The working group met every two weeks for one hour and priorities were predominately driven by the concerns and interests of those that established the working group. As a result, this Lobster project was generally discussed in the context of providing updates through presentations, and on occasion asking for advice on how to approach certain aspects of the project. The objectives and activities of the working group continue to develop with the role of the Lobster project continuously being defined.

- RESEARCH ETHICS

Through the engagement work, the researchers have found that this participatory approach builds an ethical foundation for research and contributes to developing relationships and trust with Indigenous and non-indigenous organizations. It was an extremely worthwhile, yet time-consuming, activity. Even within the limited project area, engaging with the organizations and associations of interest has been a challenging endeavor, as organizations are quite busy with a number of priorities involving the fishing industry as a whole. While the researchers may be able to move toward data collection on objectives of the fishery with non-Indigenous commercial fishers, it was unlikely that the researchers would be able to do so with the proper ethical procedures in place with Indigenous fishers within the funded time frame. As a result, the researchers decided not to pursue data collection on key objectives for the Lobster fishery in *Step 1* of the project. And, in order to be fully transparent with those that the researchers engaged with, they were very clear about the timelines and that the expected deliverable from the engagements would be a research report outlining a research plan should the project be funded beyond March 31, 2023.

The researchers determined that it was feasible to collect data on changes in fishing practices from commercial Lobster captains through the delivery of a survey. The researchers received a review from the HC-PHAC research ethics board in an advisory capacity on this survey which concluded that it complies with TCPS standards. As the HC-PHAC REB does not have the authority to grant approval for research in another department, the researchers also needed to obtain approval from the Deputy Minister of DFO before collecting primary data based on the advice provided by the REB. At the time that this report was written, internal approval was pending. The researchers also sought review of the use of participant observation during meetings from the HC-PHAC REB, as there is currently no method used by DFO's Science Branch to consistently and methodically collect information from participants that is brought forward at meetings. This was also found to be compliant with ethical guidelines.

In keeping with an approach to the project that sought to develop and maintain respectful and collaborative relationships the methodological decision was made not to deliver the survey without approval from associations. In the case of this pilot project research, consent came from association leadership, and in one case required the researchers to present to a Board of Directors for approval. Consent or approval included affirmation that the association would endorse the survey to its members.

Table 2 shows the actions taken by the researchers in application to the HC-PHAC REB for Ethics Approval.

Table 2. Actions taken in application for ethics approval.

Document Name:	**Document Date:**
Application (i.e., research protocol) for Research Ethics Review of Phase 1 of the Project: "An exploration of how fishers and their communities interconnect with jakejk/sak/homard/Lobster in the Maritimes Region."	August 11, 2022
Privacy Impact Assessment Needs Analysis reviewed by DFO's Access to Information and Privacy (ATIP) Secretariat	August 16, 2022
Presentation to the REB by the Principal Investigator	August 18, 2022
Peer review (external) completed by Dr. Ken Coates	August 22, 2022
Peer review (external) completed by Dr. Joshua Stoll	August 30, 2022
Researcher's response to the ATIP recommendations	October 5, 2022
Researcher's responses to the peer reviewers' comments	October 5, 2022
Researcher's responses to the REB's questions/observations	October 5, 2022
REB provided advice that the research protocol submitted for review meets the ethical requirements for research involving humans.	October 19, 2022
Internal DFO approval	*Pending*

STEP 2: DATA COLLECTION

Step 2 outlines a research plan, with a focus on data collection and a proposed budget that was developed based on the outcomes from *Step 1*. Data collection methods include facilitated workshops to examine key objectives for the Lobster fishery, a survey on commercial fishing practices, and participant observation. This step was *not* completed during the two-year pilot project but is proposed as a way forward if funding were to become available.

- METHODS
    - FACILITATED WORKSHOPS TO EXAMINE KEY OBJECTIVES FOR THE FISHERY

To understand key objectives for the fishery, and whether objectives are being met, the researchers propose to conduct facilitated workshops or focus groups using the co-developed questions. Focus groups are composed of 7-10 participants and are a valuable data collection tool because they allow participants to listen to others' opinions and understandings to form their own, and to check tentative conclusions. The cost of focus groups is generally low, they provide quick results, and can increase a sample size for qualitative studies by allowing more than one person to be interviewed at one time (Marshall & Rossman 2006: 114). Furthermore, focus groups are advantageous because they facilitate social interaction and conversation among participants which enables the researcher to study participants in an atmosphere that is natural and relaxed. Power dynamics can become problematic when participants are not of the same status, rank level or professional affiliation (Peek and Fothergill 2009). Therefore, consideration must be given to power dynamics with use of this data collection method.

Throughout the engagements the researchers heard that as an alternative to focus groups, facilitated workshops might be a more appropriate data collection method involving Indigenous participants because having a researcher ask questions and have a group of people respond directly is not a familiar or comfortable approach. A facilitated workshop, for example, would include several medians for interaction and communication including posting questions up on a wall where participants could respond through

conversation, or in written format at their own accord. While this proposed method was raised by an Indigenous organization, we also heard from commercial fishing associations that it may be a preferred method for non-Indigenous harvesters as well.

- SURVEY TO EXAMINE CHANGES IN COMMERCIAL FISHING PRACTICES

To understand changes in fishing practices over time and to understand how it alters the perception of stock productivity, an appropriate data collection technique is a survey. A survey, purposely sampling commercial Lobster fishery captains is the preferred type of data collection procedure because it allows for the systematic collection of descriptive data from captains as an individual unit of analysis. Commercial Lobster fishery captains have characteristics and knowledge required to answer questions about their changes in their fishing behaviour. Furthermore, a survey approach enables a researcher to detect small reactions while analyzing multiple variables, and allowed the researchers to compare the analysis of population subgroups (e.g. Lobster fishing area). Finally, a questionnaire survey is more economical in terms of research time, effort and cost than alternative methods (Bhattacherjee, 2012). The results from the survey would need to be discussed in relation to data on fishing effort collected through logbooks on commercial fishery landings completed by fishers and submitted to DFO.

The survey would be circulated among commercial Lobster fishing captains, not commercial communal fishery captains. These two types of Lobster fishery captains differ in that commercial fishery captains are directly issued a license from the Minister of Fisheries and Oceans Canada (DFO 2021). For the commercial communal fishery however, the Minister issues the commercial communal licence to the Indigenous organization who may then designate the individuals and vessel to fish the licence (DFO 2022c). There are a couple of reasons for only recruiting commercial Lobster fishery captains for this study. There was interest from Indigenous organizations and communities for this type of research because they have seen dramatic changes in fishing practices in the commercial fishery and they are concerned about the stock productivity. Therefore, they wanted to see the results from such a survey. However, at the time of this report, the commercial Lobster fishery is composed of only 4.5% of commercial communal licenses (IMFP 2019). Through our engagements with Indigenous organizations and communities we heard that generally commercial communal fishery captains follow the same practices and behaviours as the non-indigenous commercial industry. Therefore, results from the commercial Lobster fishery would reflect or represent trends in the commercial communal fishery whether the survey included commercial communal captains or not.

