

Two studies map pollutant threats to turtles

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Adult male loggerhead turtle fitted with a transmitter for satellite tracking of migratory patterns. Credit: J. Keller, NIST

(PhysOrg.com) -- In a pair of studies—one recently published online and the other soon-to-be published— researchers at the Hollings Marine Laboratory (HML), a government-university collaboration in Charleston, S.C., report that persistent organic pollutants (POPs) are consistently showing up in the blood and eggs of loggerhead sea turtles, that the turtles accumulate more of the contaminant chemicals the farther they travel up the Atlantic coast, and that the pollutants may pose a threat to the survival of this endangered species.

POPs are a large group of man-made chemicals that, as their name indicates, persist in the environment. They also spread great distances through air and water, accumulate in human and animal tissues, infiltrate

food chains, and may have carcinogenic and neurodevelopmental effects. POPs include banned substances such as DDT and toxaphenes, once used as pesticides; polychlorinated biphenyls (PCBs), once used as insulating fluids; and polybrominated diphenyl ethers (PBDEs), once used as flame retardants. While POPs have been recognized for many years as a health threat to loggerhead turtles (*Caretta caretta*), there is little scientific data available to help understand the nature and scope of the risk.

"This uncertainty makes it difficult for wildlife conservation managers to make informed decisions about how best to assist the recovery of the loggerhead species," says National Institute of Standards and Technology (NIST) researcher Jennifer Keller. "Our recent studies provide some of the first measurements of POP levels in adult male and nesting female loggerhead turtles at various locations across their migratory range."

In the first study, HML researchers from NIST and the College of Charleston (C of C), working with the South Carolina Department of Natural Resources (SCDNR), used satellites to track 19 adult male loggerheads that had been captured in 2006 and 2007 by the SCDNR near Port Canaveral, Fla., fitted with transmitters on their backs and then released back into the wild. The animals, whose blood had been drawn at the time of capture and analyzed for POP concentrations, were followed for at least 60 days to learn their travel patterns. Ten turtles travelled north along the Atlantic coast, eventually migrating to ocean shelf waters between South Carolina and New Jersey. The other nine remained residents in Florida.

Blood plasma concentrations for all of the POPs examined were higher in the transient loggerheads, suggesting that they had eaten prey that were contaminated, such as crabs, in the northern latitudes during previous migrations. Additionally, the loggerheads that travelled farthest north had the highest POP concentrations in their systems. "This may be

because the turtles' northern feeding grounds are subjected to higher levels of POPs from areas more populated and more industrialized than those in Florida," says C of C researcher Jared Ragland.

In the other HML turtle study, Keller and researchers from the National Oceanic and Atmospheric Administration (NOAA), Florida Atlantic University and Duke University measured a large suite of POPs in loggerhead egg yolk samples collected from 44 nests in western Florida, eastern Florida and North Carolina. The team found that POP concentrations were lowest in western Florida, at intermediate levels in eastern Florida and highest in North Carolina.

"This, we believe, can be partly explained by the foraging site selections of nesting females," Keller says. "[Turtles](#) that nest in western Florida forage in the Gulf of Mexico and the Caribbean Sea where POP contamination is apparently lower than along the Atlantic coast of the United States where the North Carolina nesters forage, whereas the eastern Florida nesting females forage in areas that overlap the two in terms of geography and POP levels."

More information: J.M. Ragland, et al. "Persistent organic pollutants in blood plasma of satellite-tracked adult male loggerhead turtles (*Caretta caretta*). *Environmental Toxicology and Chemistry*, Vol. 30, No. 5, May 2011 (published online Apr. 20, 2011).

J.J. Alava, et al. "Geographical variation of persistent organic pollutants in eggs of threatened loggerhead sea turtles (*Caretta caretta*) from southeastern USA." *Environmental Toxicology and Chemistry* (accepted for publication Apr. 12, 2011).

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