The Lobster Conservancy

Sustaining a thriving lobster fishery through science and community

March 2008

Dear Volunteers and Friends of The Lobster Conservancy,

The Lobster Conservancy's (TLC's) mission is to strive to sustain a thriving lobster fishery through science and community. Our quarterly newsletter keeps TLC members and volunteers informed of our research, education and outreach activities.

Lobster Landings in Maine

Based on the wonderful and insightful responses to the comments and news article (link below) we sent you a few weeks ago, it seems worthwhile to spend a bit more time discussing the preliminary lobster landings reported by the Maine Department of Marine Resources (DMR) which show that the catch declined in 2007.

To keep things in perspective, although lower than 2004-2006, last year's landings are among the highest reported since records have been made available by DMR (see Figure 1). Also, keep in mind that "preliminary" means all the data have not yet been collected. As more dealers submit information on 2007 lobster purchases, the number of lobsters reported can only rise.

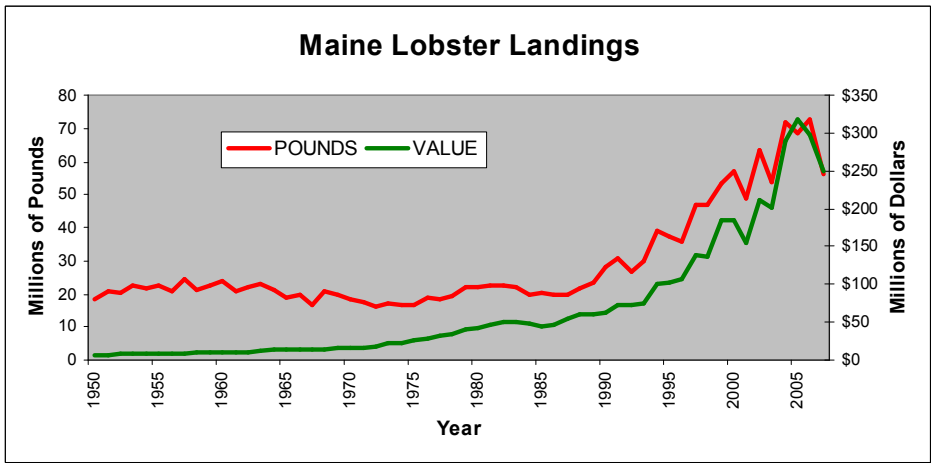

Figure 1. Number of pounds and dollar value of Maine lobster landed from 1950 to 2007. Data source: Maine Department of Marine Resources. Note that 2007 landings values are preliminary.

Current landings remain at almost three times the magnitude of historic landings, making it difficult to see 2007 numbers as a cause for alarm. Yet, the "word on the street" is that there is a problem. Such perception may be based on an expectation to catch more each year than the last because that is what happened for so many consecutive years. From an individual lobsterman's point of view catching fewer lobsters than the previous year must feel unpleasant. More frightening is the

lingering thought of what to expect the following year. Will lobstermen catch fewer and fewer lobsters for the next stretch of years? Is the catch on its way down? And if it falls can it rise again?

While there are no simple answers to these and related questions, several variables influence the landings and have no doubt contributed to both the numbers of lobsters available (such as environment and predation) and our ability to take advantage by harvesting them (fishing effort).

To sustain a thriving lobster fishery it is imperative to keep the fishery healthy so that lobsters can maintain a high productivity. Taking too many for even a short length of time can change lobster population dynamics vastly enough to make the sustainable productivity a small fraction of what it was.

Looking at the landings graph (Figure 1), it seems obvious to conclude that taking 20 million pounds per year was probably sustainable. A sharp rise in landings began in the 1990's and continued as a more or less steady rise until the early 2000's when the fluctuations in annual landings have become so dramatic that some years the change from the year before approaches the 20 million pound historic total. The big question is not why 2007 landings were lower than 2006, but what happens to make the landings rise and fall and what level is sustainable.

Even if we can't know precisely what is happening due to the complexities of the Gulf of Maine ecosystem and cumulative impacts of man and nature, surely there are steps we can take to safeguard the lobster population to keep lobsters strong, reproductively active and sustaining their and our futures.

Lobster stocks have dropped back toward or fallen to historic pre-1990's levels in other areas including Long Island Sound, Rhode Island, and other areas South of Cape Cod. Is there anything Maine can do to avoid a similar fate? Perhaps now is a good time to devise a better plan for protecting the future of Maine lobsters and in so doing, Maine's lobster industry.

Environment

Environmental variables – most notably temperature – have been favorable for Maine lobsters during the past 2 decades. Increased temperatures can accelerate growth and have apparently led to increased settlement and survival of juvenile lobsters. In addition, favorable temperatures for hatching and settlement may be leading to greater numbers of juveniles living in DownEast parts of Maine. Long-term data from our Juvenile Lobster Monitoring Program support this hypothesis.

