GEOLOGICAL SURVEY OF ALABAMA

Berry H. (Nick) Tew, Jr.
State Geologist

WATER INVESTIGATIONS PROGRAM

REDISCOVERY OF THE TRISPOT DARTER, *Etheostoma trisella*, IN ALABAMA

OPEN-FILE REPORT 0909

by

Patrick E. O'Neil, Thomas E. Shepard, and Cal C. Johnson
Geological Survey of Alabama

and

Eric Spadgenske and Jeff Powell
U.S. Fish and Wildlife Service

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ABSTRACT

The trispot darter, *Etheostoma trisella*, was rediscovered in Little Canoe Creek (Coosa River system) in October 2008 after an absence in collections for over 50 years. The trispot darter had been considered extirpated from Alabama streams until this discovery. Over a 5-month period of sampling, 228 trispot darters (92 males, 116 females, and 20 sex undetermined) were found at 12 out of 22 sites sampled. Two active breeding sites were discovered and sampling data suggested that the distribution of *E. trisella* in the Little Canoe Creek system is likely more widespread. Two distinct habitat types were noted, breeding and nonbreeding. The nonbreeding habitat occurs in the deeper and larger portions of Little Canoe Creek while breeding habitats are shallow, perhaps ephemeral, small tributaries with direct connection to Little Canoe Creek. Trispot darters were surmised to be in migration from nonbreeding to breeding habitat from October through January and were observed in breeding habitat from February through March. By early April, breeding sites were uninhabited and only a few spent individuals were collected.

INTRODUCTION

The trispot darter, *Etheostoma trisella*, was recently rediscovered in Alabama after an absence for more than 50 years from fish collections in the state. The species was described from one individual collected in Cowans Creek, a small Coosa River tributary in Cherokee County, Alabama, in 1947 (Bailey and Richards, 1963). The type locality and surrounding habitat were permanently inundated by the completion of Weiss Reservoir in 1960. An additional specimen was collected in the state in 1958 in the main stem of the Coosa River in Etowah County (Ramsey, 1976). That locality was inundated by Neely Henry Lake in 1965. Attempts to collect the species in appropriate habitat throughout the upper Coosa River system in Alabama since the discovery of the first two individuals, including an intensive survey for the species (Neely and Mayden, 1999), failed to produce additional specimens (Mettee and others, 1996; Boschung and Mayden, 2004; Warren, 2004). Due to the perceived elimination of habitat by impoundment, effects of polluted runoff in rural areas of the upper Coosa Valley in Alabama, and the lengthy absence of collection records in the state, the species was presumed to be extirpated in Alabama (Warren, 2004). While conducting a biological

assessment survey of selected sites in the Big Canoe Creek system, biologists with the Geological Survey of Alabama (GSA) and U.S. Fish and Wildlife Service (USFWS) collected three individuals of the trispot darter in Little Canoe Creek near Springville, St. Clair County, on October 30, 2008.

Trispot darters are also known from the Conasauga River system in Georgia and Tennessee and the Coosawattee River system in Georgia (Howell and Caldwell, 1967; Bryant and others, 1979; Etnier, 1970; Warren, 2004). Until discovery of the population in Little Canoe Creek, these were thought to be the only viable populations of the species. A detailed life history study was conducted on the Conasauga River population by Ryon (1986), who examined reproductive biology, food items, breeding and nonbreeding habitats, parasites and predation, age, growth, and larval development. Like other members of the subgenus *Ozarka*, *E. trisella* utilizes distinctive nonbreeding and breeding habitats. In the nonbreeding season (mid-April to mid-October), Ryon found that trispot darters inhabited edges of shallow pools and backwaters of the Conasauga River and some tributaries. The darters began to move up tributaries toward breeding sites in late autumn and congregated in and near breeding areas from late November until late April. Ryon described the main breeding area in his study as a small seepage area flowing through a pasture with a clay substrate covered by silt. The trispot darters also utilized more ephemeral side ditches as water levels rose and these had firmer substrates with both aquatic and terrestrial vegetation. Spawning behavior was observed in aquaria by Ryon and he determined that trispot darters were egg attachers with no parental care of the eggs.

