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Occurrence of the Eastern Hellbender (*Cryptobranchus alleganiensis alleganiensis*) in the Coosawattee River System (Mobile River Basin), Georgia

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Abstract - Here we report the first record of the Eastern Hellbender in the Mobile River Basin (Cartecay River, Coosawattee River system) of northwest Georgia. Nearly all records of Eastern Hellbenders in the southeastern United States are from Tennessee or Ohio river drainages (Mississippi River Basin); a few historic records of presumably introduced origin are also known from the Savannah drainage (Atlantic Basin). We first captured this species in June 2009 while surveying for fishes. We then carried out Hellbender surveys at 6 sites and captured 2 individual Hellbenders in the Cartecay River within 1 river km of our first collection site. However, no more Hellbenders were found during additional fish surveys at 21 sites. Microsatellite data indicate an 84% probability of membership with a Hellbender population in the adjacent Toccoa River system (Tennessee drainage), suggesting either natural historic dispersal (e.g., via stream capture) or a more recent introduction from the Toccoa into the Cartecay system. Additional studies are needed to assess the full range, conservation status, and origin of this species in the Coosawattee River system.

Cryptobranchus alleganiensis alleganiensis Daudin (Eastern Hellbender) ranges from the southern edge of New York State south to northeastern Mississippi, with disjunct western populations in Missouri (Petranka 1998). This species has attracted considerable attention from scientists and conservation groups because of its ecological importance, evolutionary distinctiveness, increasing rarity, and value as an indicator of high quality aquatic habitat. Eastern Hellbenders are legally protected or officially recognized on special concern lists in most states in which they occur (Phillips and Humphries 2005). Thus, an important goal in many of these states is to monitor the status of existing populations and to identify new populations through surveys.

On 16 June 2009 during a backpack electrofishing survey for fishes on the Cartecay River (Coosawattee River system) in Gilmer County, GA, we captured, measured (330 mm total length), photographed, and released an adult Hellbender. This individual represents the first record of this species from the Mobile River Basin. Neill (1957) collected a single Hellbender specimen from a Tallulah River tributary in Georgia and also reports a "few old specimens of the Hellbender … on the South Carolina side of the Savannah drainage" relayed to him by personal communication. Montanucci (2006) reports a single specimen from Lake Tugaloo in South Carolina. Both of these Savannah drainage records pre-date 1971, and Hellbenders have not been found during recent surveys of streams in this drainage (Stephen Bennett, South Carolina Department of Natural Resources, Columbia, SC, pers. comm.). Other than the Savannah River drainage, Mobile River Basin (our record), and a similarly enigmatic population from the upper Susquehanna River of New York and Pennsylvania (Phillips and Humphries 2005), known Hellbender populations occur within the Mississippi River Basin (Jensen and Humphries 2007).

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Following the discovery of a Hellbender in the Cartecay River, we searched for Hellbenders at the original observation site, at three additional Cartecay River sites (0.6–10.2 river km upstream), and at two sites on Amicalola Creek (Etowah River system, Mobile River Basin) during July and August 2009. The Amicalola Creek sites, located on Dawson Forest Wildlife Management Area, were selected because of high quality habitat similar to that occupied by Hellbenders within their known range. During each search, we targeted relatively flat, non-embedded boulders with underlying cavities (many boulders were embedded by finer substrates and did not provide cavity habitat). Boulders were flipped by hand or with a log peavey and the underlying cavities were checked for Hellbenders by hand or by visual inspection with a mask and snorkel. Boulders too large to flip were checked by inserting our hands into the underlying cavity and feeling (i.e., noodling) for Hellbenders. Sites ranged 50–300 m in length, and searches were conducted for 1.7–3.5 person hours at each site.