Surveying fishers about their own changes in fishing practices, as well as recording their observations about changes in the fishing industry over the time that landings have dramatically increased, would allow scientists within DFO to construct models to determine the degree to which changes in landings have been influenced by fishing behaviour. Using fishers' knowledge has been found to be informative in other fishery research contexts including climate change management (Bentley et al 2019; Stephenson et al 2016; Stephenson et al 2019; Meadow et al 2015). Moreover, should surveys be able to be completed on a recurring basis over a long time-span (e.g. every five years), scientists would be able to track changes in fishing behaviour over time and compare changes with catch rates to further strengthen such models into the future. There are precedents to this work, such as the use of "catchability" terms in stock assessment models that introduce how to include the degree of fishing effort and its efficiency into stock assessments (Arreguín-Sanchez 1996; Paul et al 2003).

There have been increasing calls for the expansion of the stock assessment paradigm to become more "holistic and ecosystem-linked" as well as to include factors such as social and economic drivers of the ecosystem into modelling practices through transdisciplinary methods (Lynch et al 2018. See also Bentley

et al 2020; Howell et al 2021; Tam, Fay & Link 2019). The survey could provide a test for stock assessment models and allow scientists within DFO to explore how to include data collected through social science and humanities methodologies into stock assessment modelling. The data collected from this study could also be used to inform innovative ecosystem-based fisheries management methodologies within DFO.

- PARTICIPANT OBSERVATION

The idea for participant observation emerged from several simultaneous conversations among DFO science, resource management and external participants. The common theme that emerged from the conversations was that information is being brought forward by meeting participants at, for example, advisory Committee meetings, which is important in a science context. Right now, DFO's Resource Management branch records minutes from the advisory committee meetings and they use these to inform their own work, prepare briefs, and to share with the fishing industry. However, to date there is no method used by DFO's Science branch to systematically collect information that is brought forward at meetings. The minutes of the meeting recorded by Resource Management while useful in many ways, do not necessarily provide an adequate source of science information as the minute-takers are not focused on gathering data as much as they are focused on creating an accurate and concise record of the meeting. As a result, the scientific data brought forward at meetings, through for example, on the water observations or local knowledge that is provided has, to this point, been considered "anecdotal evidence" based on individual and personal observation, not data for the purpose of research.

Participant observation is a data-gathering method that requires researchers to be immersed in a setting to hear, see, and experience the reality as participants do (See Appendix III). During the observation of an activity the researcher takes detailed notes if the activity permits it, and if not, notes are recorded afterwards. Notes include themes that arise during conversation, physical and emotional reactions and items/issues to follow up with in subsequent interactions. Participant observation is just one of several data collection methods that a social scientist uses in a single study. Participant observation is an ongoing and iterative process that requires reflection, and action from the researcher.

- ETHICAL CONSIDERATIONS FOR RESEARCH INVOLVING HUMANS
  - MEMORANDUM OF UNDERSTANDINGS (MOUs).

Where relevant and appropriate, researchers would need to enter into MOUs with participating First Nations communities and organizations, and commercial associations to outline areas of administration and cooperation (Riddell et al 2017).

  - THE FIRST NATIONS PRINCIPLES OF OWNERSHIP, CONTROL, ACCESS & POSESSION (OCAP®) AND DATA SHARING AGREEMENTS.

With assistance from DFO's Access to Information and Privacy Office, researchers would need to establish Data Sharing Agreements (DSA) with participating First Nations communities and organizations where relevant and appropriate. DSA's would enable researchers to comply with the OCAP® Principles.

- OPERATIONAL CONSIDERATIONS FOR RESEARCH
  - CO-DELIVERY OF RESEARCH

Throughout the engagement discussions in *Step 1*, the researchers explored ways to co-deliver the research with Indigenous organizations and communities. One avenue proposed is to enhance capacity and support within Aboriginal Aquatic Resource Oceans Management (AAROM) boards to undertake SSH research involving Indigenous participants. This would require hiring a social scientist through a Working

Group composed of AAROM-appointed and members of Indigenous Nations that may wish to join as representative of their own communities. Such a Working Group would be tasked with hiring a researcher that is respected and has permission from Mi'kmaq, Wolastoqey and Peskotomuhkati organizations and communities to conduct the SSH research involving their members. If a common researcher was hired, they could be hosted for example, by the Atlantic Policy Congress of First Nations Chiefs Secretariat, an AAROM that has a regional responsibility and has shown interest in participating with this project. AAROM's are already tasked with "directly support[ing] collaboration and increase scientific, technical and advisory capacity within Indigenous organizations to help facilitate the move towards greater co-management of aquatic resources and the ocean environment" (AAROM 2022).

The researchers developed an example operating budget for data collection proposed in *Step 2*. The proposed budget is informed by budgets allocated to the pilot project for *Step 0* and *Step 1*, and it is based on field work experience attained by the Principle Investigator and Co-Investigator during their graduate and postdoctoral research projects.

Table 3. Example operating budget for Step 2 data collection

YEAR 1: 2023-24	Description	Cost	Total
Salaries for three researchers	Two DFO personnel, and one external researcher hired by Indigenous organizations and communities *in partnership* with DFO to help in the delivery of the social sciences and humanities component of the research that is being co-developed with Indigenous communities. Research with non-Indigenous communities would be delivered by DFO personnel, and they would also be responsible for the overall administration of the project and deliverables. Funding for a third researcher could be obtained from the Indigenous Policy Dialogue and Development (IPOD) fund.	$210,000	$210,000
Travel for Research	The researchers will need to travel to communities to facilitate workshops.	$25,000	$18,000
Other expenses	E.g. office supplies, laptop, printing costs	$3500	$3500
YEAR 2: 2023-24	Description	Cost	Total
Salary for three researchers.	Increase reflects automatic salary increments in public civil service and increment for external researcher.	$220,000	$220,000
Travel for Research	The researchers will need to travel to communities to collect SSH data.	$25,000	$18,000
Facilitated Workshop	To collect data on key objectives.	$20,000 for workshop $5,000 for deliverables	$25,000
Facilitated Workshop	To collect data on key objectives.	$20,000 for workshop $5,000 for deliverables	$25,000
Other expenses	Office supplies, etc.	$1500	$1500
Total costs (for two years)			$521,000

DISCUSSION

In 2021 the Blue Economy Lobster Team was brought together as pilot project to integrate and assess natural and social science data in order to provide more comprehensive stock advice on the Maritimes Region Lobster fishery. The social science and humanities research of the Blue Economy Lobster team was guided by two principal questions: 1) How have commercial fishing practices, also referred to as fishing effort, changed over time and how does it alter the perception of stock productivity? 2) What are the key social, cultural, institutional and economic objectives for the Lobster fishery?