Etheostoma trisella is not a federally listed endangered or threatened species; however, it is listed as endangered in the most recent list of imperiled freshwater and diadromous fishes of North America by the Endangered Species Committee of the American Fisheries Society (AFS) (Jelks and others, 2008). The listing is an elevation from threatened status in the previous 1989 AFS list (Williams and others, 1989). Reasons for the listing were present or threatened destruction, modification, or reduction of habitat or range, and a narrowly restricted range. The species is listed as endangered by the state of Georgia (Georgia Department of Natural Resources, 2006) and threatened by the state of Tennessee (Withers, 2009). Since trispot darters had not

been collected in Alabama since 1958 at the time of the most recent list of imperiled fishes in Alabama (Mirarchi and others, 2004), the species was listed as extirpated in the state (Warren, 2004).

ACKNOWLEDGMENTS

Many individuals were involved in this brief survey for the trispot darter in Big Canoe Creek and we sincerely appreciate their efforts. Marty Kodis of the USFWS as well as Brett Smith and Anne Wynn of the GSA were part of the original discovery team along with Jeff Powell, Cal Johnson, and Pat O'Neil. Steve Rider, Andrew Henderson, Dan Catchings, and Rob Andress of the Wildlife and Freshwater Fisheries Division (WFFD) of the Alabama Department of Conservation and Natural Resources (ADCNR) participated in sampling. John Grogan of the Alabama Power Company (APCO) arranged for sampling on APCO corporate property, and Steve Krotzer, Casey Knight, Jeff Baker, and Chad Fitch, biologists with APCO, participated in sampling and located the largest breeding population of trispot darters during the survey. Bernard Kuhajda and Brooke Fluker with the University of Alabama Ichthyological Collection (UAIC) and Biological Sciences Department assisted with sampling and obtained fin clips of trispot darters for genetic comparisons with the Conasauga River population. Mr. Chris Donald and Mr. Charles Beauchamp allowed access to Little Canoe Creek through their property and we appreciate this courtesy on their part.

STUDY AREA

Little Canoe Creek is a tributary of Big Canoe Creek which itself is a western tributary of the Coosa River in St. Clair and Etowah Counties. The upper reaches of Big Canoe and Little Canoe Creeks originate in the Southern Sandstone Ridges ecoregion (67h) (Griffith and others, 2001). The middle and lower reaches of the Big Canoe system flow through the Southern Shale Valleys ecoregion (67g) eventually entering the Coosa River south of Rainbow City. The lower 8.2 miles of Big Canoe Creek is impounded by backwater of the Coosa River from H. Neely Henry Lake (fig. 1).

METHODS

Subsequent to discovery of *E. trisella* in Little Canoe Creek in October 2008, the GSA and USFWS initiated a sampling program designed to determine the extent of this population and its viability through the location of breeding sites. It is known that

