

US-Canada Climate & Fisheries Futures Collaborative

Workshop 1
October 21-22, 2021



Photo credit: Maine Lobster Marketing Collaborative

Synthesis, take-aways, and next steps from Workshop I

Draft: 11/23/21

Background

This report is a synthesis of the outcomes of the first plenary workshop of the *US-Canada Climate and Fisheries Futures Collaborative*. The CFFC initiative emerged from a growing awareness of the rapid climate-related changes in our Northwest Atlantic marine ecosystem and the building evidence that these changes are in part linked to rapid warming in the Arctic that have ripple effects to lower latitudes. These changes pose both threats and opportunities for our traditional fisheries and the communities that depend on them. We see value in building a cross-border collaborative involving key stakeholders to evaluate Arctic influences on our shared fisheries resources. Toward that end, the Lobster Institute secured support from the University of Maine's Arctic Seed Grant program to hold two plenary cross-border workshops to develop and strengthen partnerships with other institutions and individuals in the region and to promote collaborations to elevate future external proposals to a highly competitive level.

The short-term charge of the CFFC is therefore to develop a proposal for submission to the US National Science Foundation's **Navigating the New Arctic Program (NNA)** in February 2022. A Canadian counterpart funding opportunity is the **New Frontiers Research Foundation (NFRF)** to which a proposal is being prepared to reinstate the very successful Canadian Fisheries Research Network's Lobster Node, the first round of which ran its course from 2010 to 2015. In both cases, the task will be to better understand how rapid climate change, and in particular changes in the Arctic, are affecting the socio-ecological system of New England and Atlantic Canada coastal waters. Our focus is on the American lobster fishery as the most valuable single fishery in both countries, and a well-studied model system.

Our longer-term aim is to build a long-standing US-Canadian collaborative that can leverage funding to support cross-border partnerships and synergies for the sustainable use of our shared marine resources.

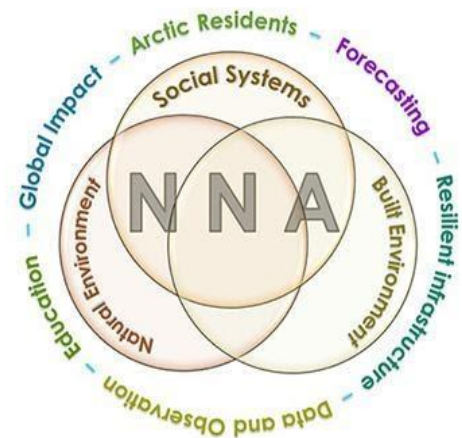
NSF’s **Navigating the New Arctic Program** is one of NSF’s so called “**10 Big Ideas**”. The full solicitation is at [this link](#). The text box and Venn diagram below encapsulate the program objectives.

The NNA tackles [convergent scientific challenges](#) in the rapidly changing Arctic, that are needed to inform the economy, security and resilience of the Nation, the larger region and the globe. Major goals of NNA include:

- Improved understanding of Arctic change and its local and global effects that capitalize on innovative and optimized observation infrastructure, advances in understanding of fundamental processes, and new approaches to modeling interactions among the natural environment, built environment, and social systems.
- New and enhanced research communities that are diverse, integrative, and well-positioned to carry out productive research on the interactions or connections between natural and built environments and social systems and how these connections inform our understanding of Arctic change and its local and global effects.
- Research outcomes that inform national security, economic development, and societal well-being, and enable resilient and sustainable Arctic communities.
- Enhanced efforts in formal and informal education that focus on the social, built, and natural impacts of Arctic change on multiple scales and broadly disseminate research outcomes.

What is Convergence Science?

NSF defines Convergence Research as science that is “*deeply integrated*” and “*from its inception...brings together diverse researchers to develop effective ways of communicating across disciplines...*” That is, if the project doesn’t fall at the center of the Venn diagram, it’s not “convergent.” In our case, convergence research requires meaningful input from stakeholders across sectors to shape solutions to mitigate challenges or capture opportunities anticipated under different climate scenarios.



Therefore, anticipated outcomes of Workshop I were to (1) assess the core values of the group regarding convergence/co-constructed research, and (2) to identify knowledge gaps that will help us define objectives for upcoming proposals.