To address these principal research questions several Steps and actions were taken which are outlined in *Figure 5.*

Figure 5 Actions taken to address principal research questions

The actions from *Step 0* have been completed. The outputs from this step include scoping of context for the research, the identification of Rightsholders and stakeholders to contact and invite to participate in the pilot project, ethical and procedural aspects to consider in engaging potential participants throughout the pilot project.

Step 1 was also completed. Throughout this step, emphasis was placed on developing relationships with Indigenous and Non-Indigenous organizations, communities and associations throughout the pilot project areas. The methodological approaches applied include participatory research and an exploratory phase to co-develop social science and humanities research questions that reflect key objectives for the Lobster fishery, and to co-develop a survey on changes in commercial fishing practices. The first outcome is the identification of common, overlapping questions about key objectives for the fishery (Appendix IV). The most common overlapping questions that appeared among groups were safety and security, social and economic values arising from the fishery, and trust, transparency and accountability in science, policy and

decision making. It was determined throughout the exploratory phase that it was not feasible to collect data on key objectives for the fishery. The second outcome is a survey on changes in fishing practices over time (Appendix V). It was determined that was realistic to collect data on changes in fishing practices from commercial Lobster captains through the delivery of a survey (Appendix V). In the absence of an ethics process for research involving humans within DFO, HC-PHAC's REB agreed to review the survey and recommended that it meets ethical requirements. The third outcome is the development of a research plan for *Step 2 data collection*.

None of the actions in *Step 2* were completed at the time of writing this report. While HC-PHAC recommended that the survey meets ethical requirements, the next step is to obtain DFO approval to distribute it among commercial Lobster fishery captains represented by the associations who approved the use of it and agreed to assist in distributing it to their members during the engagement phase. In order to collect data on key objectives for the Lobster fishery, longer term funding is required. Only through long term investment in social science and humanities research can DFO Sciences collect, analyze and integrate it in with natural science data to provide full-spectrum advice on sustainability of the social–ecological system for Lobster.

Throughout this two-year pilot project, several lessons were learned. They include:

- Engage as early as possible. The researchers sought advice from someone experienced in consultation with the Nova Scotia government, who advised, “Don’t ask for the recipe after you have already made the stew.”
- You can only “move at the speed of trust,” a piece of advice given by Glenn Page, President and CEO at SustainaMetrix, a company operating out of Baltimore, at the Peskotomuhkati-DFO Summit held in March of 2022. Building trust takes time.
- Learn and return. Take what you have learned from the discussions and incorporate it into research material, then return it to participants for feedback to ensure it reflects their interests, needs and concerns. Do this several times.
- Listen and do not get defensive. Don’t take feedback or comments personally, use it as an opportunity to learn and do better. If you take a step in the wrong direction, apologize and move on.
- Engage with Indigenous organizations and communities first as Rightsholders, prior to reaching out to commercial fishing associations.
    - This demonstrates affirmative action to respect, protect and fulfill the rights of such groups (Pourfaraj et al 2022b)
- Remember the “Truth” in Truth and Reconciliation.
    - a) Listening and learning the history of colonization at an interpersonal level.
    - b) Learning the history of colonization through scholarship.
    - C) Acknowledging the impacts of colonization
        - This requires being vulnerable and recognizing difficult problems.
- Decisions made by other branches or sectors can inadvertently create obstacles for research projects.
- Those trained in the Social Sciences and Humanities have various skills and expertise that can inform science advice and can provide insight into the human aspects of fisheries and oceans being addressed by other branches and sectors.
- Long-term investment through funding and infrastructure is required in order to support the delivery of social science and humanities research within the DFO science sector.

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APPENDICES

Appendix I

TO DISCUSS DURING EXPLORATORY PHASE

Activity	**Notes**
Personal and organizational introductions and impetus and context for the research • Climate Change • Changes in the way that people are fishing	
Timeline for the research • Two year pilot project March 2023 • Scale of the research and project? Increased risk that with larger scale we won't be able to bring this to completion • Are you willing to accept a smaller scale if it helps bring the project to completion? • If not, is there a way you feel comfortable participating within the two years that we have? What does that look like? • If you are not comfortable in participating, that is information that we appreciate knowing. This does not compromise your relationship with DFO at all. We will take note of that, and will ensure that it is in our documentation so that we can communicate that to our superiors.	
Solicit feedback • Is there any terminology that is important to use *or* to avoid?	

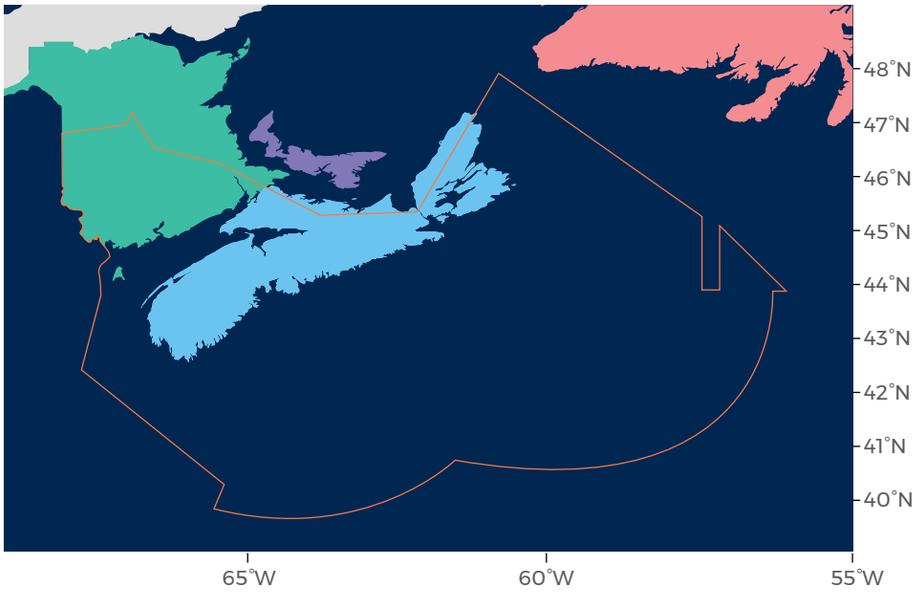
○ Objectives versus Needs ○ Beneficiary, Resource user, Fish harvester, fish collector, fishermen, fisher person ○ Social Ecological system, ○ Human dimensions, human aspects, human components. • What sort of interactions will help facilitate the research relationship? (ex. Go out on boats, face-face meetings) • How can we create trust for the research and the research process?	
Ethics Processes • Do you have any documents concerning ethics that you would like to share with us? (Ex. Research protocols) • Are you familiar with Indigenous led research ethics boards/do you have a research ethics board? (e.g. Mi'kmaq Ethics Watch) • From Rogers 2018 Power point slide: ○ Indigenous peoples are increasingly asking the following critical questions of researchers: 1. Whose research is it? 2. Who owns it? 3. Whose interests does it serve? 4. Who will benefit from it? 5. Who has designed its questions and framed its scope? 6. Who will carry it out? 7. Who will write it up? 8. How will its results be dissemination? (Smith, 2012, p. 10)	

