Biology and Conservation of Alligator Snapping Turtles (Macrochelys)
2023 *Southeastern Naturalist* 22(Special Issue 12):78–83

Observations of the Suwannee Alligator Snapping Turtle from the Okefenokee Swamp

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Abstract - *Macrochelys suwanniensis* (Suwannee Alligator Snapping Turtle) is restricted to the Suwannee River drainage in Florida and Georgia. Over the last century, there have been scattered reports in the published and gray literature of *M. suwanniensis* sightings from the Okefenokee Swamp. This large wetland straddles the Georgia–Florida border and serves as the headwaters of the Suwannee River. Here, we discuss historic records of *M. suwanniensis* within the Okefenokee Swamp, provide details of recent sightings (2000–2021), including an extension of the known distribution to the northern portion of the swamp, and discuss the conservation and management implications of these observations.

Introduction: The Okefenokee Swamp

The iconic Okefenokee Swamp (hereafter, Okefenokee), at close to 200,000 ha in size, is among the largest freshwater wetlands in North America (Batzer et al. 2012, Folkerts 2002). Located in southeastern Georgia and northeastern Florida, the Okefenokee is a complex mosaic of habitats, including cypress and bay swamps, extensive prairies, sphagnum bogs, and small lakes (Edwards et al. 2013). Islands forested with *Pinus* spp. (pines) dot the swamp, and peat deposits form floating islands called "batteries". The name Okefenokee is derived from "O-ke-fin-o-cau" a Native American term meaning "land of the trembling earth", alluding to peat deposits that quake when walked on (Harper and Presley 1981). Due to these peat deposits, which vary in thickness from 0.08 to 4.6 m, the waters of the Okefenokee are highly acidic (pH = 3.3–4.0) and tannin-stained (Edwards et al. 2013, Wharton 1978).

The Okefenokee is drained principally by 2 blackwater rivers, the Suwannee River (a Gulf drainage) and the St. Mary's River (an Atlantic drainage) (Fig. 1). Although most water inputs into the swamp are from rainfall (and most outputs from evapotranspiration), the western half of the swamp is also strongly influenced by inflows from tributary streams (Batzer et al. 2012, Edwards et al. 2013). With respect to geohydrology, the Okefenokee has characteristics of an enormous depressional wetland. The swamp waters have both low mineral (Ca, Mg, Na, K, Cl) and nutrient (N, P) concentrations, and given the largely closed nature of this system, nutrients are intensively recycled by the resident biota (Batzer et al. 2012).

Much of the Okefenokee (~150,000 ha) is a National Wildlife Refuge managed by the US Fish and Wildlife Service, and a substantial portion of the refuge

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Manuscript Editor: David Steen

(>143,000 ha) is designated as a National Wilderness Area. Large portions of the Okefenokee were logged in the early 1900s, but logging operations are not thought to have significantly altered hydrologic regimes in the swamp. During the 1960s, an ~8-km earthen dam, the Suwannee River sill, was constructed on the west side of the swamp at the North Fork of the Suwannee River in an attempt to impound water to prevent wildfires (Loftin et al. 2000). The effects of the sill on turtle populations and movement, if any, are unknown (Enge et al. 2021). Here, we discuss historic and recent observations, of *Macrochelys suwanniensis* Thomas, Granatosky, Bourque, Krysko, Moler, Gamble, Suarez, Leone, Enge and Roman (Suwannee Alligator Snapping Turtle) within the Okefenokee, including the upper reaches of the Suwannee River and its tributaries. We compiled records from the literature, our own work (see Enge et al. 2021), and searched natural history collection databases (e.g., American Museum of Natural History, Cornell Museum of Vertebrates, Georgia Museum of Natural History, Florida Museum of Natural History, and vertnet.org) for additional records.

Suwannee Alligator Snapping Turtles in the Okefenokee

Several authors have mentioned Suwannee Alligator Snapping Turtles as occurring within the Okefenokee but provided no additional details (Laerm et al. 1980, Pritchard 1989, Wright and Funkhouser 1915). De Sola and Abrams (1933) described Suwannee Alligator Snapping Turtles as "being frequently hooked" in the Suwannee Canal near Camp Cornelia on the eastern side of the Okefenokee. Prichard (1989) suggested that *M. suwanniensis* was rare within the Okefenokee and upper Suwannee River and hypothesized that populations in this region were negatively impacted by historic harvest.

