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NH Sea Grant

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UNH Horseshoe Crab Research Benefits From Model Airplane Flyovers

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DURHAM, N.H. – New research on horseshoe crabs is taking to the friendly skies over Great Bay.

To survey pits dug by horseshoe crabs in the sediments of the Great Bay Estuary, researchers attached a small camera onto a model airplane. This novel approach allowed University of New Hampshire graduate student Wan-Jean Lee to determine the extent of the horseshoe crab impacts without having to mar the sediments by walking over them. Lee, a Ph.D. candidate in zoology, stood on the bank at Adams Point in Durham, directing Joshua Idjadi, assistant professor of biology at Eastern Connecticut State University, as he maneuvered the plane over certain areas and at various altitudes by remote control.

Lee’s research, sponsored by the Cooperative Institute for Coastal and Estuarine Environmental Technology, NOAA’s Great Bay National Estuarine Research Reserve and N.H. Sea Grant, focuses on sediment disturbance by foraging horseshoe crabs to see how it impacts the invertebrate community. Video data collected from the model airplane flyovers will determine the extent and location of the disturbance in the bay.

In late spring, the crabs migrate to the mud flats in the Great Bay Estuary to spawn. The adults revisit the mudflats throughout the summer until early fall, digging around in soft sediments looking for invertebrates to eat and creating round pits about one foot in diameter. When the tide recedes, the crabs move into deeper waters and the newly exposed mud resembles the surface of the moon.

There is a growing recognition that organisms can impact their environment in physical ways, similar to how a beaver can change a flowing stream into a pond by constructing dams, explains Jeb Byers, associate professor of ecology at the University of Georgia, formerly a UNH professor of zoology who continues to serve as Lee’s graduate adviser. The horseshoe crabs’ pit digging can influence the sediment structure, size and amount of organic matter, and turbidity, all of which can then influence the type of organisms that inhabit the sediment.

“No one has ever investigated how these pits change the turbidity, biogeochemistry or biota,” Byers said. “These are seemingly large and obvious effects but they’ve been off the radar screen thus far.”

The rates of disturbance are highest in late summer and begin to taper off in early fall each year. This is not a new phenomenon, and both Lee and Byers emphasized that the pit digging is normal in Great Bay.

“The term ‘disturbance’ has a negative connotation,” Lee said. “But the truth is that disturbance is a natural part of the ecology.”

Lee collected sediment samples in the pits and compared the invertebrate community to undisturbed sediments half a meter away. Her research indicates that less than a day after a pit is made by the crabs, there is a significant reduction in the abundance of invertebrates as compared to the undisturbed sediments. This remains true for up to three days after the pit is dug, as invertebrates begin to return after that point.

Lee will continue to monitor the invertebrate densities and horseshoe crab activity throughout other areas of the bay to better understand the role that crabs play in the ecosystem. The results will also be used to aid in education and outreach in the future, Byers said.

The University of New Hampshire, founded in 1866, is a world-class public research university with the feel of a New England liberal arts college. A land, sea, and space-grant university, UNH is the state's flagship public institution, enrolling 12,200 undergraduate and 2,200 graduate students.

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Aerial and other video of Wan-Jean Lee’s horseshoe crab research is here: http://vimeo.com/16041752

Photographs available for download:

Caption: Joshua Idjadi, assistant professor of biology at Eastern Connecticut State University, launches his radio control airplane over Great Bay.
Credit: Rebecca Zeiber.

http://www.unh.edu/news/cj_nr/2010/oct/bp21crab_03.jpg
Caption: University of New Hampshire graduate student Wan-Jean Lee surveys pits dug by horseshoe crabs in the sediments of the Great Bay Estuary.
Credit: Rebecca Zeiber.

Caption: Idjadi controls his radio control airplane as it shoots video of horseshoe crab pits above Great Bay.
Credit: Rebecca Zeiber.

Caption: Pits dug by foraging horseshoe crabs give the sediments of Great Bay a lunar quality.
Credit: Rebecca Zeiber.

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