• May mean for example, when we audio record, we get a copy for our records and they get a copy for their records	
Resources to share: • Do you have any relevant research underway that could inform us? • Do you have any other documents (e.g. maps, oral histories conducted and made public) you think may be valuable and that you'd like that share?	
Research Questions: • What questions do you have about people and the lobster fishery? (e.g. what research questions do you have?).	
Research Methods: • What are the culturally appropriate methods to address research questions (e.g. surveys, interviews, focus groups/group discussions)	
Purpose of research: • What do you want to see out of the research? • What is of interest to you?	

MOU/Research Agreements: • Do you require a Memorandum of Understanding to engage in the research? • Do you require a Research Agreements prior to the start of data collection?	
Capacity to collaborate? • What capacity do you have to participate in this research?	
Knowledge exchange? • What is the best way to share results with you/the community? • How do you and your community want the research to be presented? (ex. Graphs? Posters? Community Presentations? Write up in the newsletters?)	

This research will inform future studies on the lobster fishery in the Maritimes Region. For now, it will focus on Lobster Fishing Areas (LFAs) 29, 30, 31a, 31b, 36, and 38).

DFO Maritimes Region / La région des Maritimes du MPO



We recognize that LFAs are based on federally established boundaries and regulations and may not reflect the geographical space, historical significance or traditional territory accepted and practiced by Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples throughout the Maritimes Region.

Fisheries and Oceans Canada is interested in these topics

- Lobster is celebrated as one of the few healthy commercial stocks remaining.
- Lobster is being challenged by the impacts of climate change.
- People are changing the way that they are fishing (E.g. soak time, amount of bait).
- More research is needed to understand how people interact with lobster and why they make certain choices when fishing.
- The results of this research will describe the lobster fishery from the perspective of those who have experienced it.
- Currently this research is funded until March 2023.

But we want to know what topics you are interested in for social science and humanities research as it relates to lobster.

Science ped Canada Fisheries and Oceans Canada Pêches et Océans Canada

'Kwe'! Qey! Bonjour! Hello!

An exploration of how fishers and their communities interconnect with jagej/sak/homard/lobster in the Maritimes Region

The jagej/sak/homard/lobster fishery is important to our region. In order to make the social science and humanities research on lobster accurate and reflective of the needs and interests of those who harvest and benefit from lobster, we need participation from those involved in the fishery.

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Step 1
Develop Research Relationships and Co-Develop Research Direction