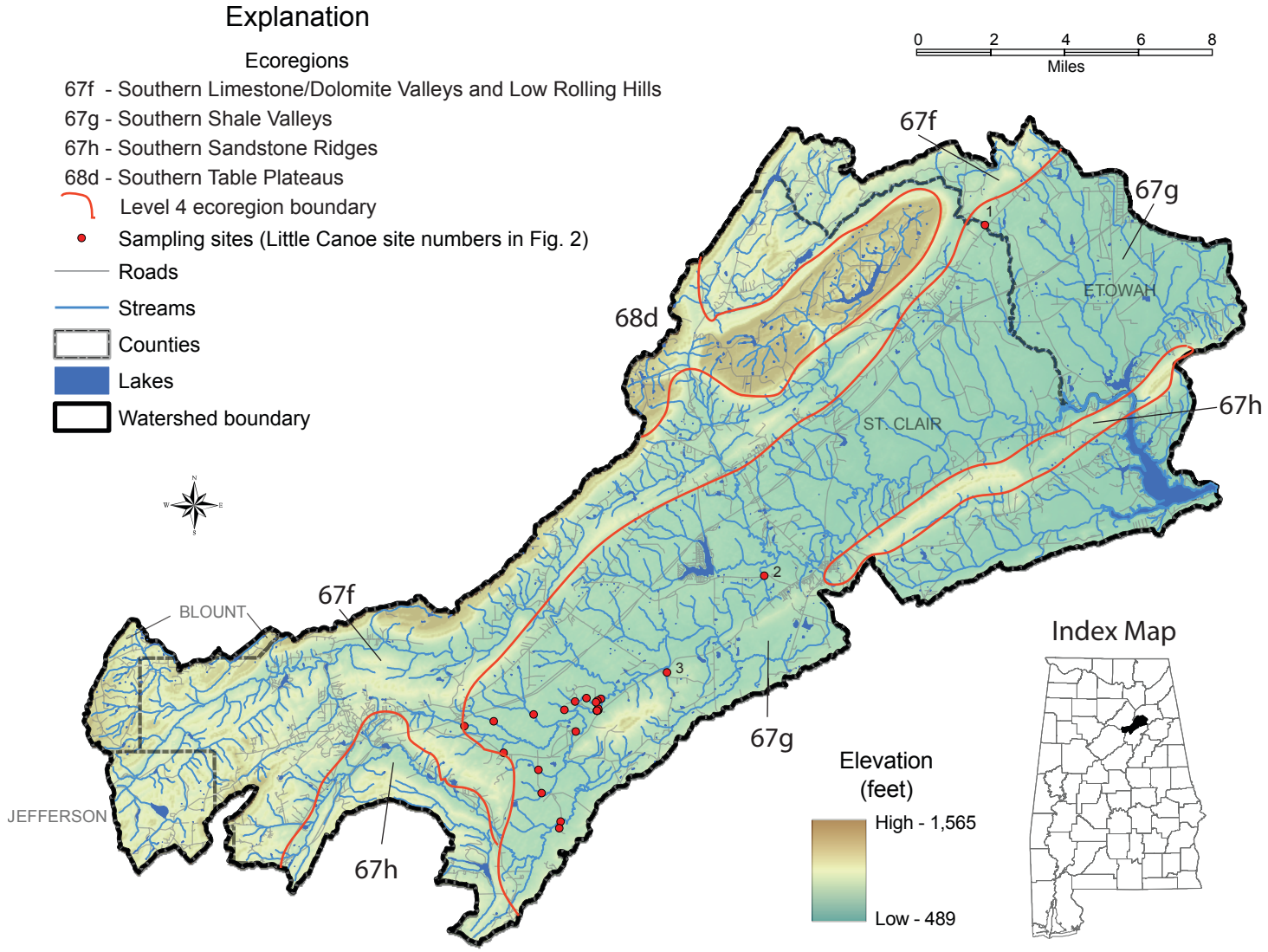

Figure 1. The Big Canoe Creek watershed.

members of the subgenus *Ozarka* have two distinct habitats, breeding and nonbreeding, and that individuals will migrate short distances from the nonbreeding stream habitat to shallow, off-channel breeding habitat. Individuals captured in the main channel of Little Canoe Creek were surmised to be en route to breeding habitat, and their presence or absence would indicate the status of such movements. Smaller tributaries flowing into Little Canoe Creek were checked regularly from November through April for the presence of darters and to monitor their reproductive condition by observing nuptial coloration and degree of gonad development. Small mesh nylon minnow seines, dip nets, and a backpack electrofisher were used to collect fishes. The majority of individuals were examined on site and returned to the stream, but a few were preserved as vouchers to document this discovery and are housed at the GSA and the UAIC.

RESULTS

A listing of stream sites surveyed can be found in table 1 and are depicted in figures 1 and 2. Twenty-two sites (table 1) were surveyed between October 30, 2008, and April 1, 2009, with 228 trispot darters (92 males, 116 females, and 20 sex undetermined) found at 13 sites. The chronology of sampling trips follows.

October 30, 2008 - *Etheostoma trisella* was rediscovered in Alabama at site 12, Little Canoe Creek at Beulah Circle Road (BCR). The first individual, a female, was taken in a shallow sand and gravel shoal (about 1 foot deep) directly downstream of a small patch of cobbles interspersed with small boulders. Later, two male trispot darters where taken midstream in a small gravel/rubble riffle directly upstream of the BCR bridge (fig. 3).

