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UNH Researchers Track Lobster Migrations To Improve Population Estimates

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DURHAM, N.H. - Jason Goldstein checks his lobster traps in New Hampshire's Great Bay Estuary once a week, but not for tasty crustaceans to sell. Instead, the University of New Hampshire Ph.D. candidate is fitting these lobsters with transmitters and tracking their migrations year-round.

Goldstein has tracked lobsters along the New Hampshire coastline and into Great Bay throughout the past two years. This research, funded by N.H. Sea Grant, will provide more accurate information about the sources of juvenile lobsters and interactions between the population stocks in New England. The information could improve the management of this economically valuable fishery, thus allowing lobster to remain front-and-center among the New England menu choices.

Goldstein and UNH professor of zoology Win Watson are particularly interested in the movements of "berried" females, those carrying eggs. This year, they are comparing the berried females' movements with those of the large- and small-sized males and females without eggs. Where the berried females go, so go their eggs, and those movements likely have implications for New England lobster populations.

"We often go diving one day and there are a lot of lobsters around, and the next day they're all gone and have moved offshore," Watson says. "There's a dramatic shift that takes place in late autumn and causes them to move out into deeper water."

Watson and other researchers believe this drive to migrate is primarily due to water temperatures. The deep offshore waters are consistently warmer in the winter and cooler in the summer than shallower water close to the shore, Watson explains. Lobster migrations might also be driven by turbulence in the water, particularly during autumnal storms.

"They are very mobile animals and move around to avoid bad conditions," Watson says. He notes that the average lobster can walk from the Isles of Shoals to the New Hampshire shore - up to 10 miles - in just a few days.

Along with other students and technicians, Goldstein has spent numerous hours tracking the lobsters using ultrasonic and handheld hydrophone tracking equipment to locate them and determine their movements. Commercial lobstermen are assisting Goldstein by helping to tag some of the creatures they find in their traps. In many cases, lobstermen who capture tagged lobsters will call Goldstein to report the tag number and location.

In addition, 15 "lobster listening stations" moored throughout Great Bay and the coastal waters allow researchers to more accurately pinpoint where the lobsters go. These stations hold special ultrasonic receivers that can identify and record tagged lobsters moving within a 400-meter radius of the equipment. For example, receivers are currently located at the Great Bay Marina, the Shafmaster dock, the Public Service of New Hampshire power stations, and the Weathervane dock in Portsmouth.

The various tracking efforts have led to a wealth of knowledge. Watson originally hypothesized that berried females would be more likely to move offshore to protect the eggs during the winter months. However, he was surprised to find out that most lobsters, regardless of size, gender or maturity, followed the same migration patterns.

The researchers also learned that relatively few berried females are located in the estuary, while male lobsters are often found there. Goldstein and Watson theorize that the estuary is too extreme an environment for most females carrying eggs, so they migrate toward the ocean when they reach sexual maturity.

In addition to studying the migrations of the adult lobsters, Watson and Goldstein are using oceanic drifters - submerged box-like structures that mimic the movements of lobster larvae - to learn how the movements of berried females could impact where larvae are released and the path they travel when carried by ocean currents during the three weeks they are in the water column prior to settlement. They've found the drifters, which are fitted with satellite transmitters so they can monitor them remotely, travel as far away as Cape Cod and Georges Bank. However, those released in Great Bay estuary tend to remain there, likely to the detriment of the lobster populations.

"The estuary is not the best place for lobster larvae because of the warmer temperatures, higher turbulence and lower salinity," says Watson. "That might explain why there are few mature females there."

Putting all these data into perspective will be Watson's next step. He hopes to apply what he has learned to improving management practices for the species. In particular, Watson wants to know if New Hampshire lobsters can be managed in isolation or if the management unit needs to be larger.

"If our lobsters are leaving for Massachusetts or elsewhere, then we need to work together to better manage the population," he says.

The University of New Hampshire, founded in 1866, is a New England liberal arts college and a major research university with a strong focus on undergraduate-oriented research. A land, sea and space-grant university, UNH is the state's flagship public institution, enrolling 11,800 undergraduate and 2,400 graduate students.

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Photographs available to download:
www.unh.edu/news/img/lobster_tag.jpg
Caption: UNH Ph.D. candidate Jason Goldstein holds a lobster with a temperature logger, an ultrasonic transmitter and a return tag. These items are secured to the lobster like a lightweight backpack to help UNH researchers learn about their migration patterns.
Credit: Rebecca Zeiber, NH Sea Grant

www.unh.edu/news/img/listening_station.jpg
Caption: Goldstein surveys the Great Bay "lobster listening station" that holds an ultrasonic receiver to identify and record tagged lobsters moving within a 400meter radius of the equipment.
Credit: Rebecca Zeiber, NH Sea Grant

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