Step 2
Research Ethics

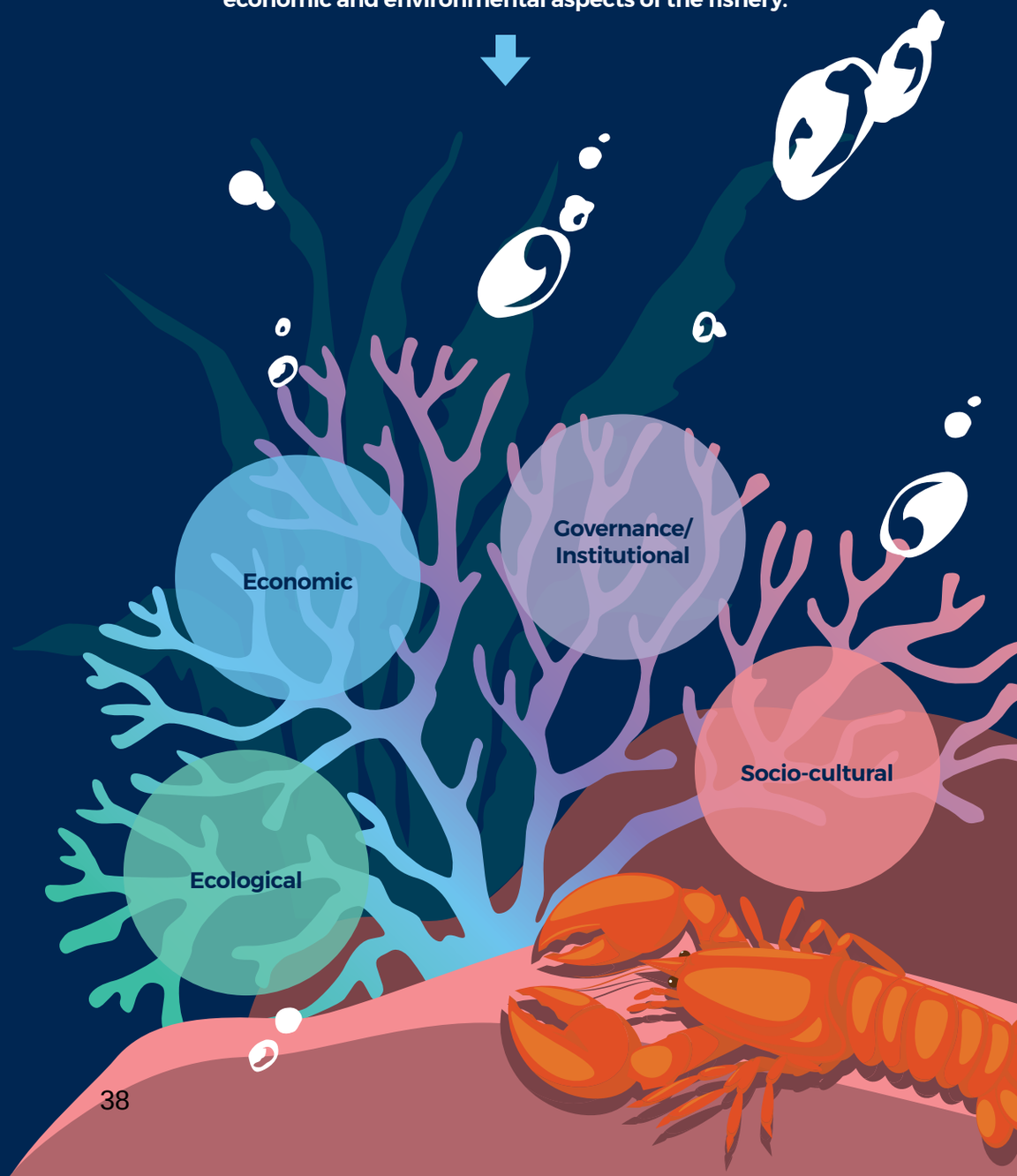
Step 3
Collect Data

Step 4
Analyze Data

Step 5
Return Results to Research Participants

Step 6
Develop Science Advice for DFO

This preliminary study will understand the research through the perspective of Ecosystem Based Management, an approach that considers governance, socio-cultural, economic and environmental aspects of the fishery.



Appendix III

Participant Observations

Seek consent through consensus prior to taking notes

- Consensus here means general agreement – although everyone might not agree equally, they do agree to move forward regardless of unevenness and differences of opinion.
- Notes will abide by the rule that note takers are free to use the information received, but the identity of speakers and participants will not be revealed. However, note takers will include information relating to organizations, associations, departments etc… that are present and speaking.

Meeting:
Date:
Location:
Type (please put an X):
__In Person
__Virtual
__Hybrid

Attendees	**Topics/Themes Raised**	**Interpretations of Observations?**
How many attendees are present?	Social-Cultural:	
Who is present? (e.g. organization, association, department etc…)	Economic:	
Who is present online?:		
Who is present in person?		
What they are saying:	Governance:	
What they are doing:	Ecological/Biological:	
Where are they sitting?	Other/Not sure:	
What body language are they displaying? • Did this change? If so, what do you think triggered it?		
Other:		

Overlapping and Common Questions

Overlapping and Common Questions from engagement sessions focused on identifying key social science and humanities questions.

Ecological

Stewardship (also in Governance)

- Are there practices that should be adopted to promote resource stewardship?
- In what ways do you act as a steward of the ecosystem, especially in relation to lobster?
- What is your vision for how the stock should be managed?
  a) How does this differ from current management practices? (precautionary approach)

Conservation

- What does effective management for conservation look like?
- What conservation measures are working? What aren't?

Health of Lobster Stock (also in Economic)

- What do you think are the indicators of a healthy lobster stock in your fishing area?

Stressors

- What are the major stressors on the health of the lobster stock?

Long-term sustainability

- Do you think lobster will continue to provide for your community in the long term? Why or why not?
- How confident are you in the long-term sustainability of the lobster stock?

Ecological Observations

- Do you notice any changes in the ocean ecosystem? If so, what types of changes?
  a) Do these changes impact the lobster fishery? If so, how? If not, do you think that will change in the future?

Economic

Value of lobster fishery (related to questions in Social-Cultural)

- What economic benefits does lobster bring to you and your community? (e.g. spending money at local businesses, housing, etc…?)
- Do the economic benefits have spinoffs in other ways? (E.g. Investment in social cultural services, daycares, libraries etc., developing relationships among people (crew, extended family, communities), business development (partnerships, co-ops)?)

Observations on Changes in Fishing Behaviour (also in Ecological)

- What changes have you seen in fishing practices in the lobster fishery over time?

  a) What changes have you made?
  b) What changes have you seen others make (either within your community or outside of your community)?

Economic Reliance on Lobster Fishery

- What are the risks involved to the individual to becoming heavily indebted?
- What are the risks involved to the communities to becoming heavily indebted?
- What are the risks involved to the industry to becoming heavily indebted?
- What are the risks of such a heavy reliance on the lobster fishery?

Future Planning

- What does your retirement and succession plan look like when you decide to give up your license?

Social-Cultural

Safety and Security

- Do you feel safe on the water? If not, what do you need to feel safe on the water?
- Do you feel prepared if there is an emergency on the water?
- Do you have the right equipment to deal with an emergency on the water?
- What do you need to feel safe on the wharf?

Social Capital

- How did you get into lobster fishing?

- Did you learn how to fish from a relative, or did you learn from somebody else?
- What relationships allow you to benefit from fishing lobster and in what ways?

Impact of Access or Lack of Access

- What kind of cultural activities, knowledge and identity are nurtured when you are able to harvest lobster?
- What kind of cultural activities, knowledge and identity are lost as result of a lack of access to lobster?
- In what ways is the community impacted by their lack of access to lobster?

Values and Meaning Related to Lobster Fishery (related to questions in Economic)

- What do individuals and communities value about lobster? Why is fishing for lobster important?
- If you feel comfortable responding, what does the lobster fishery mean for you and your family?
- What does it mean to you to call yourself a fisherman?

Travel (also in Governance)

- How does travelling for the lobster fishery impact you and your family?

Social value of infrastructure

- What is the importance of port/harbour infrastructure to you? To your community?
- Who contributes to their maintenance?

Role of Values and Culture in fishing practices (also in Ecological and Governance)

- What values inform fishing practices?
- What values inform your vision of what the lobster fishery should look like?
- What values are being prioritized in the lobster fishery?

<u>Governance</u>

Indigenous Rights in the Lobster Fishery

- In an ideal world, what do Rights (treaty, inherent, Aboriginal) look like in the lobster fishery at the ground level?
    a) What mechanisms enable or hinder the ability of Rights to be acknowledged?
- What does the recognition of Rights in science, governance, and management look like in the lobster fishery?

Shared responsibilities

- What is your vision for how responsibility for lobster can be shared among rightsholders and stakeholders?
- Should you bring the multiple rights and privileges that exist in the lobster fishery under the same governing system? What are the tools required to do this?
    a) What would collaboration look like?

Adaptation (also in Social-Cultural)

- What do you think is required to ensure that harvesters can adapt and react to changing conditions in the lobster fishery?
- What type of information do you think managers need in order to be proactive about their decisions?

Indigenous Knowledge

- How can Indigenous Knowledge guide science, management and policy?

Trust and decision-making

- Who do you trust to be involved in fisheries governance, management and decision-making and how should they be involved?
- What is required to increase trust, transparency, and accountability around science, policy and decision-making?