Workshop I Outcomes

Workshop I was originally intended to be an in-person meeting, but because of the fall 2021 surge in the COVID pandemic, we pivoted to a virtual format. While the absence of in-person contact was disappointing, the benefit was in being able to reach a much wider audience. The virtual Workshop I spanned two morning sessions on October 21-22, 2021 following the agenda summarized on the next page. It engaged 86 registrants and some 60 attendees each day. Attendance comprised an almost equal split of US and Canadian participants across a diversity of sectors from academic institutions, government agencies, the fishing industry and non-governmental institutions. The [Participant Profiles](#) include all the attendees of the workshop.

This report captures some of the key take-aways and ideas emerging from Workshop I. The Workshop agenda is given in brief below. The following pages capture the highlights of the presentations and discussion that seemed to resonate especially strongly. These themes can serve as foundations for those participants who chose to work together to build out the CFFC and respond to the parallel US and Canadian funding opportunities. The report also includes (1) an Assessment matrix of actors from different sectors involved in the collaborative, (2) a schematic diagram illustrating the niche where the CFFC may best operate, and (3) a section on Next Steps.

The Appendix includes (1) the list of CFFC staff and steering committee members, (2) references and resources, and (3) additional thought pieces offered by members of the steering committee shortly after the workshop. Slide decks of presentations, and many more notes are available at request for those who want to review in more detail.

Workshop I Agenda in Brief

DAY 1: 08:30-12:30 ET / 09:30-13:30 AT

- **Setting the Stage:** Three talks on Arctic influences on oceanography, ecosystem, fisheries
 - Joaquim Goes** (Research Professor, Columbia University) *The Arctic Connection: Physical oceanography, the cryosphere, and links to lower latitudes*
 - Andrew Goode** (PhD Candidate, University of Maine School of Marine Sciences) *Biological oceanography, regime shifts, and ecosystem modeling*
 - Kathy Mills** (Research Scientist, Gulf of Maine Research Institute) *Forecasting and adaptation for fisheries shifts*
- **Breakout Groups:** What is Convergence Research to You?
 1. *In your experience, what are some best practices in collaborative/convergence research that should be implemented in the CFFC? Give examples.*
 2. *From your perspective, what knowledge gaps in the natural and social sciences emerge from the previous talks? How would you prioritize them?*
- **Panel:** Two Case Studies in Convergence Research
 - Jasmine Saros** (Climate Change Institute, University of Maine) *NSF Research Trainee Program/Navigating the New Arctic*
 - Robert Stephenson** (Fisheries & Oceans Canada/ University of New Brunswick) *Canadian Fisheries Research Network*
- **Wrap-up / Homework**

Day 2: 08:30-12:30 ET / 09:30-13:30 AT

- **Panel:** Industry-Research Partnerships
 - Patrice McCarron** (Maine Lobstermen's Association)
 - Curt Brown** (Ready Seafood Co., Portland)
 - Melanie Giffen** (Prince Edward Island Fishermen's Association)
 - Lillian Mitchell** (Fundy North Fishermen's Association)
- **Panel:** Social & Economic Impacts and Resilience
 - Joshua Stoll** (University of Maine)
 - Melanie Wiber** (University of New Brunswick)
 - Paul Foley** (Memorial University)
 - Courtenay Parlee** (Fisheries and Oceans Canada)
 - Tora Johnson** (University of Maine at Machias)
- **Breakout Groups:** Pulling it all together
 1. *Reflect on the information presented on Days 1 and 2 to suggest socio-economic and cultural issues facing the fishing industry.*
- **Wrap-up**

Highlights from Plenary Discussions and Breakouts

Below we provide a distilled listing of participant comments and thoughts that capture the vision, core values, best practices and knowledge gaps as portrayed by the attendees of Workshop I. We have attempted to capture these themes in the bullet points that follow. A less distilled, more comprehensive, listing of comments and phrases is listed on the next two pages. The word cloud below, generated from breakout group notes, further underscores the themes most discussed.

- ***Vision, core values and best practices of Convergence Research***

- Convergence research should be transdisciplinary, deeply collaborative, co-constructed, co-produced and participatory (Rob Stephenson)
- Communication should be early, often, open, transparent and honest.
- The Canadian Fisheries Research Network Lobster Node was held up as model to emulate in that it successfully engaged all sectors in the research from the outset and throughout the process.

