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Working with South Thomaston, Maine to Consider Impacts of a Changing Climate on the Community and the Lobster Fishery

What We Do

This project brings together local citizens, stakeholders, and decision-makers to characterize the vulnerability of *fisheries and fishing communities* to threats from extreme weather and climate change. The goal is to understand how marine fisheries and fishing communities are vulnerable to numerous kinds of threats and to identify things that can be done to reduce those vulnerabilities via short-term adjustments and long-term adaptations. We facilitate community discussions using a structured process that involves the creation of influence diagrams that link climate/weather events to impacts and qualitative models of system dynamics. The process helps to identify actions a community can take to increase their resilience in the face of a changing climate—both today and into the future.

An example from South Thomaston, Maine

“It’s been a fascinating two days. I appreciate everything you guys have been doing here.”

“Whenever you bring fishermen together you hear amazing things that I never talk about.”

“You can’t realize how much value this will have for this community. It won’t be obvious, but the conversations we’ve had here will change so many things in our community.”

Phase 1: A Community Workshop on the impacts of climate change on the lobster fishery

The first phase of the process engages local decision-makers, stakeholders, and scientists in a participatory modeling process known as VCAPS - Vulnerability and Consequences Adaptation Planning Scenarios. In VCAPS participants discuss vulnerability to climate change and come up with actions to make their communities more resilient.

On February 5th a workshop in South Thomaston focused on talking with local leaders and lobstermen to better understand how people see the challenges a changing climate poses to the community and the local lobster fishery. The workshop also considered what steps might be taken to address those challenges, either by public or private entities. An example meeting agenda is shown in the appendix.

During the workshop participants identified potential impacts of a changing climate on the South Thomaston community and lobster fishery. The impacts identified include:

- Increased Ocean Temperatures, potentially associated with the following:
 - Influx of new species and diseases that may affect lobster population.
 - Increased frequency of molting in lobsters, giving rise to the higher numbers of shedders.
- Increased Ocean Acidification, potentially associated with the following:
 - Weakened shells and immune systems of lobster, making them susceptible to diseases such as shell rot.

As part of the VCAPS process, we developed influence diagrams with participants to show the links between increasing ocean temperatures and acidification and impacts to the *South Thomaston community* and to *the lobster fishery*. These are created in real time with the participants. The following is an *abbreviated* list of identified impacts:

- Community Impacts
 - Rising air and water temperatures,
 - Increased precipitation,
 - Increased storm surge,
 - Increased storm frequency and intensity
- Lobster Fishery Impacts
 - Increased lobster landings—especially early shedders,
 - Changing location of lobsters,
 - Increased alga growth and related bio-fouling of lobster gear,
 - Introduction into the ecosystem of warmer water species

We also work with the participants to identify actions that can be taken by public entities (e.g., local government, state) and private entities (e.g., local fishermen) to mitigate or prevent impacts. The Appendix lists the full set identified during the meetings; some examples are:

- Develop an on-board grading system to indicate quality to consumers,
- Voluntary/temporary stop to fishing to allow shells to harden,
- Establish lobster holding system that avoids overcrowding and mortality

Phase 2: Creation of a model to characterize the dynamics of climate change and lobster fishery interactions.

On March 27th and 28th meetings were held with the fishermen and local leaders in South Thomaston. Meetings were held for 3 hours in the morning of each day.

The two day meeting focused on creating a model to assist the South Thomaston community with decision-making about climate change and the lobster fishery. The goal was to produce a detailed model that focused on an important part of the system in order to serve local decision maker needs. By involving scientists we ensure that the model

reflects the best available knowledge. The workshop also identified areas where additional information is needed to support effective decision-making in the context of a changing climate.