Role of Provincial Government

- How does the provincial government either enable or hinder the ability to benefit from the lobster fishery?

Conflict

- How should conflict be resolved in the lobster fishery?

Access (also in Economic)

- If you are comfortable responding, are you able to harvest lobster?
    a) Why or why not?

- What enables or hinders your ability to access the lobster fishery?
- What is enabling you or hindering you from accessing programs and infrastructure to participate in the fishery?

Partnership and Collaboration

- On which topics and under what conditions should there be opportunities to partner and collaborate? With whom and for what?

Traditional Knowledge/On-the-water observations (also in Social-Cultural)

- How, when, and where should traditional knowledge and/or on-the-water observations be accounted for in science and management?

Fisheries and Oceans Canada | Pêches et Océans Canada

Survey – Changes in Fishing Practices Over Time

** Si vous avez besoin d'une copie de ce sondage en français, veuillez communiquer avec les recherchistes à Courtenay.Parlee@dfo-mpo.gc.ca ou au (782) 488-7364.*

This survey is voluntary, and you may choose to answer, or not answer any questions. If you choose not to answer any of the questions, the survey can still be successfully submitted.

Please circle your response, and provide text where you feel comfortable responding.

Survey Questions:

1. Age (choose one);
    a. Under 20
    b. 20-29 years old
    c. 30-39 years old
    d. 40-49 years old
    e. 50-59 years old
    f. 60-69 years old
    g. 70-79 years old
    h. 80+

2. Years fishing for lobster (combined as a licence holder or on deck):
    a. Less than 5 years
    b. 5-14 years
    c. 15-29 years
    d. 30 years or more

3. How long have you been a captain for lobster fishing?
    a. Less than 5 years
    b. 5-14 years
    c. 15-29 years
    d. 30 years or more

4. How do you identify?
    a. Male
    b. Female
    c. Non-Binary
    d. Transgender
    e. Other

5. On average, how many deck hands do you employ for lobster fishing?
    a. 1
    b. 2
    c. 3
    d. 4+

6. Of the deckhands you employ, how many identify as:
    a. Male
    c. Female
    d. Non-Binary
    e. Transgender
    e. Other
    f. I don't know.

7. Does the number of deck hands you employ for lobster change throughout the year?
    a. Yes.
    b. No.
    c. If yes, explain why:

8. What factors influence where you fish lobster?
   Check all that apply.
    a. Family's traditional fishing grounds.
    b. Traditional fishing grounds for our harbour.
    c. Changes in Lobster abundance.
    d. Good catch rate.
    e. Follow movement of lobster.
    f. Fuel cost considerations
    g. Weather.
    h. Size of your boat.
    j. I don't know.
    k. Other. Please explain

9. What Lobster Fishing Area (LFA) do you fish in? Check all that apply.
   Options:
    a. LFA 27
    b. LFA 28
    c. LFA 29
    d. LFA 30
    e. LFA 31a
    f. LFA 31b
    g. LFA 32
    h. LFA 33
    i. LFA 34
    j. LFA 35

k. LFA 36
l. LFA 37
m. LFA 38
n. LFA 38b

10. If you're comfortable responding, on average, how far do you have to travel from the wharf to fish your traps in nautical miles?

11. When you're lobster fishing, how far do you need to travel (from home) to get to the port that you fish from?

a. 1-9 km/0.6 -5.5 miles
b. 10-49 km/6-30 miles
c. 50-99 km/31-62 miles
d. 100 km+/63 miles+

12. On average over the last 2-3 years, what is the maximum distance you will shift your gear in nautical miles?

13. Has the maximum distance you will shift your gear in nautical miles changed over your career as a fish harvester?

i. No.
ii. If yes, please explain

iii. I don't know.

14. On average over the last 5-10 years, are you working harder to maintain catch rates throughout the season?

a. Yes
b. No
c. I don't know.

15. On average over the last 2-3 years, has your effort in shifting your gear increased, decreased, or remained steady?

a. Increased
b. Decreased
c. Remained steady
d. I don't know

16. On average over the last 5-10 years, has your effort in shifting your gear increased, decreased, or remained steady?

a. Increased

b. Decreased
c. Remained steady
d. I don't know

17. What factors are affecting your lobster catches? Check all that apply.
    a. Changing air temperatures.
    b. Changing water temperatures.
    c. Changes in lobster abundance.
    d. Weather events.
    e. Number of boats in your area.
    f. Availability of bait/bait type.
    g. Trap design.
    h. Conservation/management measures.
    i. I don't know.
    j. Other, please explain

18. When was your boat built?

19. What year did you purchase your boat?

20. Where was your boat built? If you're not comfortable sharing, leave the space blank.

21. If you had your boat built for you rather than purchasing a boat, why did you choose your boat builder?

22. Please answer the following. Any questions you prefer not to answer can be left blank:
    a. Boat length

    b. Boat width

    c. Engine Horse Power

d. Live Well? (Yes or No)

e. Fuel burnt on an average lobster fishing day in litres.

f. Have you modified your boat in the last twenty years? If so, in what way (e.g. widening, stern extension.)

23. Do you have the following electronics on your boat? (Select all that apply)
    a. Radar.
    b. Sounder.
    c. Plotter.
    d. Olex/Time Zero (or equivalent).
    e. Other, please explain.

24. What is the most important reason for the increased catch rates over the past 20 years? (Choose only one response.)
    a. Bigger faster boats.
    b. Moving more gear.
    c. Able to locate bottom better.
    d. Climate change (warming water).
    e. Increase in natural population of lobster.
    f. Other, please explain.

25. Do you have a financial loan for your boat?
    a. Yes.
    b. No.
    c. Prefer not to answer.

26. Do you have a financial loan for your license?
    a. Yes.
    b. No.
    c. Prefer not to answer.

27. What type of lobster trap do you use? Check all that apply.
    a. Wood.
    b. Wire.
    c. Wood/wire combination.
    d. Jumbo/coffin boxes.
    e. Why do you use this trap/these traps?

28. What species of bait do you use?

29. Do you use bait that was caught in the following areas? (check all that apply)

    a. Catch your own locally.
    b. Caught by others locally.
    c. Caught within the province.
    d. Caught within Atlantic Canada.
    e. Caught in Western Canada.
    f. Caught internationally.
        i. Europe.
        ii. Asia.
        iii. United States of America.
    g. Other, please specify.

    h. Why do you buy bait from this sources/these sources?

30. Do you use the following bait types? Check all that apply.
    a. Salted.
    b. Fresh.
    c. Frozen.
    d. Manmade/artificial bait.
    e. Other, please specify.