November 12, 2008 - Three sites, 12, 20, and 21, were sampled on this date. At site 12, two trispot darters were found in the same shoal and riffle collected on October 30 and five other individuals were found about 800 feet upstream of the bridge on point and mid-channel sand/gravel bars in water about 1 foot deep with remnant *Justicia* growth. These same bars had been sampled on October 30 but did not yield darters. Site 20 was a small spring tributary flowing next to the St. Clair County Correctional

Table 1. Sampling sites for *Etheostoma trisella* in the Big Canoe Creek system, 2008-09.

Site no.	Sampling site and county	Lat/Lon	section, township, range	Date	Time	Number of *E. trisella* collected	Collectors	Notes
1	Little Canoe Creek (lower watershed) at Rocky Hollow Road. Etowah Co.	33.96982 86.17829	sec. 24, T. 12 S., R. 4 E.	17-Dec-08	1420-1450	0	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske	Significant flow, poor trispot darter habitat.
2	Big Canoe Creek at Co. Hwy. 36. St.Clair Co.	33.83267 86.28348	sec. 12, T. 14 S., R. 3 E.	30-Oct-08	0840-1045	0	Pat O'Neil, Jeff Powell, Marty Kodis, Cal Johnson, Brett Smith, Anne Wynn	Sampled downstream of bridge approximately 600 feet.
3	Unnamed tributary to Big Canoe Creek at Ala. Hwy. 24 at Cool Spring. St.Clair Co.	33.79671 86.32939	sec. 21, T. 14 S., R. 3 E.	4-Mar-09	1400-1410	0	Tom Shepard, Cal Johnson	Stream rocky and clear, not typical trispot darter habitat.
4	Unnamed tributary-1 from Little Canoe Creek upstream to road side pool. St.Clair Co.	33.78411 86.36227	sec. 30, T. 14 S., R. 3 E.	28-Jan-09	0945-1400	9	Pat O'Neil, Tom Shepard, Cal Johnson	7 male and 2 female trispot darters taken from mouth of unnamed tributary upstream to road side pools.
				19-Feb-09	0945-1400	0	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	
5	Unnamed tributary-1 at road side pool. St.Clair Co.	33.78339 86.36307	sec. 30, T. 14 S., R. 3 E.	28-Jan-09	0945-1400	21	Pat O'Neil, Tom Shepard, Cal Johnson	6 male and 15 female trispot darters taken in roadside pools near Beulah Church road.
				19-Feb-09	0945-1400	10	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	7 female and 3 male trispot darters.
				4-Mar-09	1130-1200	13	Tom Shepard, Cal Johnson	7 male and 6 female trispot darters. Females running eggs with light pressure. Most trispots taken about 300 feet downstream of culvert.
				1-Apr-09	0900-0930	0	Tom Shepard, Cal Johnson	

Table 1. Sampling sites for *Etheostoma trisella* in the Big Canoe Creek system, 2008-09 -- Continued.

Site no.	Sampling site and county	Lat/Lon	section, township, range	Date	Time	Number of *E. trisella* collected	Collectors	Notes
6	Little Canoe Creek approx. 1,900 ft. downstream of bridge at mouth of unnamed tributary-1. St.Clair Co.	33.78483 86.36074	sec. 30, T. 14 S., R. 3 E.	17-Dec-08	0900-1200	1	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske, Dan Catchings, Rob Andress	One trispot darter (sex undetermined) taken on left bank at mouth of unnamed tributary-1 to Little Canoe Creek
7	Gin Branch approximately 250 feet upstream of mouth. St.Clair Co.	33.78097 86.36203	sec. 30, T. 14 S., R. 3 E.	17-Dec-08	0900-1200	2	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske, Dan Catchings, Rob Andress	Two trispot darters (sex undetermined) taken near muddy shoreline.
8	Gin Branch from mouth to approximately 300 feet upstream of Beulah Circle Road East Loop. St.Clair Co.	33.78089 86.33627	sec. 30, T. 14 S., R. 3 E.	28-Jan-09	0945-1400	3	Pat O'Neil, Tom Shepard, Cal Johnson	Taken in eroded plunge pool near bridge culvert.
9	Gin Branch from Beulah Circle Road East Loop to property line fence. St.Clair Co.	33.78516 86.36743	sec. 30, T. 14 S., R. 3 E.	19-Feb-09	0915-1135	3	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	3 male trispot darters taken in deeper pools.
4+9	Gin Branch from Beulah Circle Road East Loop to property line fence + unnamed tributary (1) from Little Canoe Creek upstream to road side pool. St.Clair Co.	33.78516 86.36743	sec. 30, T. 14 S., R. 3 E.	12-Feb-09	0915-1135	54	Pat O'Neil, Steve Krotzer, Jeff Baker, Casey Knight, Eric Spadgenske, Tom Shepard, Cal Johnson, Bernard Kuhajda, Brooke Fluker	17 males, 33 females, 4 sex UNID trispot darters taken in two areas. B. Kuhajda photographed his specimens and took fin clips. Individual count was combined for sites 4 and 9.