TLC data show that annual settlement and abundance of young-of-the-year lobsters remained relatively low from 1993-2001 (Figure 2). Then in 2002 the number of young lobsters started heading up a bit, and have increased ever since (Figure 2). The marked increase in 2002 was probably due largely to increased temperature. Thresholds associated with temperatures most suitable for embryos to hatch and postlarvae to settle have been well documented in the laboratory and in models. Numbers of lobsters settling and surviving through their first year on the sea floor increased dramatically when the mean annual water temperature rose above $10^{o}C$ ($50^{o}F$). There were simply more days in more months when water temperatures were conducive to larval hatching, settlement and survival.

In addition, higher temperatures in historically colder waters of DownEast Maine may be contributing to the occurrence of settlement in areas where our volunteers formerly found few or no newly settled lobsters – including Jonesport, Winter Harbor and Islesford.

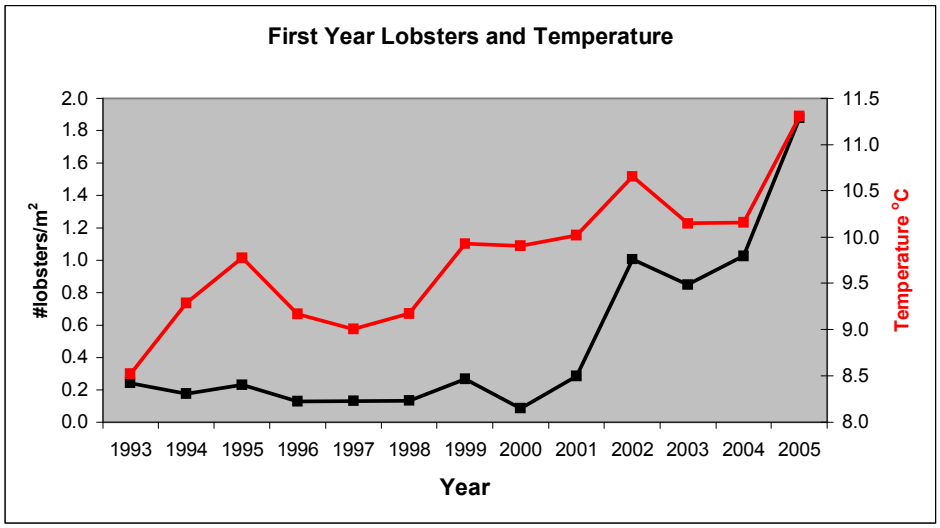

Figure 2. Average annual lobster abundance (in black) and temperature (in red). Data sources: lobster densities from The Lobster Conservancy's juvenile lobster census, sea surface temperature from Maine Department of Marine Resources in Boothbay Harbor.

It takes a Maine lobster an estimated 7 to 11 years to reach maturity. Although our juvenile lobster census bodes well for the future because we have recorded increases in numbers of recently-settled and early juvenile lobsters from 2002-2007, we fear that even if these young lobsters are fortunate enough to grow up and enter the fishery it may not be enough to sustain record high catches in the long term because there is no guarantee that high numbers of juveniles will continue to appear year after year.

One of the problems with knowing how high abundance of juveniles translates to future landings is that we have no idea what settlement was like in the 1970's and 1980's during the time that would have contributed to the high landings in the 1990's. Meanwhile, TLC scientists, staff and volunteers will continue our commitment to gathering the long-term data necessary to tease out such relationships.

One caveat to keep in mind when viewing the potentially positive effects of warming waters in the Gulf of Maine for juvenile lobsters concerns adult lobsters. Elevated winter temperatures pose a potentially dangerous threat to would-be reproductively active lobsters. Waddy and Aiken ((1992) Invertebrate Reproductive Developments 22:245-252) discovered that low winter temperatures were required during winter months for lobsters to produce both eggs and sperm. While all tagged lobsters recording temperature in our Lobster Sonar Tracking Project the winter of 2002-2003 found sufficiently low temperatures (Figure 3), subsequent winters have been much warmer. This winter is the first that our lobster pound on Friendship Long Island hasn't frozen over. This is a potential worry because eggs and sperm are mandatory for future lobster production. We need to pay far more attention to the needs of brood stock lobsters because without them, there will be no young-of-the-year.