- ***Knowledge Gaps in natural and social sciences***

- Identify the needs for more comprehensive environmental and biological monitoring and ocean observing.
- What are the predictive links between the cryosphere in the Arctic and circulation changes influencing NW Atlantic marine ecosystem at lower latitudes?
- How do fish and fishing activity respond to environmental change?
- Develop forecasting tools at different spatial/temporal scales, and understand their consequences to the industry.

- ***Social and cultural issues to be addressed***

- What are reliable indicators/predictors of social of change in our coastal communities?
- Who are the winners and losers as coastal communities change?
- Need to address the competing uses of traditional fishing grounds – such as aquaculture, offshore wind energy.
- How is profitability, sustainability and diversity maintained in a rapidly changing ecosystem?



Thinking Big: Vision and Outcomes

- A problem-based approach fosters convergence: What are the “big” or “wicked” problems we want to address?
- Think big: For example, the Canadian Fisheries Resource Network (CFRN) Lobster Node’s vision was to reshape how we do fisheries research, so that the fishing industry is engaged in identifying research needs from the outset.
- Think boldly: Is it enough to think in terms of social and natural sciences? What about humanities, and the arts? What about other ways of knowing?
- Observe change – track how it impacts stakeholders now and in the future.
- Forecast, then shape future impacts of change – foster resilience
- Convergence research should be transdisciplinary, deeply collaborative, co-constructed, co-produced and participatory (Rob Stephenson).
- In convergence research, the collaborative methods are as important as the research questions.

“Convergence research should be transdisciplinary, deeply collaborative, co-constructed, co-produced and participatory.”

(Dr. Robert Stephenson,
DFO, UNB, CFRN Lobster Node).

Core Values of Convergence Research

- Communication - open, transparent, honest, impartial
- Break down biases
- Facilitate joint ownership/ mutual trust
- Timely dissemination of results
- Importance of regular in-person and informal meetings to promote collaboration
- Engage stakeholders early and often, deep listening, and give back (e.g. data reports)
- Foster diversity, equity, and inclusion
- Foster collaboration between social, natural sciences and stakeholder groups
- Take the time needed to work through cultural disconnects between sectors and build trust
- Identify the incentives for industry participation
- Properly fund research & stakeholder engagement

Best practices for building co-created research questions

- Acknowledge differing temporal needs of industry vs stock assessment/managers
- Identify cultural disconnects, e.g. Fishermen do observations very well, observation is intuitive. Researchers want to pose a hypothesis and have controls.
- Include Local Ecological Knowledge
- Work with stakeholders to evaluate utility of forecasting tools at different temporal/spatial scales.
- Integrate monitoring and experimental data
- Data collection needs to be relevant to decision makers - policy makers, regulators, business planners
- Research needs to explore responses to change: coping, adaptation, resilience.
- Establishing a shared language across disciplines, sectors

Knowledge gaps and potential research topics in natural and social sciences

- Need more monitoring data for temporal context.
- Ocean observing capacity (satellite and *in situ* data buoys, eMOLT)
- How systems are changing - markets, fishing communities, governance.
- History of fishery mgt to understand impacts on target species, and socio-economics
- How does fishing activity respond to ecological change.
- Impact of pandemic, 2008 economic crash.
- Post climate impact adaptation strategies, social placidity.
- Competing interests of capture fisheries with wind energy or aquaculture development.
- Need for dynamic fishery management.
- Real time whale movement monitoring.
- Understand shell disease causes and future expansion
- Capitalize on wealth of harvester navigational, seabed and fishing effort data.
- Understand impact of shifting species distributions – loss of traditional species, appearance of new species.
- Embrace regional/local differences among fisheries.

“Profitability, Sustainability, and Diversity - if you lose any of these three, then you don’t have a fishery.”