Fishermen and community leaders discussed the types of decisions they were responsible for making regarding fishing in a climate of change. Areas where further information or knowledge was required to inform these decisions were then identified. Participants opted to focus on decisions intended to maintain or increase the viability of the fishery through improved profitability. Actions and the information necessary to support movement towards this end were grouped into the following categories:

- Improving Product Quality
- Reducing Expenses (bait, fuel, gear, boats)
- Increasing Product Demand (internationally, nationally, and locally)

Fishermen, community leaders, and project partners, then produced a model that summarized the information that came out of this discussion. The model produced at the workshop is comprised of four sections. For example one section of the model pertains primarily to actions intended to increase product quality. The lobstermen are extremely interested in reducing loss in their yield due to mishandling of lobsters. The section of the model simply identifies different places in the lobster-harvesting process where lobster can be injured or killed. The model represents times and activities when lobsters are handled and where opportunities for injury exist

Lobsters move sequentially through the following *physical spaces* in the lobster-harvesting process and rely the following actions to move from ocean floor to market.

Physical Spaces	Actions
1. Trap	1. Hauling
2. Boat	2. Crating
3. Dock	3. Loading
4. Truck	4. Trucking
5. Processor	5. Marketing
6. Market	

Participants identified that lobsters could be injured at any point in the lobster-harvesting process. To reduce injuries that result in damaged or lost product and ultimately reduce profitability, fishermen identified *best practices for handling lobsters*:

1. Postpone fishing to increase shell hardness
2. Take more care when handling to prevent culls
 - Install aerators on each boat, perhaps with CDC loan
 - Use oxygen probe
3. Develop Guidelines for Fishermen that address: trap mesh, water flow, water and air temperature, tank flow, crate location

4. Develop Guidelines for Dealers that address the following:
 - Appropriate handling care
 - Appropriate placement of crates
 - Use of ice
5. Reduce distance to processor by having a local processor

By simply breaking down the problem into these different pieces, the participants of our workshop felt empowered to move forward with the task of next identifying a best handling practices for each of these actions. . They are very excited about the model because it makes it clear that there are specific places in the harvesting process where best practices for handling lobsters need to be defined.

Appendix

Example of Agenda for Phase 1 Community Planning Workshop

8:00 – 8:15	Welcome, Introductions, and Overview of Agenda
8:15 – 8:45	Presentation and Q&A: <i>Climate observations and change in midcoast Maine</i> Presenter: Bob Steneck, University of Maine School of Marine Science
8:45 – 9:00	Orientation to VCAPS diagramming Presenter: Tom Webler, SERI
9:00 – 10:00	VCAPS Diagram #1: How could climate change affect the community?
10:00 – 10:15	Break & Refreshments
10:15 – 12:00	VCAPS Diagram #1: Identify adaptive actions
12:00 – 12:30	Lunch Break
12:30 – 2:00	VCAPS Diagram #2: How could climate change impact the fishery?
2:00 – 2:15	Break
2:15 – 3:15	Group discussion of data gaps in diagrams
3:15 – 3:30	Next Steps & Wrap Up

Management Actions Identified to Increase Resilience of South Thomaston Fishery

Management Actions	Impact					Existing, Ongoing, New	Category of Impact Averted							
	New Species	Algae Growth	Location of Lobsters	Increased Catch	Early Shedders		Economic	Leisure Recreation	Governance	Health Safety	Culture	Ecology	Communication	Property
Set up experimental fishery	X					N	X				X			
Promote recreational fishing	X					N	X				X			
Coops establish processing plants	X			X	X	N	X				X			
Develop onboard grading system				X		N	X				X			
Increase marketing efforts				X		O	X				X			
Identify new markets				X	X	N	X				X			
Involvement in state's efforts to use license surcharge for marketing				X		N	X				X			
Shut down to allow shells to harden					X	N	X				X			
Research new technology for hardening shells					X	N	X							
Communicate better with processors					X	N	X				X			
Store lobster near shore					X	N	X				X			
Sell to local consumers						O	X				X			
Fewer lobsters in each crate					X	N	X				X			
Fish further offshore			X			E	X				X			