Table 1. Sampling sites for *Etheostoma trisella* in the Big Canoe Creek system, 2008-09 -- Continued.

Site no.	Sampling site and county	Lat/Lon	section, township, range	Date	Time	Number of *E. trisella* collected	Collectors	Notes
10	Gin Branch from Beulah Circle Road West Loop upstream approximately 2,000 feet. St.Clair Co.	33.78381 86.37279	sec. 30, T. 14 S., R. 3 E.	11-Feb-09	1330-1500	17	Eric Spadgenske, Tom Shepard, Cal Johnson	9 male and 8 female trispot darters taken intermittently in Gin Branch from Beulah Church Loop Road West upstream from bridge to about 2,000 feet upstream past farm.
				19-Feb-09	1100-1145	2	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	1 male and 1 female trispot darter.
				4-Mar-09	1240-1255	4	Tom Shepard, Cal Johnson	2 male and 2 female trispot darters. Females very extended and running eggs with pressure.
				1-Apr-09	1000-1025	0	Tom Shepard, Cal Johnson	No fish, streamflow up from recent rains.
11	Little Canoe Creek at mouth of Gin Branch. St.Clair Co.	33.78037 86.36192	sec. 30, T. 14 S., R. 3 E.	17-Dec-08	0900-1200	1	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske, Dan Catchings, Rob Andress	1 male trispot darter taken on left bank at mouth of Gin Branch. High flow in Little Canoe Creek, backwater in Gin Branch.
12	Little Canoe Creek at Beulah Circle Road. St.Clair Co.	33.78008 86.36256	sec. 30, T. 14 S., R. 3 E.	30-Oct-08	1130-1330	3	Pat O'Neil, Jeff Powell, Marty Kodis, Cal Johnson, Brett Smith, Anne Wynn	2 male and 1 female trispot darters taken downstream of bridge in bedrock/sand run and in cobble riffle upstream of bridge about 150 feet.
				12-Nov-08	0845-1045	7	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske	2 male and 5 female trispot darters; 2 were taken in downstream shoal, 5 were taken on edge of *Justicia* /sand/small gravel shoal 800 feet upstream of bridge.
				17-Dec-08	0900-1200	3	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske, Dan Catchings, Rob Andress	3 trispot darters (sex undetermined) taken in cobble riffle downstream of bridge, high flow.
				28-Jan-09	0945-1400	0	Pat O'Neil, Tom Shepard, Cal Johnson	Worked from downstream riffle to upstream *Justicia* shoal.

Table 1. Sampling sites for *Etheostoma trisella* in the Big Canoe Creek system, 2008-09 -- Continued.

