

Study shows commercial harvest of snapping turtles is leading to population decline

October 26 2017, by Leah Small



Ben Colteaux, Ph.D., in the Integrative Life Sciences program holds a snapping turtle in the field. Credit: Courtesy of Team Snapper

Crawling through neck-high mud on riverbanks is a dirty job, but someone has to do it for the sake of Virginia's snapping turtles.

That task falls on Benjamin Colteaux, a Ph.D. candidate in Virginia Commonwealth University's Integrative Life Sciences program, and other members of "Team Snapper" working in the lab of Derek Johnson, Ph.D., associate professor in the Department of Biology in the College of Humanities and Sciences.

For four years, the researchers spent several weeks at a time trekking through muddy turtle turf to catch and tag the animals, and record indices of health and growth for multiple studies on the impacts of wild turtle harvesting.

"Some would say it's disgusting and messy, but for my team and me it's been a blast!" Colteaux said.

Team Snapper has documented the extent of snapping turtle population decline due to skyrocketing rates of harvesting in Virginia—a trend also occurring in other states. Three tributaries of the Mattaponi, Chickahominy and Rappahannock rivers served as study sites with harvest levels ranging from zero to almost 50 percent of the snapping turtle population.

More than 200,000 wild snapping [turtles](#) were harvested across the United States in 2012 and 2014, Colteaux said, a dramatic increase from the nearly 50,000 harvested cumulatively from 1999 to 2011.

Colteaux said increased harvesting of wild snapping turtles may indicate growing pressure on domestic snapping turtle farms, which may not be meeting demand. The vast majority of wild snapping turtles harvested throughout the country are exported to Asian markets, mainly China, where animal populations have been decimated and farming efforts are nascent, he added.

Colteaux, who heads the snapping turtle project, is partnering with

Johnson on four scientific papers that will show the impacts of harvesting on wild snapping [turtle populations](#). During his dissertation defense in November, Colteaux will present data gathered in the field from 2012 to 2015.

The pair published a paper last year in the *Journal for Nature Conservation* on the efficacy of size limits for harvest reduction. In addition, one of Colteaux's field technicians went on to earn her master's degree in environmental studies from VCU based on data from this project.

"Low hatchling survival, combined with late maturation and prolonged harvest, has the potential to decimate populations in a very short period of time," Colteaux said. "Even if harvest is reduced or eliminated, it will take decades for populations to rebound."

In Virginia, the population decline has led to consideration of regulatory changes that would further protect the turtles. The Virginia Department of Game and Inland Fisheries, the state's primary wildlife regulatory agency, has funded most of Team Snapper's work to learn more about snapping turtle population stress. The researchers have also received substantial contributions from the VCU Rice Rivers Center.

"It's one thing to say we need to preserve wild snapping turtle populations, but protective legislation is made more effective when it's informed by solid research," Colteaux said.

Saving the turtles



Team Snapper measures a turtle's shell and fits it with a tracking device. Trackers help scientists determine the animal's territorial boundaries. Credit: Team Snapper

The data to back up stronger regulations to protect turtles was difficult to collect, considering the aquatic creatures' habit of submerging to dine on

fish and the detritus on river bottoms. Team Snapper spent months traipsing through muck to set 20 netted traps daily in each of the three study sites. Armed with protective gauntlets that guard against the animal's claws and powerful legs, the researchers checked the traps the morning after setting them. They recorded weight, size, sex and other demographic measurements for any turtles that wandered into the nets.

"Each one is then fitted with a numbered tag, in the hope of recapturing them at some later date," Colteaux said. "It's incredibly hard work and a lot of trudging through mud and hauling back nets and turtles."

When turtles are recaptured over subsequent seasons, the researchers are able to record growth rates and estimate population sizes. Many of the turtles are fitted with tracking devices that are painlessly bolted onto their shells, allowing the team to track range boundaries, assess whether animals are territorial and identify variations in range size between the sexes and across seasons.

"We use a handheld receiver to track their positions. Frequently, we were up to our necks in mud or water with the receiver overhead following the beeps," Colteaux said.

