Increasingly threatened loggerheads follow their own paths in travel, eating

March 24 2010, by Aaron Hoover

With loggerhead sea turtle nests in dramatic decline, researchers would love to know more about where the turtles go, and what they eat, so they can better protect the creatures' habitat.

Now, a team of University of Florida biologists from the Archie Carr Center for Sea Turtle Research teasing that information from the turtles' shells is reporting some surprising findings.

Doctoral student Hannah Vander Zanden writes in Tuesday's online edition of the journal *Biology Letters* that analyses of the chemical elements in the shells of 15 living female loggerheads suggests the turtles are remarkably individualistic in their range, diet, or both. The findings are unexpected because loggerheads -- named for their large heads -- are known to swim thousands of miles and eat 80 types of prey, often including crabs, whelks and many other ocean-bottom-dwelling creatures.

"The fact is, you have this big range of potential things they can eat, and potential places they can go, and it seems that individuals are not using that whole range," Vander Zanden said.

Although the findings need to be refined, the research could one day help scientists and public policy makers find and protect areas of the open ocean or coastal waters where loggerheads congregate or feed heavily. Such protection may be more and more urgent: On March 10, federal agencies proposed upgrading the turtle's status from "threatened"

to "endangered" among seven Atlantic and Pacific populations.

Vander Zanden's findings also shed light on the turtles' habits over a span of 12 years, at least three times as long as the longest study involving satellite-tagged turtles -- proving the worth of analyzing shells, or similar tissues in other animals, that contain forms of elements known as stable isotopes.

"It really revolutionizes our way of looking at these animals that have this kind of tissue," said Karen Bjorndal, UF professor of biology and director of the Archie Carr Center for Sea Turtle Research, noting such animals include whales with tooth-like baleen and mammals with tusks or horns. "This loggerhead research offers the longest records that I am aware of obtained from living individuals."

Agreed James Estes of the University of California at Santa Cruz, "The length of the method -- because of the isotopic analysis method -- is really unprecedented."

Vander Zanden used a small biopsy punch tool to gather pencil-eraser sized shell samples from adult female turtles while they were nesting at Cape Canaveral National Seashore in Florida. Removing the samples, which cut away only the dead tissue of the shell, is harmless and painless to the turtles.

She ground the samples into thin layers and analyzed them using a mass spectrometer, a machine that separates stable isotopes according to charge and mass.

The higher an animal on the food chain, the more heavy stable isotopes it accumulates, the greater the ratio of heavy to light isotopes in its tissue. Different ocean latitudes, meanwhile, have different ratios of light and heavy isotopes, ratios also incorporated into shells or other

tissues.

So while the analyses revealed that the turtles were surprisingly different in their individual diet or travels -- and that they maintained these differences over the dozen years of growth reflected in the shell samples -- it did not specify discrete food items or locations.

"The problem with stable isotopes is that diet and habitat are kind of confounded," Vander Zanden said. "So we can't necessarily parse out what is causing these differences. Whether this turtle is eating just blue crabs or is eating whelks. Whether this turtle is eating in New Jersey or in the Bahamas."

She said she will seek to sort out that question in the remainder of her dissertation research -- with luck filling in major gaps about a species once celebrated as healthy but today viewed as in jeopardy. While population numbers for adult members of the species are somewhat mysterious, it is known that nests in the U.S. have declined 41 percent in the past 10 years, Bjorndal said.

"It is very important to know where they are, and what they are doing, so this work is critical," she said.

Provided by University of Florida