31. Does your bait change over the course of the season?
    a. No.
    b. Yes, please explain.

32. Has the type of bait you use changed over the course of your fishing career? If so, explain why.

33. On average, over the last 2-3 years, how many pounds of bait do you use per season? If you don't know, leave it blank.

a. Has this changed over time? If so, please describe.

34. How deep do you fish in fathoms?

a. Shallowest.

b. Deepest.

c. Average.

d. I don't know.

35. Over the last 2-3 years, do you fish the maximum amount of gear allowed by your license conditions?

a. Yes.

b. No. If not, please explain.

c. I don't know.

36. Approximately how many days do you fish lobster within one year? If you don't know, please leave blank.

37. Have the numbers of days you fish per year changed over time?
    a. No change
    b. I fish more days per year than I used to. Why?

    c. I fish fewer days per year than I used to. Why?

    d. I don't know.

38. Do you fish on Sunday?
    a. Yes.
    b. No.
    c. Sometimes.
    d. Has this changed over time? Please explain.

39. On average over the last 2-3 years, how many pounds of lobster (keepers) do you catch per trap:

a. First week of season.

b. Middle of season.

c. Last week of season.

d. I don't know.

40. Have your catch rates changed?

a. Compared to two years ago
   i. No.
   ii. Increased since then
   iii. Decreased since then
   iv. I don't know.

b. Compared to five years ago
   i. No.
   ii. Increased since then
   iii. Decreased since then
   iv. I don't know.

c. Compared to ten years ago
   i. No.
   ii. Increased since then
   iii. Decreased since then
   iv. I don't know.

41. How many hours do you typically let your traps soak? If this changes throughout the season, please describe how. If you don't know, please leave blank.

42. Do you fish singles, doubles or strings (swings, trawls etc...). Check all that apply.
    a. Singles.
    b. Doubles.
    c. Strings. If yes, how many traps per string.

43. What percentage of your own annual income does lobster fishing represent:
    a. 100%
    b. 75-100 %
    c. 50-75%
    d. 25-50%
    e. 0-25%
    f. I don't know.

44. For your household, what percent of annual income is from lobster fishing:
    a. 100%
    b. 75-100 %
    c. 50-75%
    d. 25-50%
    e. 0-25%
    f. I don't know.

45. What other species do you fish (besides lobster) and what approximate percentage of your annual fishing income does that represent? If you only earn income from lobster, leave it blank.

Species	% of Income

46. If you're comfortable sharing, have you ever been in a partnership (stacked) with another license?

a. No. If no, would you ever do so and when/why?

b. Yes. If yes, why did you choose to pursue a partnership?

47. If there is anything that we missed that you would like to add, please add your comments here.

If you have selected 2(d), i.e. that you have more than 30 years of experience fishing, there are 5 additional questions that we have for you.

Please remember that your responses are entirely voluntary.

a. How many lobster fishing boats have you owned? Briefly describe the reasons you decided to change boats, and if you know the approximate dates when you did so, enter them as well.

b. Throughout your fishing career, were there years that you reduced your number of fishing days that had nothing to do with the lobster population? Why?

c. Are you able to catch lobster in more places now than you did 20 years ago?

i. Yes. Please explain.

ii. No.

iii.I don’t know.

d. What does it take to be a good fish harvester? Are those skills more important now than they were 20 years ago?

e. Is there a wider gap today between those that have bigger and smaller catch rates than there was 20 years ago?

i.Yes. Please explain.

ii.No.

iii.I don’t know.

Thank you for participating in the survey!

Appendix VI

EXECUTIVE SUMMARY

Prepared for:

Social Sciences and Humanities Lobster Research Pilot Project: Approaches, Methods and Findings.

2023. Canadian Technical Reports of Fisheries and Aquatic Sciences.

Principle Investigator: Courtenay E. Parlee
Co-Investigator: Jill Campbell-Miller
Co-Authors: Adam Cook, Vahab Pourfaraj and Jamie Tam.

Fisheries and Oceans Canada | Pêches et Océans Canada

The *Canadian Technical Report of Fisheries and Aquatic Sciences* titled "*Social Sciences and Humanities Lobster Research Pilot Project: Approaches, Methods and Findings*" presents the actions and results of a Fisheries and Oceans Canada (DFO) social science and humanities pilot project. Principal Investigator Dr. Courtenay Parlee and co-investigator Dr. Jill Campbell-Miller led the project, which was part of the work being undertaken by the Blue Economy Lobster Team (BELT). In 2021 the BELT came together through the Deputy Results Reserve Fund to integrate and assess natural and social science data in order to provide more comprehensive science advice on the Maritimes Region lobster fishery.

When the social science and humanities lobster research project started, DFO scientists were initially curious about the degree to which changes in landings have been influenced by fishing behaviour. While this focus might provide additional insight into the health of the lobster stock, it does not capture a broader understanding of the social aspects of the fishery that influence how harvesters interact with the ecosystem. It also does not acknowledge the participation of Indigenous Peoples in the fishery. Fish harvesters, just like other members of society, are embedded within larger social fabrics which are informed by characteristics such as history, customs, traditions, beliefs, *de jure* and *de facto* rights and regulations, economic incentives, and environmental concerns. It is the value of the fishery as it relates to these characteristics that could translate into indicators and objectives to assess the sustainability of a social system. These human dimensions of fisheries are emphasized in Sections 2.5 and 6.3 of the Modernized Fisheries Act. In order to respond to these new considerations in science and decision-making processes, social science data, methods and methodologies are required.

Given these considerations there are two principal questions guiding this research:

1. How have fishing practices changed over time and how does it alter the perception of stock productivity?
2. What are the key social, cultural, institutional and economic objectives for the lobster fishery[1]?

To examine these questions, a step-by-step approach was taken to the research (*Figure 1*).