This work is the first of its kind, Colteaux said. Previous studies on these animals have focused on lakes and other still bodies of water. Team Snapper has collected a wealth of new information on turtle life in river systems that can be used to launch more studies by researchers at any institution.



Field technician Eric Burke uses a radio receiver to track snapping turtles.
Credit: Team Snapper

"Studying these animals in an open water system is critical to understanding the potential effects prolonged harvest has had on populations, as the majority of wild turtles harvested come from rivers

and not lakes or ponds," Colteaux said.

Changing regulations

Virginia is one of many states that have regulations on the size snapping turtles must reach before harvest. In 2012, size limits were increased from a curved carapace length of nine inches (which is a measurement of a shell from front to back over its peak) to a length of 11 inches.

While that is an improvement, it is not enough to protect the turtles, Colteaux said. Totuskey Creek, located off the Rappahannock River, had an estimated harvest rate as high as 46 percent annually from 2012-2015. The rate was the highest of the three sites studied. Meanwhile, in areas untouched by harvesting, turtle populations are thriving. One such site is Morris Creek, a tributary of the Chickahominy River, which had an estimated annual population increase of 4 percent over the same time frame. VDGIF staffing constraints have also hampered regulation enforcement and public attention has focused more on the protection of big game, Colteaux added.

But as concern for snapping turtles grows, so does self-policing by the watermen who harvest the animals. Many harvesters frequently report to authorities incidences of overharvesting by watermen from neighboring states working under Virginia licenses. The majority of commercial snapping turtle harvest in Virginia is driven by out-of-state harvesters, Colteaux said.

"The VDGIF receives many calls that are from lifetime harvesters who say their fathers taught them and it's a family tradition. They are complaining there are too many out-of-state harvesters taking too much," he said. "They are at least letting us know where there might be a problem and allowing us to get some eyes on the issue."



Armed with gauntlets, or protective gloves, Colteaux holds a snapping turtle.
Credit: Team Snapper

The researchers also work with domestic turtle processing plants to ensure the facilities are not purchasing from harvesters animals that do not meet the size limit. One of the largest of these plants is located in Maryland. From there, live females are shipped to China to augment aquaculture operations. Males are mostly butchered, and the meat sold to a variety of domestic and foreign markets. A small turtle plant that serves local markets is located in Virginia Beach.

To better inform VDGIF regulators on turtle harvesting, the researchers are calculating the impact that Virginia's previous and current harvest size limits have on population decline. They are also analyzing a plethora of potential harvest regulations to find the best method to ensure viability of the populations. Two scenarios include increases to the minimum size limit and the establishment of a maximum size limit.

As Colteaux's mentor and co-author, Johnson taught the wildlife conservationist much of the analysis and data interpretation required to draw conclusions from the scenarios.

Johnson helped Colteaux use data on growth rates gathered from his recapture of snapping turtles, and other indicators of population health, to determine the impacts of overharvesting.

"When we combine Ben's data with other information on snapping turtles like harvest rates, survival probability and reproductive output, we can model population growth under various harvest pressure scenarios,"

Johnson said.

According to the researchers' models, if the stress on the population is reduced, snapping turtles could have a fighting chance because they are naturally hardy creatures.

"Once they get to the adult stage, they are bullet proof," Colteaux said. "Their estimated rate of survival at that point is about 94 percent and they can live upwards of 50 years. But getting them to that point is really tough under current harvest conditions."

More information: Benjamin C. Colteaux et al. Commercial harvest and export of snapping turtles (*Chelydra serpentina*) in the United States: trends and the efficacy of size limits at reducing harvest, *Journal for Nature Conservation* (2016). [DOI: 10.1016/j.jnc.2016.11.003](https://doi.org/10.1016/j.jnc.2016.11.003)

Provided by Virginia Commonwealth University

Citation: Study shows commercial harvest of snapping turtles is leading to population decline (2017, October 26) retrieved 12 May 2024 from <https://phys.org/news/2017-10-commercial-harvest-snapping-turtles-population.html>

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