Site no.	Sampling site and county	Lat/Lon	section, township, range	Date	Time	Number of *E. trisella* collected	Collectors	Notes
13	Unnamed tributary-2 from mouth to approximately 200 feet upstream of dirt road. St.Clair Co.	33.78055 86.37781	sec. 30, T. 14 S., R. 3 E.	12-Feb-09	1330-1445	53	Steve Krotzer, Jeff Baker, Casey Knight	23 male and 30 female trispot darters taken in small tributary, gravel/sand/detritus mix. The highest density of trispot darters observed this season.
				4-Mar-09	1315-1330	14	Tom Shepard, Cal Johnson	8 female and 6 male trispot darters, still in breeding condition.
				1-Apr-09	1035-1100	1	Tom Shepard, Cal Johnson	1 male trispot darter. Very little color and appeared to be spent.
14	Unnamed tributary-3 to Little Canoe Creek. St.Clair Co.	33.77888 86.39242	sec. 36, T. 14 S., R. 2 E.	12-Feb-09	1300-1400	0	Pat O'Neil, Tom Shepard, Cal Johnson	Sampled from APCO dirt road upstream approximately 2,900 feet. Clear, rocky, sandy stream, poor trispot darter habitat.
15	Unnamed tributary to Little Canoe Creek originating at Red Hill Church. St.Clair Co.	33.77623 86.41121	sec. 35, T. 14 S., R. 2 E.	11-Feb-09	0900-1200	0	Pat O'Neil, Steve Krotzer, Jeff Baker, Chad Fitch	Sampled from APCO field upstream for about 4,000 feet to near I-59. Acceptable habitat, sampled too early in the year for trispots to have moved upstream this far.
16	Unnamed tributary to Little Canoe Creek originating at St.Clair Springs community Ala. Hwy. 23. St.Clair Co.	33.76385 86.40664	sec. 35, T. 14 S., R. 2 E.	11-Feb-09	0900-1200	0	Tom Shepard, Cal Johnson, Eric Spadgenske	Sampled from tributary near APCO field to springs at St.Clair Springs community. Beaver ponds at the lower reach, spring habitat near Hwy. 24. No trispot darters collected.
17	Unnamed tributary to Little Canoe Creek at Ala. Hwy. 24 near I-59. St.Clair Co.	33.77451 86.42475	sec. 34, T. 14 S., R. 2 E.	4-Mar-09	1430-1440	0	Tom Shepard, Cal Johnson	Rocky and clear stream, not trispot darter habitat.
18	Little Canoe Creek at Beauchamp Property approx. 2,100 feet downstream of Ala. Hwy. 23 crossing. St.Clair Co.	33.77194 86.3725	sec. 31, T. 14 S., R. 3 E.	4-Dec-08	--	3	Eric Spadgenske, Jeff Powell, Bernard Kuhajda, Brooke Fluker	1 male and 2 female trispot darters taken in riffle area.

Table 1. Sampling sites for *Etheostoma trisella* in the Big Canoe Creek system, 2008-09 -- Continued.

Site no.	Sampling site and county	Lat/Lon	section, township, range	Date	Time	Number of *E. trisella* collected	Collectors	Notes
19	Unnamed tributary to Little Canoe Creek north of Correctional Facility about 0.5 mi. south of Ala. Hwy. 23. St.Clair Co.	33.75711 86.38986	sec. 1, T. 15 S., R. 2 E.	4-Mar-09	1025-1035	0	Tom Shepard, Cal Johnson	Small clay-bottomed tributary, no trispot darters.
20	Unnamed tributary to Little Canoe Creek at St.Clair Co. Correctional Facility. St.Clair Co.	33.74792 86.38879	sec. 12, T. 15 S., R. 2 E.	12-Nov-08	1215-1300	0	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske	Sampled spring tributary about 400 feet downstream of county road. Spring-like habitat, no trispot darters.
				19-Feb-09	1215-1300	0	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	Sampled downstream about 1,500 feet beginning at park area. Clear, rocky, sandy stream not good trispot darter habitat.
21	Little Canoe Creek at St. Clair Co. Correctional Road. St.Clair Co.	33.73667 86.37993	sec. 12, T. 15 S., R. 2 E.	12-Nov-08	1330-1400	0	Pat O'Neil, Tom Shepard, Cal Johnson, Eric Spadgenske	Worked upstream approximately 2,000 feet. Majority of stream was pool habitat. No trispot darters.
22	Little Canoe Creek overflow pools at St. Clair Co. Correctional Road. St.Clair Co.	33.73667 86.37993	sec. 12, T. 15 S., R. 2 E.	19-Feb-09	1330-1400	1	Pat O'Neil, Tom Shepard, Cal Johnson, Steve Rider, Andrew Henderson	1 male trispot darter found in overflow pool
				4-Mar-09	0920-1005	3	Tom Shepard, Cal Johnson	1 male and 2 female trispot darters. Females very swollen, male in peak color. Captured in small off-channel pool area.
				1-Apr-09	1230-1250	0	Tom Shepard, Cal Johnson	No trispot darters