(Maine State Rep. and lobster harvester
Genevieve MacDonald)

Socio-economic and cultural issues facing the fishing industry and fishing communities

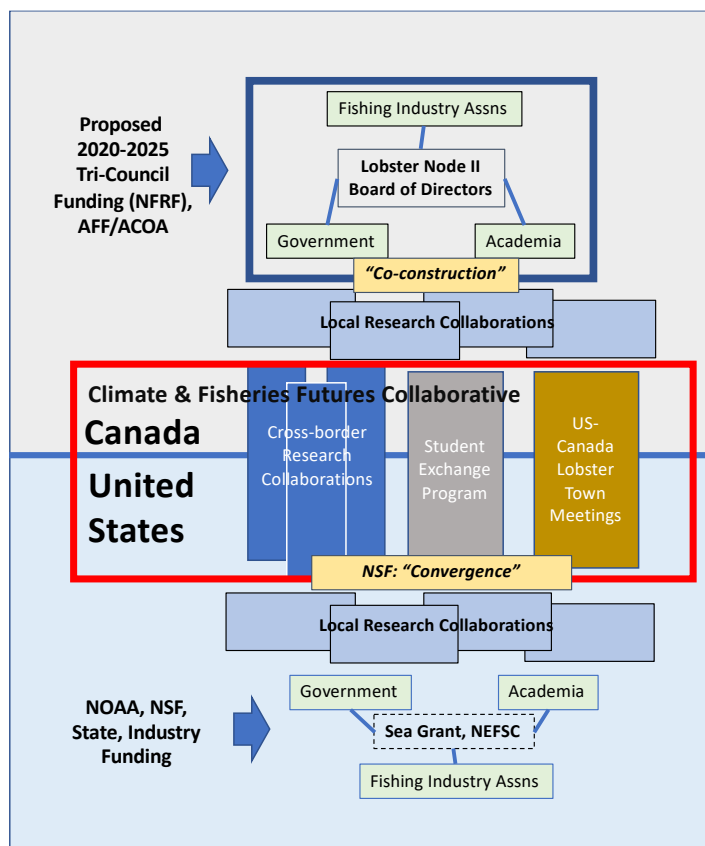
- Competing conflicting access to marine environment by different interests
- Increasing cost to do business: debt, permits, bait, fuel, tech, supply chain, changing markets and benefit flows
- Loss of working waterfront, gentrification, aging fleet
- What is the baseline for socio-cultural changes?
- Cultural resilience: what are barriers to change?
- Vulnerability: who are the winners and losers in climate change impacts?
- How to use forecasting to minimize loss?
- Mismatch in time/spatial scales of interest. Fisher - interest in short term; Scientist short and longer term.
- Indigenous populations: what changes are they seeing?
- Is “social science” a barrier for industry members who are used to talking about their observations, not necessarily their own personal lives? (e.g. impacts of fisheries change on income, stress level, work hours etc).
- “Profitability, Sustainability, and Diversity - if you lose any of these three, then you don’t have a fishery.” (Genevieve MacDonald)

An Assessment Matrix of Actors Engaged with the US-Canada lobster fishery.

Roles in Fishery/Community	Responsibility	Institution/Agency	
		US	Canada
Public Government	Governance, Resource management, laws, regulations, communication,	NOAA, ASMFC, State Agencies (ME, NH, MA, RI, CT, NJ, NY, DE, VA)	DFO, Provincial Agencies (NB, NS, PEI, QC, NL)
Fishing Industry	Harvesting, processing, distribution, advocacy, communication	Harvester Assns (MLA, MALA, AOLA, DELA, RILA), Dealers (MLDA, Ready, East Coast, Lukes Lobster, Cozy Harbor, etc.), ME Lobster Marketing Collaborative	Harvester Assn (MFU, PEIFA, Fundy North FA, etc.)
Science Research	Environmental, economic, social science, monitoring, stock assessment, hypothesis-driven research	NOAA, ASMFC, State Agencies, Universities, Research Institutions (e.g., State, private colleges, universities, GMRI, Bigelow)	DFO, Provincial Agencies, Universities, Colleges (e.g., UNB, Dal, UPEI, MUN, Laval, Rimouski)
Higher Education	Undergraduate, graduate training, Communication	Universities, Research Institutions (e.g., State, private colleges, universities, GMRI, Bigelow)	Universities, Colleges (e.g., UNB, Dal, UPEI, MUN, Laval, Rimouski)
Supporting, Complementary, Competing Interests	Marine suppliers, fuel, bait suppliers, boat builders, trap makers, aquaculture industry (finfish, shellfish, seaweed), offshore wind energy		
Conservation/Advocacy Groups			

An Emerging Structure of Cross-border Convergence Research

The CFFC can fill an important niche by promoting US-Canada partnerships in marine social-ecological research. The schematic below illustrates the space where the CFFC may most effectively operate. While the business of fishing, fishery management and research operate under their own governance on each side of the border, there are many more opportunities for cross-border partnerships than currently exist. The Lobster Node in Canada perhaps serves as the best example of convergence research in fisheries, where research projects were co-constructed through partnerships between the fishing industry, government agencies and academia. Collaborative research between industry and scientists also has a long-standing tradition and has flourished on the US side, although in a less widely coordinated fashion than in Canada. We believe that facilitating cross-border partnerships will enhance and advance the science.



