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The Ozark Hellbender, *Cryptobranchus bishopi*, in Arkansas: Distributional Survey for 1992

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Abstract

We searched for Ozark hellbenders, *Cryptobranchus bishopi*, from 17 March 1992 to 10 November 1992, in four major river drainages within its presumed range in Arkansas. Twelve sites were visited at least once; scuba gear was donned on all occasions. Three new localities in the Eleven Point River (Randolph County) were discovered. Anthropogenic causes are suspected in the decline of this species from optimal habitats.

Introduction

The Ozark hellbender, *Cryptobranchus bishopi* (Figure 1), is a large, long-lived, aquatic salamander endemic to the Ozark Mountains of southern Missouri and northern Arkansas (Conant and Collins, 1991; Dundee, 1971). Dundee (1971) indicated on his distributional map the presence of *C. bishopi* along the Arkansas-Missouri border in Arkansas, but gave no mention of any specific localities other than the Spring River. Prior to impoundment of the White River, the distribution of this species (formerly *C. alleganiensis bishopi*; see Collins, 1991) in Arkansas undoubtedly included most or all of the North Fork of the White River in Baxter County. Both the Spring and Black River drainages in Fulton, Randolph, and Sharp counties should also harbor the salamander (Dundee, 1971; Nickerson and Mays, 1973b). Prior to our field work which began in 1991, the only documented populations of *C. bishopi* in Arkansas that we found in a cursory review of the literature are those that occur in the upper reaches of the Spring River (Dundee and Dundee, 1965; Nickerson and Mays, 1973a & b; Peterson, 1985).

Trauth et al. (1992b) provided a summary of the published information regarding Ozark hellbenders; these include the earliest ecological studies (Dundee and Dundee, 1965; Nickerson and Mays, 1973a), a comparative demographic analysis

(Peterson, 1985), food habits (Peterson et al., 1989a), fecundity and reproductive biology (Ingersoll et al., 1991; Topping and Ingersoll, 1981), winter breeding (Peterson et al., 1989b), habits and nest site selection (Nickerson and Tothulka, 1986), release of captive animals (Nickerson, 1980), and current management needs (Williams et al., 1981). A new Arkansas county record, reported by Trauth et al. (1992a), is discussed in the present study.

Recent purported declines in amphibian populations worldwide have prompted an increased awareness and concern regarding population trends in native United States species (see Pechmann et al., 1991; Dunson et al., 1992). Williams et al. (1981) reported that hellbender populations in the United States had undergone sharp population declines throughout its range, although they also stated that large populations of *C. bishopi* were still present in the Spring River in Arkansas. Peterson (1985) confirmed the presence of these large aggregates while performing a mark and recapture study on two populations in the Spring River from 1980 to 1982; he captured and tagged 370 animals. However, in recent years, reported sightings of *C. bishopi* in the Spring River have decreased dramatically. In fact, we could find only 20 hellbenders in the Spring River during our study in 1991 (Trauth et al., 1992b).

Our objectives in the present study were to investigate a variety of optimal habitats within the presumed range of *C. bishopi* in Arkansas, assess the habitat use, and identify possible factors affecting the welfare of this species.

Materials and Methods

Between 17 March 1992 and 10 November 1992, we visited potential collection sites for *C. bishopi* within its presumed range in Arkansas. Scuba diving gear was worn at each site, and individual dives (normally two divers) usually lasted one hour. Optimal habitat situations (rocky riffles, shoals, and falls) were investigated during daylight hours. The standard method of searching the habitat was overturning rocks and logs, reaching beneath large rocks. The captured salamanders were permanently marked (see Figure 1) with a Floy tag in a method similar to that of Nickerson and Mays (1973b), except

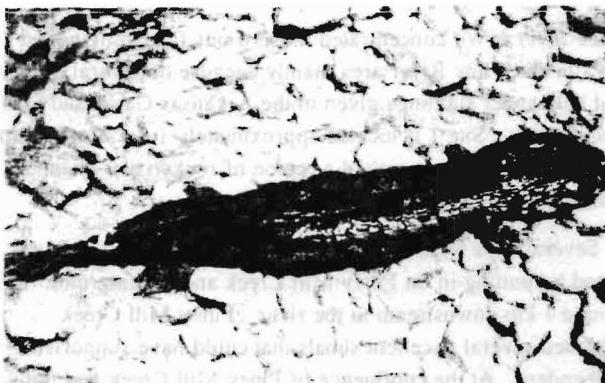


Figure 1. Adult Ozark hellbender, *Cryptobranchus bishopi*, from the Spring River (Dam Site 1/J), Arkansas. Identification tags attached through dorsal fin of tail.

