# NEW COMPUTER MODEL HELPS LOBSTERMEN ADAPT TO CHANGING CLIMATE

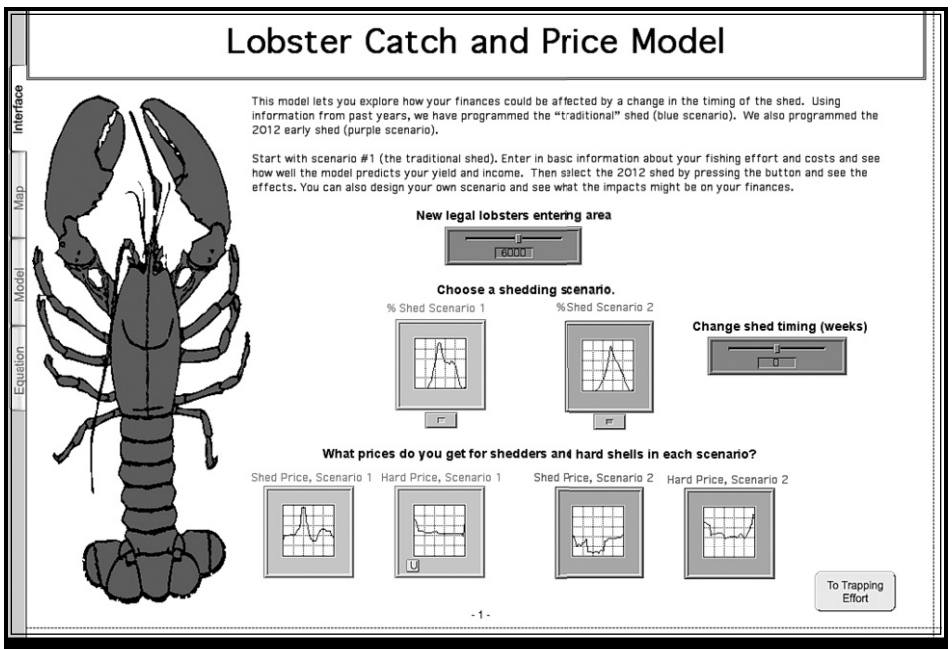
*By Melissa Waterman*

What if a lobsterman could easily understand how changing temperature, market variability, and fishing effort could change his or her bottom line? Would he or she then choose to fish differently? That, in a nutshell, is the focus of an intriguing project developed by Maine Sea Grant and UMaine Extension program, along with others. The three-year project, bearing the title "Planning for a Changing Climate: A Participatory Approach to Fishing Community Adaptation," draws on the observations of lobstermen in one midcoast community to develop a program that may help all lobstermen cope with a warmer Gulf of Maine.

Esperanza Stancioff, Extension associate professor, is a lead investigator along with other partners from UMaine, Clark University and the Social and Environmental Research Institute. "Economic reliance on the lobster fishery means that coastal communities are particularly sensitive to changes in the marine environment that affect the lobster populations," she said. The unusually warm water in the spring and summer of 2012 had a dramatic effect on lobsters, prompting the earliest molting season most lobstermen had ever seen. The boat price crashed and lobstermen grew worried. "Lobstermen told us that for the past 40 years, they could set their watches by the appearance of the first molt. This was no longer the case," Stancioff said.

"In early 2013, we began conducting in-person interviews of eighteen lobstermen and five community members in South Thomaston," Stancioff said. With her colleagues and graduate students from the University of Maine, Stancioff employed specific techniques to elicit from lobstermen and community leaders in South Thomaston exactly how the warming climate affected the lobster industry. "During a two year timeframe, we used a process called dialogue mapping, or VCAPS, in order to identify potential actions that would help fishermen prepare for changing conditions," Stancioff said.

Dialogue mapping is a technique for diagramming a problem, proposing possible solutions, and evaluating how well the solutions fit the problem. VCAPS stands for Vulnerability, Consequences, and Adaptation Planning Scenarios. "The participants were very concerned about the impact of climate change on the lobster fishery and community," Stancioff recalled. "We asked them if they could think of some actions to take to cope with or lessen the impacts. Reducing fishing effort by limiting the fishing season was one consideration, along with several other management actions."