We see three pillars of cross-border activity that can be promoted and managed by the CFFC:

1. Cross-border research projects in the natural and social sciences.
2. Undergraduate and graduate student exchange opportunities.
3. Conferences and meetings, such as the long-standing US-Canada Lobster Town Meeting.

In addition, it will be necessary to create a governance structure for the collaborative to ensure coordination and compliance with the convergence/co-construction process.

Next Steps before Workshop II

Activity in the weeks following Workshop I will build on the workshop-generated material to begin developing the parallel proposals to NNA (US due Feb 16, 2022) and NFRF (CA due Sep 2022) proposals. On November 1, a required letter of intent was submitted to NFRF by the University of New Brunswick.

In the weeks between Workshop I and Workshop II informal working group meetings will self-organize around focal areas of expertise to advance specific research questions in the natural and social sciences, and to develop thinking around the educational component, cross-border/cross-sector gatherings and events.

Periodic Steering Committee meetings are scheduled during this period as an opportunity to monitor progress and guide project development.

Work during this period also sets the stage for Workshop II on January 10-11, 2022. A survey of the Workshop I participants will also be deployed to gain participant feedback on that workshop and to gauge interest and inclination to attend Workshop II as a virtual or in-person meeting.

Workshop II will serve as the final opportunity to have a plenary meeting to gain feedback from stakeholders on the NNA proposal in the run up to submission by Feb 16th. At this time the plan is for Workshop II to be an in-person meeting on the UMaine campus in Orono. We are prepared to pivot to a virtual format as we did for Workshop I, if necessary. The decision will be made in early December.

APPENDIX
STAFF & STEERING COMMITTEE
US-Canada Climate and Fisheries Futures Collaborative

	US	CANADA
STAFF		
Coordinators	Rick Wahle (UMaine Lobster Institute)*	
	Chris Cash (UMaine Lobster Institute)*	
Facilitator	Natalie Springuel (Maine Sea Grant)*	
STEERING COMMITTEE		
Academic/NGO	Damian Brady (UMaine)	Remy Rochette (UNB)
	Kathy Mills (Gulf of ME Research Inst)*	Melanie Wiber (UNB)*
	Joaquim Goes (Columbia U.)	
	Andrew Goode (UMaine PhD student)	
	Josh Stoll (UMaine)	
Industry	Curt Brown (Ready Seafood)*	Melanie Giffen (PEIFA)*
		Lillian Mitchell (Fundy North FA)
Gov't Agency	Kathleen Reardon (ME DMR/ ASMFC)*	Helen Gurney-Smith (DFO) *
		Adam Cooke (DFO)