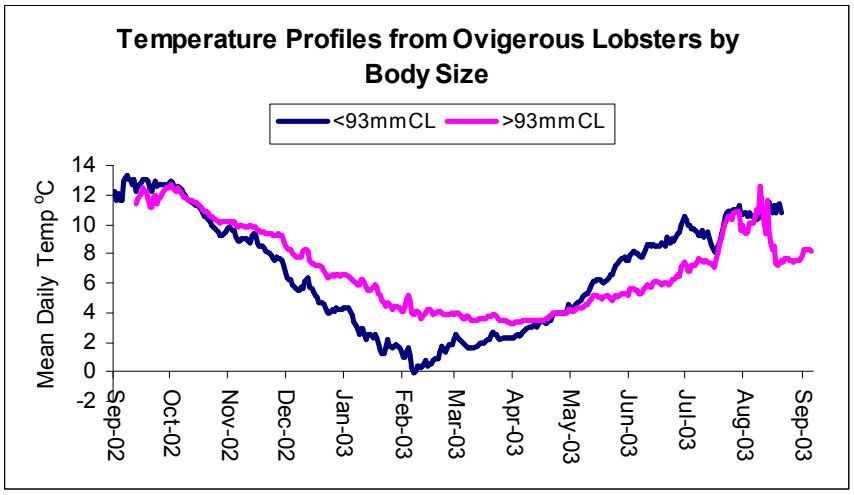

Figure 3. Temperature profiles recorded by 30 egg-bearing lobsters averaged by body size. Note that 10°C is 50°F and 0°C is 32°F. Figure from Cowan *et al*, Marine Biology (2007) 150:463-470.

Predation

The arguments stating that reduction of predation by codfish on lobsters has led to higher numbers of lobsters don't seem to be supported by the data. Time series of historic abundance of lobster and cod indicate that large lobsters and large cod coexisted at huge numbers in the 19th and early 20th centuries. Besides, lobsters still have many predators – anything with a big enough mouth or a trap. The most efficient lobster predator is man. Although increased human predation on lobsters is a feasible explanation for numbers being caught, reduced predation by other species probably makes up a much smaller part of the picture.

Fishing Effort

Fishing effort has changed in a number of ways over the past two decades. Along with a transition to bigger, faster boats with technologically advanced electronics including global positioning units, Maine lobstermen have traded in three-foot single parlor traps for four-foot long traps with two parlors. The kitchen is the trap chamber that holds the bait while the parlor is the room where lobsters get trapped. Having two parlors allows at least twice as many lobsters to occupy a single trap and limits their options for escape. Bigger, faster boats are more efficient because they allow lobstermen to shift gear to exploit freshly molted lobsters (especially female lobsters that have just molted into reproductive size, mated for the first time and have not yet extruded eggs). Recently molted lobsters are highly motivated to feed and are easily captured.

Along with the above mentioned increases in effort, it appears that there may have been a concurrent range expansion in the lobster trap fishery that puts far greater pressure on previously underexploited and now probably fully exploited or – (hopefully not) overexploited lobsters in lobster management Area 1 (the Gulf of Maine region outside of state waters and inside 40 miles). No hard data exist to support a range expansion because the lobsters captured in Area 1 and landed in Maine are reported as part of the overall Maine catch.

In addition dragger-caught lobsters as well as the trap fishery in Area 3 and the Outer Cape take large lobsters that are illegal to harvest in Area 1. Although the current state of the lobster population and the lobster fishery offers a complex web of problems with a myriad of potential solutions, the loss of irreplaceable large brood stock lobsters is perhaps the worst offense because behemoth animals are the best current hope for stock recovery if there is a marked downturn in

catch. The veritable non-existence of large lobsters in Long Island Sound – where the stocks have collapsed and are not recovering – should serve as the utmost of the multitude of reasons to guard against loss of "oversized" lobsters in Gulf of Maine waters.

Many lobstermen and recreational boaters complain that there are too many traps in the water. Maine adopted trap limits in the early 1990's as an attempt to reduce fishing pressure. The trap limit rule backfired for several reasons – the most onerous of which was a build up of traps in the water. The number of traps increased for two reasons, (1) there was no concurrent limit on the number of licenses, and (2) lobstermen bought more traps to rise to the limit. Instead of having a few lobstermen with large numbers of traps, we ended up with most fishermen having the maximum allowable gear.

Bigger, faster boats, more efficient gear, additional sternmen, more bait, varying soak times are just a few of the seemingly countless ways to increase effort. Attempts to limit effort don't work because fishermen are clever and can find new improved ways to catch what's there. It makes sense that profits would soar and fewer backs would be sore if there were fewer traps in the water because lobstermen could probably catch the same number of lobsters using fewer traps, less bait and less fuel. That's all well and good, but it doesn't necessarily help the lobsters or the long-term sustainability of the lobster fishery.