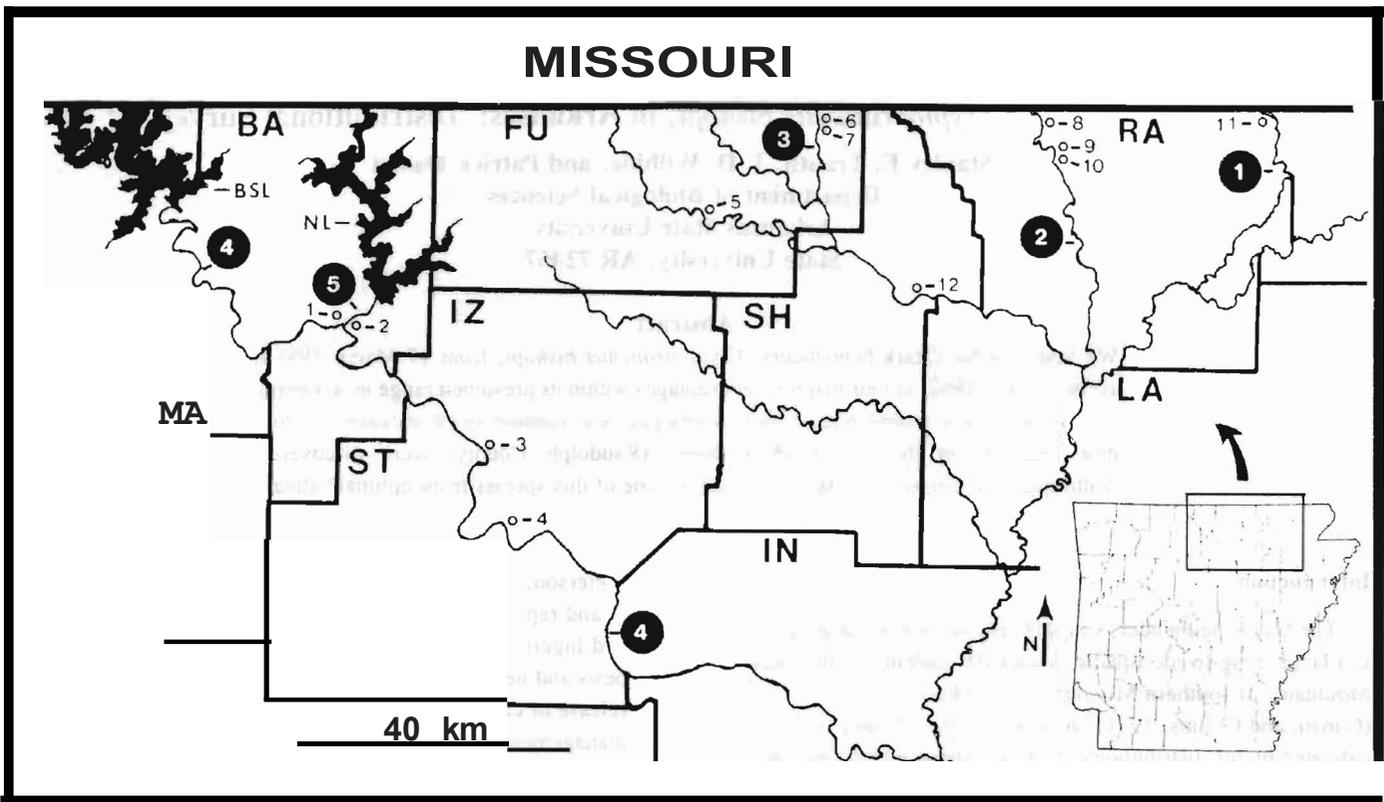


Figure 2. Map of Missouri showing survey sites for *Cryptolmmchus bisl(opi)* in northern Arkansas during 1992. Numerals within dark circles indicate major rivers (1, Current; 2, Eleven Point; 3, Spring; 4, White; 5, North Fork of White). Abbreviations for counties are: BA (Baxter), FU (Fulton), IN (Independence), IZ (Izard), LA (Lawrence), MA (Marion), RA (Randolph), SH (Sharp), and ST (Stone). BSL = Bull Shoals Lake, and NL = Norfolk Lake. Small numerals assigned to 10 open circles designate access points, collection or tagging sites, and/or stretches of river habitat surveyed, these include the following: 1 - White River (vicinity of SL Highway 341 bridge), 2 - North Fork of White River (Norfolk access), 3 - White River (Piney Mill Creek access), 4 - White River (Guion access), 5 - South Fork of Spring River (Han access), 6 - Spring River (U.S. Highway 63 access), 7 - Spring River (Dam Site 113 access), 8 - Eleven Point River (vicinity of Mill Dam), 9 - Eleven Point River (1.9 km N Dalton), 10 - Eleven Point River (Dalton access), 11 - Current River (Pilman access), and 12 - Manin's Creek, tributary of Spring River (U.S. Highway 63 access).

That we looped our tags. Salamanders were confined in five gallon buckets of river water during the tagging and mensural procedures. The total length and snout-vent length of each animal were measured to the nearest centimeter on a standard fish board; mass (to the nearest gram) was taken with a spring scale. The animals were photographed and then released at the approximate site of collection.

Results and Discussion

Ozark hellbenders were found only in the Spring and Eleven Point Rivers: the specific sites will be addressed later in this section. Otherwise, the following includes brief survey summaries for each river system investigated in this study.

North Fork of White River- Lake Norfolk inundates most of the North Fork of the White River (hereafter, North Fork) in Arkansas (Figure 2); the lake continues another 15 km or so into Missouri. Thereafter (and upstream from the town of Tecumseh in Missouri), the North Fork narrows to become a small, clear, relatively shallow stream. Hellbender populations have been extensively studied in the upper stretches of this river (see Nickerson and Mays, 1973a & b). We took the opportunity to dive the North Fork in Missouri on two occasions at Dawt Mill (located approximately 4 km above Tecumseh) and observed many *C. hishopi*. Consequently, by search-

ing the North Fork in Arkansas (below Norfolk Dam), we assumed there was a good chance to find populations of this species that had survived impoundment which had occurred in the early 1950s. Because of limited access points, the North Fork immediately below the dam to a point approximately 3 km below the dam was not investigated during the present study. (We plan to search this area in the future.) At the town of Norfolk, at the confluence of the North Fork and the White River at site 2, we searched for hellbenders in a 200 m section of rocky channel with no success.