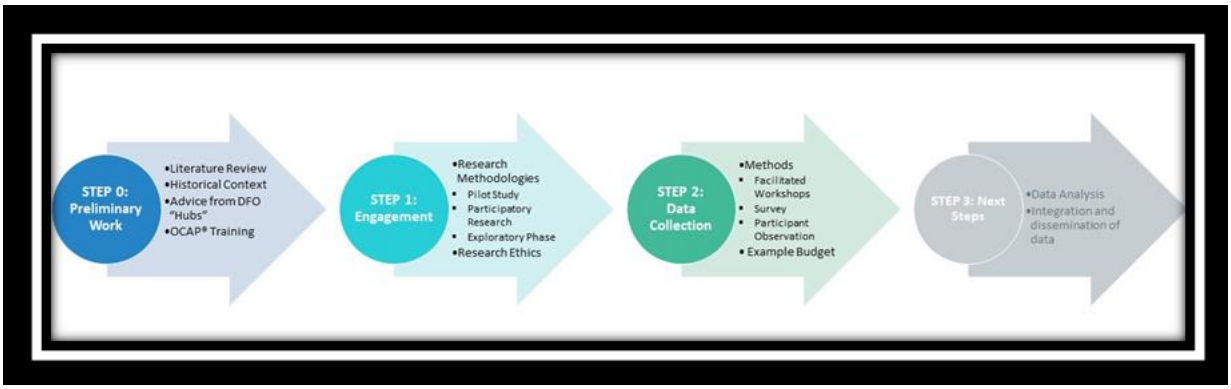


Figure 1. Step-by-Step approach to social science and humanities pilot project.

As a pilot, the geographic scope of the research was limited to Lobster Fishing Areas (LFAs) 29, 30, 31a, 31b, 32, 36, 38. However, the research acknowledged that LFAs are based on federally established boundaries and regulations and may not reflect the geographical space, historical significance or traditional territory accepted and practiced by Mi'kmaq, Wolastoqey and Peskotomuhkati Peoples throughout the Maritimes Region.

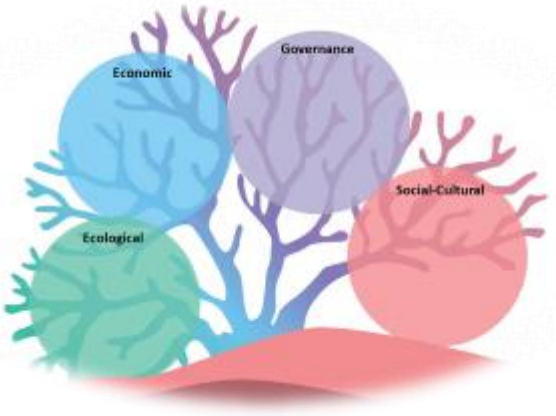
Step 0 involved preliminary work that the researchers undertook in order to understand the context in which the pilot project could and should be developed. This included a review of gray and scholarly literature. The gray literature included government policies, documents and speeches, in addition to reports and research that

were not distributed through academic journals. Scholarly literature was drawn from academic, peer-reviewed journals. The literature review focused on the Blue Economy and Ecosystem-Based Management (EBM). EBM was the dominant lens through which the research was theorized, communicated and organized. *Step 0* also included a review of the historical context of the lobster fishery so that the researchers could be prepared for the conversations they were going to undertake. The researchers sought advice from DFO's Indigenous Relations and Partnership Hub about who to contact, how, and when. They also asked for advice from the Partnership and Collaboration Hub regarding how to operationalize DFO's *Science Integrity Policy*. The policy states that DFO employees involved in science or research need to conform with principles and procedures outlined in the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*. The big output from this step was that the Research Ethics Board for Health Canada and the Public Health Agency of Canada agreed to do a courtesy ethics review of the project so that it complies with ethical standards set out in the DFO policy. Finally, the researchers took training on the First Nations principles of ownership, control, access, and possession (OCAP) ®.

Throughout *Step 1* of the project, emphasis was placed on developing relationships with Indigenous and Non-Indigenous organizations, communities and associations throughout the pilot project areas. Based on information from *Step 0*, the researchers chose to use a participatory approach to the research. Participatory research allows researchers to be perceptive, responsive and reactive to how participants want to engage and what it is that they want to research. This context can then inform decisions around the type of science action that should be taken, and the types of methodologies and analyses that should be used to address the research questions. The researchers also went through an exploratory phase with those who agreed to participate in the pilot project. According to the *Tri-Council Policy Statement*, an initial exploratory phase does not require ethics approval if the intention is to establish research partnerships or to inform the design of research even if it involves contact with individuals or communities. Using these approaches, the objective of the research was to co-design a research plan to address the two research questions in a respectful and ethical way.

To address the first research question on changes in commercial fishing practices, in Step 1 the researchers co-developed a survey (see Tech Report Appendix V). Having data about how commercial fishing practices have changed over time would allow the researchers to put the increased catch rates into proper historical context, in part, by looking at the survey results in relation to combined data on fishing effort that is collected through logbooks on commercial landings. The researchers started this process by first designing a draft of the survey based on previous surveys conducted on effort. The draft questions were then mapped to an Access Theory Framework in order to identify gaps in the types of questions being asked. The draft list of the survey was then circulated among DFO colleagues on the Lobster Team to identify any additional gaps. Finally, the researchers engaged with three commercial fishing associations to determine whether they support the distribution of a survey among the commercial lobster captains that they represent, and if so, whether they had questions they wanted to add. They also provided advice on the best way to circulate the survey among commercial lobster captains.

To address the second research question on key objectives for the lobster fishery, in *Step 1* the researchers engaged first with Indigenous organizations and communities, and then commercial fishing associations. During the engagement the researchers asked what the most pressing issues were on the minds of pilot project participants. Following the engagement session, the researchers met internally to identify themes, to categorize them using the EBM tool (*Figure 2*) and then they developed example social science and humanities research questions based on the themes that emerged, and the context in which those themes were presented.



Once example questions were established, the researchers returned to the next meeting and reviewed the questions in the EBM engagement tool to ensure that they accurately reflected the needs, interests and values of those the researchers engaging with. Some questions were unique to individual organizations, communities and associations. However, once combined, many of the questions were overlapping or common among all pilot project participants (see Tech Report Appendix IV).

Figure 2: Ecosystem-Based Management Tool

Step 2 involves the collection of data. During the engagement process in *Step 1*, the researchers determined that while the researchers may be able to collect data on objectives of the fishery with non-Indigenous commercial harvesters, they were unlikely to be able to do so with the proper ethical procedures in place with Indigenous fishers within the two-year pilot period. However, it was determined that it was realistic to collect data on changes in fishing practices from commercial lobster captains through the delivery of the survey. Health Canada and the Public Health Agency of Canada's Research Ethics Board reviewed the survey and judged that it met ethical requirements. At the time that the Technical Report was written, internal approval for data collection was pending. The researchers also asked the research ethics board to review the use of Participant observation during lobster meetings. Participant observation allows a researcher to watch and listen, and then to take notes on emerging topics, and emotional responses to issues that are raised. The systematic collection of this type of information over time can then translate into useful information for science. The data collection requirements in *Step 2* guided the development of a budget to demonstrate the commitment and capacity required to undertake the research plan that is set out in the Technical Report.

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