

NEWS RELEASE

Media Contacts: Dr. Bob Fornaro, 919/515-7848 or
fornaro@adm.csc.ncsu.edu
Mick Kulikowski, News Services, 919/515-3470 or
mick_kulikowski@ncsu.edu
Kathleen Angione, keangion@unity.ncsu.edu

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Tiny Sensor-Based Computers Could Help Track Wildlife

FOR IMMEDIATE RELEASE

Computer scientists at North Carolina State University aren't afraid of the big bad wolf – instead they're revolutionizing the technology that tracks him. The NC State researchers are studying how tiny, sensor-based computers can improve wildlife tracking methods for red wolves in eastern North Carolina.

Current tracking methods based solely on radio telemetry are expensive, cumbersome and provide limited data, said Dr. Robert Fornaro, professor of computer science at NC State. Wildlife researchers can currently track red wolves using radio collars, but this approach doesn't show the big picture, said Mark MacAllister of the North Carolina Zoological Society. "Radio telemetry helps us understand locations," he said, "but this new technology could help us understand behaviors."

Although red wolves are some of the most endangered animals in the world, very little is known about their pack dynamics. Since these tiny sensors can track location, movement patterns and environmental conditions throughout the day, researchers believe this new information could shed some light on pack behavior. By placing these devices on wolf collars, "We can find out who is hanging out with whom," MacAllister said.

Fornaro and colleagues from the N.C. Zoological Society and the N.C. Zoological Park are searching for sources of funding to support this research. But even as they wait for funding, they continue to plan for a project that requires sophisticated programming.

Wireless sensor systems are becoming commercially available; for example, Crossbow Technology markets a version called "MICA Motes." Powered by AA batteries, each MICA Mote measures only 2x1x1 inches, but is programmable and can be equipped with a global positioning system (GPS) component, a tiny radio transmitter, and a sensor board that detects light, temperature and acceleration.

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Throughout a given day, the GPS component would receive signals from satellites to determine the longitude and latitude of a specific wolf. At the same time, the sensor board would take a reading of temperature and light, as well as the wolf's direction and acceleration. These GPS and sensor readings would be stored on the wolf's collar. The on-board radio would transmit the animal's position to a computer base station nearby.

To accomplish this, Fornaro envisions using the devices in another role – to build a wireless network grid across areas of wildlife habitat to act as a data collection mechanism.

“If 10 or 15 Motes were attached to trees about every thousand feet, the grid could conceivably cover an area of about one-half square mile,” he said. Besides collecting and storing data, the Motes on the wolf's collar would also need to seek out these data-collection Motes and off-load collar information using its radio transceiver.

However, at certain times during the day, both the collar Motes and the grid Motes need to power down to conserve battery life. “So the wolf collar is either awake or sleeping, and the grid element is awake or sleeping,” he said. “Sometimes we may get the wolf next to the grid, but both Motes are asleep.”

This is one of several programming kinks that Fornaro and a team of students in the Computer Science Senior Design Center are working on. Both he and MacAllister believe Motes can improve tracking methods and supply wildlife researchers with more useful data.

And such knowledge would prove enormously helpful for projects such as the Red Wolf Recovery Program, which works to restore wild red wolf populations in eastern North Carolina.

Governed by the U.S. Fish and Wildlife Service (USFWS), the program has worked to restore wild red wolf populations in eastern North Carolina since 1987. The current red wolf population totals 100.

MacAllister and Fornaro also see MICA Mote technology helping urban planners and wildlife researchers conduct more complete environmental impact studies.

As the North Carolina Department of Transportation (NCDOT) plans to move forward to widen Highway 64 in Dare and Hyde counties – home of the Alligator River National Wildlife Refuge and prime red wolf habitat – Motes could be used to determine wolf activity patterns in the vicinity of the roadway. By understanding these patterns, researchers will be able to better predict the impact a wider highway would have on interaction among packs or red wolf fatalities caused by automobiles.

“In either case, the new data can only expand our understanding of the lives and habits of our red wolf neighbors,” Fornaro said.