White River- We concentrated most of our field activities in 1992 in the White River area mainly because of several unverified hellbender sightings given to the Arkansas Game and Fish Commission. Site 1 is located approximately 1.5 km upstream from Norfolk. We searched a region of rocky river channel near the St. Highway 341 bridge to no avail.

Several trips were made to site 3, to which access was attained by putting-in on Piney Mill Creek and floating/lotoring around 1 km downstream to the river. Piney Mill Creek exhibited several excellent shoals that could have supported hellbenders. At the confluence of Piney Mill Creek and the White River, we searched an optimal river riffle area with no success.

At Guion (site 4) we talked to Mr. Billy Engels and other local fishermen who were able to describe hellbenders and then positively identify *C. bishopi* from Conant and Collins' field guide. They directed us to two areas (above and below the Guion access point). We chose to live a region of the river 1.5 km upstream. At this point, the White River is wide (around 150 m) and maintains a swift current. A stretch of ideal rocky channel bottom approximately 300 m in length and 3 m in depth was searched on two occasions. This channel habitat consisted of long spans of bedrock broken into slabs which exhibited numerous cracks and crevices; in addition, large boulders from the tall bluffs above were scattered throughout the area. Large logs and rootwads were held by these boulders and provided a variety of microhabitats. The bottom substrate was mainly sand and fine-to-coarse gravels. This habitat description could characterize most of the channel bottoms that we have examined in the White River.

Current River- Large populations of *C. inshopi* exist in the Current River in Missouri (Nickerson and Mays, 1973b). One of us (PD) conducted dives in a deep (> 4 m), sluggish section of the river just inside the Missouri border. Most of the river in Arkansas has large mid-channel pools and generally lacks optimal habitat for hellbenders; yet, searching will con-

tinue at more access points in this river in the future

Spring River-The Spring River, fed by one of the largest springs in the Ozarks, originates at the town of Mammoth Spring just inside the Missouri-Arkansas border. In 1991, we conducted a tag and release study of *C. hishopi* (Trauth et al., 1992b) at 10 sites along a 26 km section of the river in Fulton County. Two of these 10 access sites (Figure 3: sites 6 & 7) were revisited in 1992. At site 6, we dove on three different dates, and no hellbenders were observed. By comparison, we found three salamanders here in 1991.