*The components of the model enable individual lobstermen to tailor it to their specific fishing practices, allowing them to see for themselves what happens when they change those practices. Image courtesy of S. Belknap.*

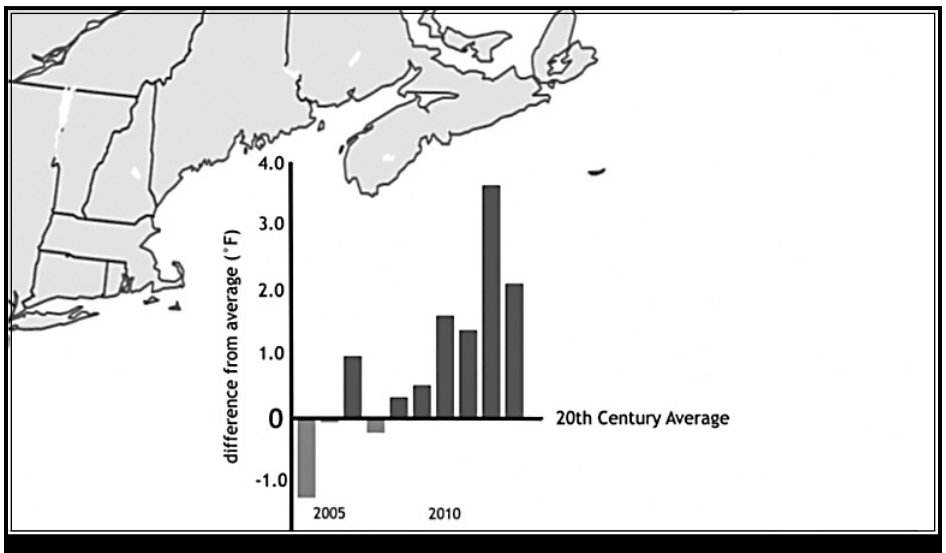
Stancioff and her colleagues held a series of group meetings in 2014 and 2015 on current impacts and future adaptations to climate change. "We heard from scientists about how climate change is affecting the ocean and about how these changes affect South Thomaston and the lobster fishery," she said. "We discussed impacts to lobstering in more detail, developing a table of potential management strategies that could be used in order to adapt to warming waters." The next step was for the South Thomaston participants to learn about system dynamics modelling and assist in developing a model with their information and data.

"System dynamics modelling is one way to better understand how human and natural systems affect each other," Sam Belknap explained. Belknap is a graduate student and National Science Foundation Fellow at the University's Climate Change Institute. "These models are excellent at capturing the complex feedback that define systems where economics and ecology intersect. The lobster fishery is a prime example. Water temperature, fishing effort, lobster supply and demand for the product all play an important role in fishermen's livelihoods. More importantly, changes in any one of these things can affect the others. That's where system dynamics comes into play."

The South Thomaston lobstermen specifically wanted to understand how the timing of the first shed affects net income. Bit by bit, through a reiterative process, the lobstermen and the Extension team built a model that reflected the South Thomaston lobstering world.

The model has six modules that include such things as the number of traps fished, the frequency of hauling, the temperature of the water, and other environmental and economic factors. "We are able to model this dynamic system in such a way that allows fishermen to experiment with different scenarios. What's even better, we co-developed the model with the lobstermen themselves. Who better to describe the system than those who participate in it every day?" Belknap said.

The model allows data to be tailored to the individual lobsterman's business. They can input data about fishing effort, landings, and finances directly into the computer and see what happens when they shift one or another parameter. What those who have run the model have found is that often annual profitability will remain the same or increase when a lobsterman changes the timing of heaviest fishing.




*The Gulf of Maine has warmed considerably faster than most of the world's oceans since 2005. Image courtesy of "A Lobster Community Adapts Through Participatory Planning" video.*

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