Solutions

Action should be taken before there is a crisis. The best existing rules and the best potential solutions are the ones that protect the lobster's biology. Such measures are easier to enforce than effort reduction, are fair in terms of treating all lobstermen the same way and have proved valuable in the past. They also make good sense.

Three of Maine's greatest regulations have long been and are still the prohibition on harvesting (1) females carrying externally attached embryos, (2) all lobster below a minimum size limit, and (3) all lobsters above a maximum size limit. That said, the minimum legal size for capture is still one full molt increment below the size at 50% maturity, which is not as good as it could be at protecting immature animals and it weakens the protection of egg-bearing lobsters if too few survive the fishery to breed. That leaves the maximum size limit as potentially the best safety net.

Lobsters in Maine state waters are protected from harvest once they reach five inches in carapace length which translates to about three and a half pounds for females and four to four and a half pounds for male lobsters. In recent years, some other states have adopted this or a bit less stringent rule but there are still waters where mammoth lobsters (the maximum recorded size is 44.5 pounds) are fished including outer Cape Cod and some offshore waters. The bigger problem is that Maine is the only state that prohibits the buying and selling of large lobsters. As long as there is a market for the "oversized" lobsters in 49 states, they will be captured, bought and sold. Therefore, having other fisheries management areas adopt Maine fishing practices is not enough if these areas don't at the same time prohibit their local markets from buying the brood stock lobsters from another source.

Other potentially effective ways to protect lobster biology include having closed areas centered on breeding and spawning grounds and closed seasons during times when lobsters are mating and egging-out. The one conservation area in Maine that had a closed season (Monhegan Island) just weakened its rules to add two more months of fishing.

Meanwhile, we need better information regarding the location of breeding and spawning areas. In the past two decades, science has learned quite a lot about nursery habitats but we still know next to nothing about hot spots for breeding and brooding. The Lobster Conservancy will continue to work on developing new projects to fill in the gaps in our knowledge with an ever present and relentless drive to strive to sustain a thriving lobster fishery through science and community.

Juvenile Lobster Monitoring Program
It was a slow winter for the juvenile lobster census at Friendship Long Island and Lowell's Cove in Harpswell, Maine. Foul weather brought by a low pressure system reduced our ability to sample in January and deemed reaching lobster rocks impossible in February. High pressure and favorable tides put us back in full swing for March sampling. Overall, winter lobster densities were about average, with numbers of juveniles this winter higher than most years, but lower than the top years.

Welcome to new volunteers Jennifer and Jonathan Braff and Marissa McMahon who comprise the newly recruited Lowell's Cove census and tag team. Marissa also volunteers at the TLC office in Friendship where she is becoming expert at data processing. Many of Marissa's graphs will be featured at the presentations of results for TLC's Volunteer Season Kick-Off Meeting at the end of this month.

Reminder to volunteers: the season kick-off will be held in a new location. Many thanks to Professor Brian Tarbox for making it possible for TLC volunteers to practice and hone their lobster census skills by sharing his laboratory and lobsters at Southern Maine Community College.

Outreach and Education
Diane ventured to Long Island Sound to share what The Lobster Conservancy has learned about lobsters with lobstermen from the Connecticut side (who attended her presentation at the Coast Guard Academy in New London) and in Riverdale on the New York side. The Long Island Lobstermen's Association annual forum was well attended and interest in TLC's research was great enough to lead to discussions of teaming up to do some research projects on both juvenile and adult lobster behavior and ecology in the summer and fall of 2008. Post-lecture discussions focused on the differences between how Maine and Long Island lobsters appear to behave in response to seasonal changes in the lobsters environment. We'll be sure to keep you abreast of what we plan and learn.

A TLC photo of an egg-bearing lobster held in Sara Ellis's hands appeared in Scholastic Science World Magazine in a February 18, 2008 article entitled, *Lobsters in a Pinch.* Our work along with some views on why the lobster landings may be declining appeared in the Steve Mistler's February 22nd piece in the Falmouth Forecaster, *Fishing on the Edge of Disaster* (http://www.theforecaster.net/story.php?storyid=13933). Executive Director Diane Cowan and Board Chair Amy Watson met with Leila Percy for a televised interview at Harpswell Television (H-TV) on February 24th. The three women were so enthralled and engaged with their subject matter and the feisty male and female lobster stars of the show that the event felt like one of the shortest half hours on record.

Memberships
A hearty thank you to new members and to those of you who have renewed your TLC membership! More new members are always welcome. Become a member today by visiting www.lobsters.org

and clicking on the membership icon. Your contribution to TLC is a terrific investment in the future sustainability of the Gulf of Maine lobsters!

Until next time, Good Fishing and Happy Spring!

Yours in TLC,

Diane Cowan, Jane Roundy, and Sarah Lash