Site 7 (known as Dam Site #3) is located around 6 km downstream from the springhead. A major dam spans the river here; in addition, this is the present site of the Spring River State Fish Hatchery as well as a primary point-of-entry for canoeing activities on the river. The hatchery is built on a large island below the dam. Peterson (1985) marked 310 hellbenders in habitats along the lower end of this island. Furthermore, Peterson et al. (1989a) used this site and another 1.4 km downstream from the spring head to remove 62 hellbenders for reproductive studies. In 1991, we could find only six hellbenders after several visits to habitats just below the island and only 11 animals in the spillway area immediately below the dam (see Trauth et al., 1992b). In 1992, we re-

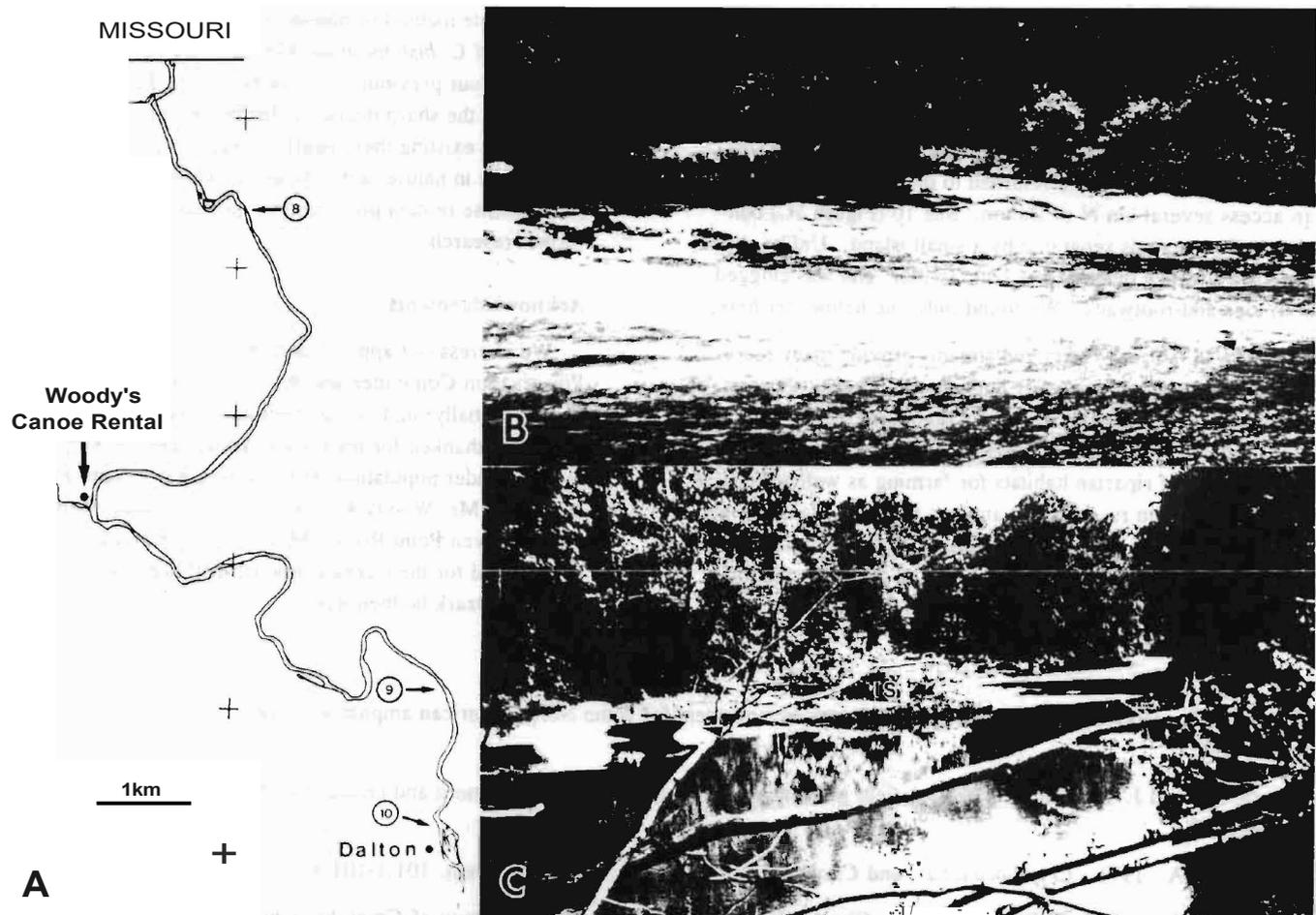


Figure 3. New locality sites for *Cryptobranchus hishopi* in the Eleven Point River, Randolph County. A. Map of Eleven Point River north of Dalton; numerals same as in Figure 2. Access to sites 8 and 9 was gained from Woody's Canoe Rental. B. Mill Dam (Site 8). Arrowheads point to water collection areas for hellbenders just downstream from falls. C. Dalton (Site 10). Falls occur on both sides of small island (IS). At left, a motorist in a motorboat is visible in the river.

turned to the island site and found no salamanders; only five were observed below the spillway.

On the South Fork of the Spring River (site 5), we investigated a small stretch (approximately 100 m) of suitable habitat without success. One other site (12) we inspected is found on Martin's Creek, a small tributary of the Spring River. This site deserved attention because a local fisherman reported to us that he hooked a hellbender while fishing a deep hole. We dove several stretches of the creek with no success.

Eleven Point River - Nickerson and Mays (1973b) speculated that because large populations of *C. bishrpi* were known from the upper reaches of this river in Missouri, they should also occur in portions of the river in Arkansas. (Max Nickerson told us that he and others had searched the Eleven Point River repeatedly in Arkansas without success). Because no voucher specimens were known from the Arkansas side, we devoted several trips to the upper regions of this river. On 8 July, a fisherman, Mr. Gary Thatch, found a hellbender in his hoop-net which had been set at the bottom of a bluff 1.9 km N of Dalton (Figures 2; 3A, site 9). He brought the specimen to Mr. Woody King; he notified us about the find. (We had previously spoken to King regarding the possible existence of hellbenders in the Eleven Point River.) As a consequence of this new locality record (Trauth et al., 1992a), we made several subsequent trips to the river. On 11 July, we traveled via a Jet-prop powered river boat to site 8, a small riffle area commonly called Mill Dam (Figure 38). The site exhibited a very swift