* Executive Committee

REFERENCES AND RESOURCES

Resources	Links
NSF Navigating the New Arctic solicitation, slide deck and video	https://www.nsf.gov/geo/opp/arctic/nna/index.jsp
NSF Convergence Research info and slide deck	https://www.nsf.gov/od/oia/convergence/index.jsp
Maine Climate Council Climate Impact Assessment	http://climatecouncil.maine.gov/future/sites/maine.gov.future/files/inline-files/GOPIF_STS_REPORT_092320.pdf
Maine Climate Council Climate Action Plan	http://climatecouncil.maine.gov/future/sites/maine.gov.future/files/inline-files/MaineWontWait_December2020_printable_12.1.20.pdf
NSF's Coastlines and People program solicitation	https://www.nsf.gov/pubs/2021/nsf21613/nsf21613.pdf
NSF's Dynamics of Integrated Socio-Environmental Systems (DISES) program solicitation	https://www.nsf.gov/pubs/2020/nsf20579/nsf20579.pdf
NOAA's East Coast Fishery Management Councils East Coast Climate Change Scenario Planning	https://www.mafmc.org/climate-change-scenario-planning
Lobster Node of the Canadian Fisheries Research Network	https://cdnsciencepub.com/doi/full/10.1139/cjfas-2016-0426
NERACOOS webinars on Arctic change: "We're all in the Same Boat", September 22, and October 6, and 20.	https://www.facebook.com/neracoos/photos/a.240111090660/10159246577455661/?type=3
AGU session "Connecting Arctic Change with the North Atlantic Mid-Latitudes" New Orleans, December 13-17 2021.	https://www.arcus.org/arctic-info/archive/32221
[NavHub] - [NavHub] is a community for researchers working on vulnerability assessments in the Northwest Atlantic.	https://sites.google.com/view/navhub/
Fuert, C.B. 2008. <i>Collaborative Learning Guide for Ecosystem Management</i> . Wells National Estuarine Research Reserve.	http://www.nerrsciencecollaborative.org/media/files/collaborative_learning_guide.pdf

POST WORKSHOP THOUGHT PIECES

[Post-Workshop #1 thinking from Remy Rochette (UNB), with a follow up from Melanie Wiber (UNB) below. Small edits provided by other members of steering committee]

U.S. Canada Climate and Fisheries Futures Collaborative Strawman of what and how...

Core considerations:

- Convergence research[1]
- Issues most relevant to coastal communities vary markedly among regions[2]
- US and Canadian funding proposals need to be self-sufficient[3]

Project motivation and approach: Climate-driven changes to ocean circulation, temperature and productivity are impacting (and will continue to) lobster over its range, negatively in some regions and positively in others. This collaborative will use an interdisciplinary, deeply-collaborative and scale-variant research approach to (i) forecast climate-driven changes to the lobster resource over its range, and (ii) help communities adapt to changes in their region.

Why needed: The lobster industry forms backbone of US and Canadian coastal communities, but there is currently no model to forecast the impact of sea ice melt, and climate change in general, on the lobster resource over its range. Also, research and data relevant to this goal are generally not acquired in a consistent or coordinated manner across the species' range, which limits our ability to integrate them into larger-scale products. We will review these data, identify data/research gaps, and fill some of these gaps. Our large multi-stakeholder collaborative provides an unprecedented opportunity to acquire biological, environmental, and socio-economic data and information over the species' range, and at different spatial scales.

Project objectives:

1. Develop *modus operandi* for the creation of deeply collaborative, co-constructed convergence projects.
2. Monitor and forecast changes in oceanography and lobster larval transport; use scenario analysis and forecasting to inform policy makers about consequences of decisions
3. Monitor benthic recruits and pre-fisheries-recruits, and use these data to forecast fisheries recruitment (4-9 and 1-2 years in the future, respectively)[4]
4. Create data management infrastructure[5] for the collaborative
5. Conduct diverse geographical convergence research projects to help communities address challenges and opportunities provided by climate-driven changes to the resource[6] (provide examples of social, economic implications of climate driven changes on industry)
6. Identify the social science connections and impacts of emerging natural science data
7. Provide training, education, cross-border exchange, and fellowship opportunities for students.

Structure

- Board of Directors in US and Board of Directors in Canada, diverse representation (industry, indigenous, fisheries management, academia)
- Staffed office in US and staffed office in Canada (LNode plans to include technicians)
- Committee (representative of membership) to adjudicate research proposals
- Committees to oversee data sharing protocols, ethics reviews, conflict resolution, and communication.

[1] Transdisciplinary, deeply collaborative, co-constructed, co-produced and participatory (RS).

[2] Our activities need to recognize this, otherwise there is no point for industry to be involved. This is an important part of the argument to funders to justify project co-construction post-funding.

[3] Present as country-specific initiatives, including international collaborators, and explain how the two will be "structurally integrated" if both are funded, and the benefits that would provide.

[4] Two initiatives based on pre-fishery recruits are starting in Canada, one in BoF/SS and one in GoStL.

[5] Tablet/phone-based data uploads and queries; human capacity for QA/QC and reporting; hardware/software for ocean observing; eMolt as possible model

[6] Give examples in the proposal.