Recent status assessments have failed to document *M. suwanniensis* in the upper Suwannee River (155 trap nights) but have documented small numbers of turtles from several tributaries (Jones Creek, Suwannoochee Creek, and Tom's Creek; Fig. 1; Jensen and Birkhead 2003, Enge et al. 2021). The closest record is from Jones Creek, ~7 km from the mainstem of the Suwannee River. It is unclear why Suwannee Alligator Snapping Turtles appear to be absent from the Suwannee River in Georgia, but it may be related to both natural (low nutrients, low pH, and potentially low prey availability) and anthropogenic (historic harvest and habitat alteration) factors. Suwannee Alligator Snapping Turtle populations may have been able to persist in tributaries of the Suwannee River in this region because these smaller water bodies are often difficult to access and possibly experienced less historic harvest (Jensen and Birkhead 2003). Additional trapping in the St. Mary's River (not known to be historically occupied) did not document Suwannee Alligator Snapping Turtles (Jensen and Birkhead 2003). Overall, these survey results suggest that *M. suwanniensis* populations are extremely rare and/or highly localized in the upper reaches of the Suwannee River watershed.

No surveys targeting Suwannee Alligator Snapping Turtles have been conducted within the Okefenokee proper, and to our knowledge, there have been only 4 instances of a vouchered specimen or photograph of *M. suwanniensis* from the

Okefenokee from 1900 to 2020. These records include a skull collected in 1912 (American Museum of Natural History 69731), feet and tail collected by Wright in 1921 (Cornell University Museum of Vertebrates R-0000217), an individual photographed by Carr (1952), and a large male photographed in 2019 from the Suwannee Canal (Georgia Museum of Natural History 52076) (Fig. 1; Stevenson et al. 2021, Enge et al. 2021). Other reports of *M. suwanniensis* from the Okefenokee Swamp exist but cannot be verified through specimens or photographs.

On 29 April 2021, we were contacted by staff of the Okefenokee Swamp Park, Ware County, GA, who indicated that a large *M. suwanniensis* had been captured from one of the canals near their visitor center (31°3'22.248"N, 82°16'17.076"W; Fig. 1). The turtle was discovered when it was picked up by an aquatic weed-