flowing current. Diving here for one hour yielded three *C. bishopi*, which we tagged and released. We then traveled downstream to site 9 and dove an additional 1.5 hr without success. On 8 August we returned to the Eleven Point using an access several km N of Dalton. Site 10 (Figure 3C) consisted of two rapids separated by a small island. Unlike site 8, site 10 was much deeper (3-4 km), swifter, and was clogged with logs and rootwads. We found only one hellbender here.

Habitat Use - Ozark rivers and streams provide many recreational opportunities for water enthusiasts. Fishing, boating, and canoeing are, by far, the most common activities. This is especially true for the Spring River. Clearing of the land and development of riparian habitats for farming as well as housing has accelerated in recent years and has indirectly damaged the river by adding an excessive amount of silt. Yet, possibly the most insidious activity is canoeing with its chronic pollution and habitat alteration resulting from the hordes of weekend

escapists that pummel the river's rocky substrate and increase the silt burden. Nickerson and Mays (1973b) mentioned a once common practice by canoe rental services in Missouri of dynamiting large boulders and rocks out of certain stretches of rivers (e.g., Current River) to save canoe damage. Most of the rock shelters for hellbenders available at the end of the island Mill Dam Site 113 have been buried by silt; this fact alone may have led to the catastrophic decline in hellbender, from their original numbers during the early 1980s.

The Eleven Point River is subjected to an entirely different anthropogenic activity. Because the river has a limited number of public access points, a swift flowing current, and long stretches of very shallow water with few riffle areas, jet-powered rafts are the only effective means of upstream travel. These engines produce an enormous water spray behind the boats. The turbulence caused by this method of transportation may prevent hellbenders from dwelling in riffles and other favorable habitats.

Conclusions

During the present study, we surveyed four major river systems in northern Arkansas in an attempt to find new localities for Ozark hellbenders. Because Ozark rivers and streams are typically springfed and, therefore, are swift and cold, our survey technique (i.e., the use of scuba gear) afforded us the best possible method of habitat investigation. We found new localities of *C. bishopi* in the Eleven Point River. This study reinforces our previous work on the Spring River and further dramatizes the sharp decline in hellbender population levels from those existing there nearly a decade ago. Although speculative in nature, anthropogenic causes for the salamander's demise remain provocative and must be the subject of further research.

Acknowledgements

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