From Melanie Wiber (UNB) [adding to Remy's comments]:

I also had a few thoughts after listening to the two days, and one thing that is front of my mind is that the social scientists, if properly chosen, could really help with the design and management of the project as well more social fisheries research. I thought of the following next steps:

1. Finding a quick and efficient way for the group to communicate with each other in the development stage and technical support for that
2. Building a collective objective that is relevant to everyone - I'm thinking of the CFRN Project 1.1 principle statement here.
3. Deciding on a governance structure for the process itself (I see you have thought of a board of governors kind of thing for each country - but what about coordinating across the border, and a few other governance issues such as cross border sharing data protocols, multi jurisdictional ethics review, conflict resolution, and really importantly - a communications committee so we think about how to reach our key audiences
4. Settling on some principles of co-construction that underlie our approach - for example, how much should each sub-project require combining social and natural sciences?
5. Thinking about how we want to recruit to and train for that co-construction process
6. Learning from areas that have already under gone climate changes
7. Choosing some relevant case studies given that we are dealing with a very diverse number of different lobster fisheries - how to have a representative sample of those geographical and economic and policy differences? Including native fisheries.

[Post-Workshop #1 thinking from Josh Stoll (UMaine)]

During the meeting I tried to capture socioeconomic issues/topics I heard people flag and then translate them into questions and disciplinary focus areas. I wouldn't say this is a comprehensive list, but I wanted to share it with you in case it might be useful.

Questions

How does the fishing sector, managers, and policymakers perceive risk?

How do different messages and/or communications strategies change risk perceptions?

(Communications)

What are the factors, processes, or conditions that lead to productive interdisciplinary science?

(Science of Team Sciences)

How do the tools, models, research questions, race/gender/diversity of participants, etc. shape or constrain knowledge production? *(Science and Technology Studies)*

What is the cost of adaptation (or inaction) for seafood harvesters and fishing communities?

(Economics)

What rules or institutions enable or constrain adaptation? *(Political scientist)*

How is increased uncertainty in the lobster fishery, as a result of changing ocean conditions, linked to the hollowing out of rural places? Or changes in access to fisheries? *(Rural sociology)*

How do the above changes alter family dynamics? Or contribute to stress, anxiety, and mental health? *(Rural health)*

What are the implications of ecological change on sovereignty or access to marine resources? Tribes? *(Indigenous studies)*

Who is empowered (or disempowered) by the scale at which models are built and communicated? *(Political ecology)*

What are socioeconomic indicators of resilience? *(Sustainability science)*

Beyond these types of questions, at a more meta-level, I think social science *might* also have a role in this collaborative by helping the group build a shared understanding of three key elements of research:

- 1) **Ontology:** What exists in the human world that we can acquire knowledge about? Different people and disciplines have different perspectives about what we can know. Rarely is this something we talk about explicitly, but (in my opinion) it is often a source of misunderstanding and conflict. In brief, there is a pretty wide range of views. On one end of the spectrum, there are some people/disciplines that hold the view that "Reality can be understood using appropriate methods". On the other end of the spectrum, there is a view that "No reality exists beyond the subject". If we are trying to assemble a diverse group of people, it seems safe to assume we will be working with people/disciplines that exist across this ontological spectrum. Working to define where each of us is on this spectrum and how the collaborative wants to deal with ontological diversity might be useful to our collective efforts.
- 2) **Epistemology:** How do we create knowledge? Epistemology deals with how knowledge can be created. Just as there are diverse ontologies, so too are the diverse epistemological perspectives. This topic is particularly important in our context because we're bringing together people who generate knowledge in very different ways and in ways that have a history of being in conflict (namely scientists and industry). It would probably be useful as a group to be explicit about what we see as legitimate knowledge production. For example, do we want to create a space where industry knowledge is valued the same way that western science is valued? How do we want to deal with divergent views? What about Indigenous knowledge?
- 3) **Theoretical perspective:** What is the philosophical orientation of the collaboration that guides their action/research? A third way social science may contribute is by helping the group define its theoretical perspective. Theoretical perspectives deal with the role of science in contributing to society. A common, but highly criticized view, is that science is "value-free" and should not be pursued with specific societal objectives in mind. Others reject this view and assert that research should be used to change situations and empower subjects. Still others have different views. It would be quite interesting/useful to define where the emerging project/collaborative lies in this theoretical space.