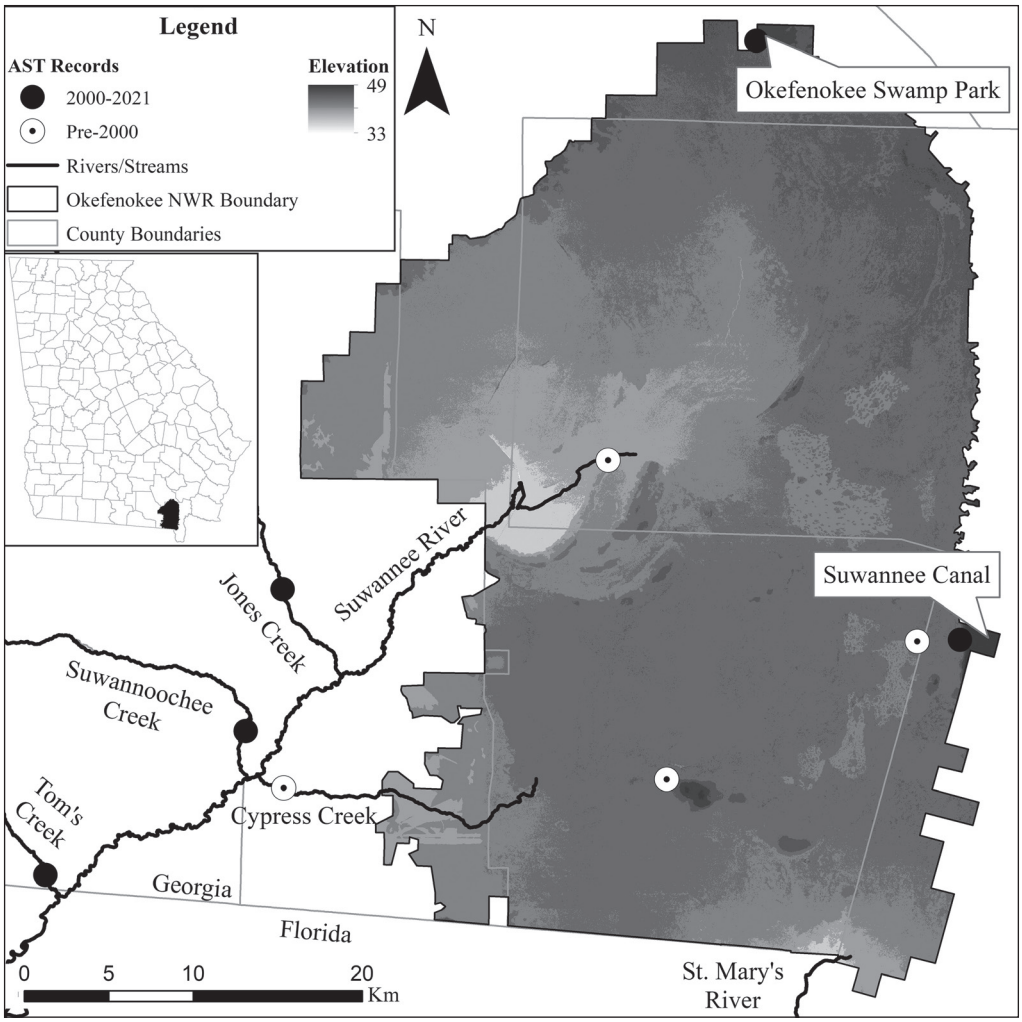

Figure 1. The Okefenokee Swamp National Wildlife Refuge (NWR) and northern portion of the Suwannee River have relatively few *Macrochelys suwanniensis* (Suwannee Alligator Snapping Turtle) records. Post-2000 records have been documented in the Suwannee Canal and at the Okefenokee Swamp Park, as well as several tributaries of the Suwannee River.

removal vessel during canal maintenance. This individual was a mature male, measuring 470 mm straight-midline carapace length and weighing 23.7 kg (Fig. 2; Georgia Southern University Herpetology Collection GSU-26897). The turtle exhibited a lunate carapacial caudal notch, which is diagnostic for *M. suwanniensis* (Thomas et al. 2014). This is the first verified record of *M. suwanniensis* within the northern reaches of the Okefenokee. This record, located ~37 km north of the nearest records from the Suwannee Canal, now represents the northeastern extent of the species' known distribution.

Recent observations may indicate the presence of an extant population of *M. suwanniensis* within the Okefenokee (although we cannot definitively rule out the possibility that these turtles were released into the swamp). While the 2 recent observations are from the periphery of the swamp, there are no obvious physical barriers that might prevent connectivity within the Okefenokee. A concentrated survey effort is needed to understand the distribution of *M. suwanniensis* within the Okefenokee. Potential surveys are complicated by the abundance of *Alligator mississippiensis* (Daudin) (American Alligator) within the swamp. Creative survey techniques may be needed instead of the traditional hoop-net surveys usually conducted for *M. suwanniensis*. Furthermore, we caution that the Okefenokee covers a large geographic area, with limited access, making detection challenging if *M. suwanniensis* occurs in low densities or localized patches. Currently, *M. suwanniensis* has been recommended for federal listing under the US Endangered Species Act (USFWS 2021). It is our contention that there is the potential for the Okefenokee to support a population of *M. suwanniensis* that could have a significant effect on

Figure 2. *Macrochelys suwanniensis* (Suwannee Alligator Snapping Turtle) captured from the northern end of the Okefenokee Swamp.

range-wide conservation and management efforts for this species (e.g., contribute to designations of critical habitat or development of recovery goals).

Acknowledgments

We thank the many people who have assisted with this research, including J. Barrett, J. Bolton, C. Dillman, K. Enge, H. Hall, G. Johnston, C. Jenkins, J. Jensen, L. McBrayer, P. Moler, B. Rice, T. Thomas, and C. Thompson. The recent observation described within was reported to us by Katie Antczak at the Okefenokee Swamp Park, and the turtle was handled under Georgia Department of Natural Resources Permit #1000476697. The manuscript was improved by comments from D. Steen and 2 anonymous reviewers.

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