Furthermore, we surveyed for fishes at an additional 21 sites located within the Coosawattee River system during 2009; these sites were located in the Cartecay, Ellijay, and Coosawattee rivers upstream from Carter's Lake reservoir. Our sampling method involved shocking a 30-m^2 quadrat of riffle and run habitat upstream of a stationary seine; 12 or more quadrats were sampled at each site. Although we were not targeting Hellbenders during these surveys, this method resulted in our first detection of Hellbenders in this watershed. This same sampling method also captured Hellbenders at 7 of 13 sites sampled during a fish survey in the Toccoa River system (Tennessee drainage) during 2008 (B. Albanese, unpubl. data).

Although no Hellbenders were found in Amicalola Creek or during the fish surveys, two Hellbenders were found on 28 July 2009 during targeted searches on the Cartecay River. One Hellbender (ca. 300 mm TL) was captured approximately 100 m downstream from the location where the Hellbender was captured on 16 June. This individual escaped before being photographed or measured, and we cannot be certain that it was not the same individual captured during June. However, a second Hellbender (240 mm TL) was captured approximately 600 m upstream of the first observation site. This specimen was photographed, fixed in 10% formalin, and deposited in the Georgia Museum of Natural History (GMNH 50119). While it is always desirable to release Hellbenders alive, we believe it is important to document new basin- level occurrences with a museum specimen. We also retained duplicate tissue clips from this specimen and preserved them in 95% ethanol; one for our analysis (described below) and one for archival at GMNH.

We did not find Hellbenders at the two additional upstream sites we sampled on the Cartecay River. However, a resident observed a Hellbender (ca. 500 mm TL) at dusk at a popular kayak access point on the Cartecay River, approximately 13 river km upstream from the first observation site. We consider this sighting reliable because of the location and because the resident provided this information without knowledge of our prior Hellbender observations.

We compared microsatellite genotypes (12 highly polymorphic loci) of the Cartecay River Hellbender to those from 70 Hellbenders sampled from the Toccoa (n = 50) and Nottely River systems (n = 20) (Unger et al. 2010). The Toccoa and Nottely river systems are part of the Tennessee drainage, with the Toccoa River system located between the Nottely and Coosawattee. We extracted and successfully genotyped high quality genomic DNA from the Cartecay individual using an ammonium acetate protocol and previously developed Hellbender microsatellite markers (Unger et al. 2010). Programs STRUCTURE and WHICHRUN were used to detect genetic structure and group individuals to putative populations (Banks and Eichert 2000, Pritchard et al. 2000). The Cartecay indi-

vidual was assigned to the Toccoa River population with 84% probability of membership. Results from both WHICHRUN and STRUCTURE indicate that the Cartecay individual is more similar genetically to the Toccoa River population than the Nottley River population and may share a more recent phylogenetic history with the former.

Although our genetic data suggest a close relationship of the Cartecay River Hellbender to the Toccoa River Hellbender population, additional analyses and a larger sample size are needed to determine if this relationship reflects ancestral gene flow between these systems or a more recent introduction. Potential vectors of Hellbender introduction include bait-bucket transfer, intentional release, or introduction through trout stocking. Citing a personal communication from Jeff Humphries, Montanucci (2006) listed trout stocking as potential source of Hellbender introductions. Trout are stocked occasionally into the Cartecay River from the Chattahoochee National Forest Fish Hatchery on Rock Creek in the Toccoa River system: the stocking location falls within the reach of the Cartecay River where Hellbenders have been observed. Although hatchery officials consider this vector unlikely (Deborah Burger, Chattahoochee National Fish Hatchery, Suches, GA, pers. comm.), it is worth noting because of the presence of Hellbenders in Rock Creek.

Historic dispersal via stream capture may also explain the occurrence of Hellbenders in the Cartecay River system. At least one other aquatic species native to the Tennessee drainage, *Nocomis micropogon* (Cope) (River Chub), has also been documented in the Coosawattee River system. The Coosawattee population of River Chubs is thought to either represent an introduction or a historic stream capture event (Boschung and Mayden 2004, Lachner and Jenkins 1971). A genetic study with River Chubs, Eastern Hellbenders, and possibly other aquatic species with closely related taxa in both drainages is needed to better understand the natural distribution of these species and the potential for historical connections between these two drainage systems.

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