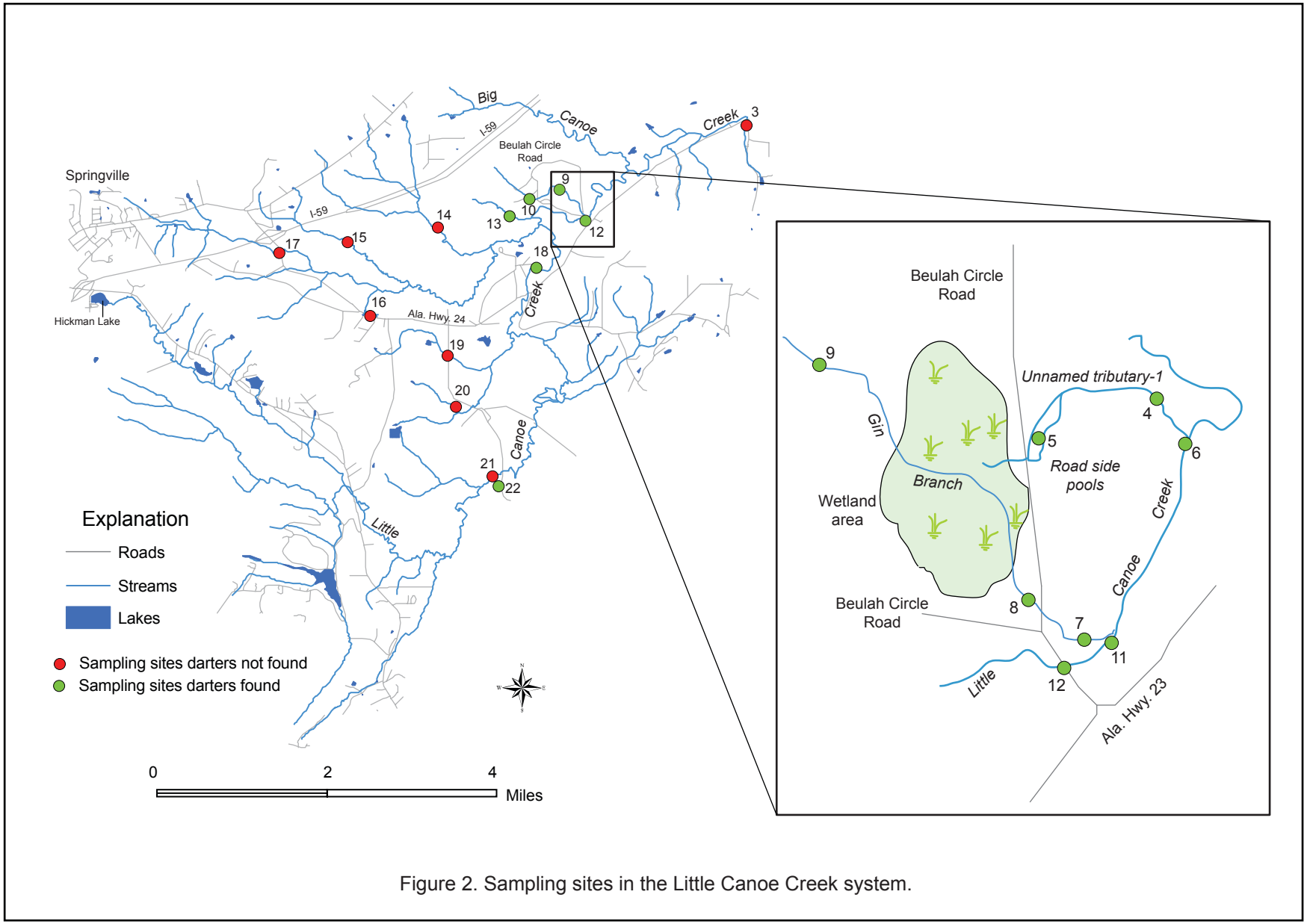

Figure 2. Sampling sites in the Little Canoe Creek system.

Shoal approx. 800 feet upstream of bridge

Shoal downstream of bridge

Little Canoe Creek discovery site 12, November 12, 2008

Looking downstream to unnamed tributary-1

Looking upstream to Beulah Circle Road

Unnamed tributary-1 at road side pools site 5, January 28, 2009

Looking upstream

Substrate detail

Middle Gin Branch site 9, February 12, 2009

Figure 3. Photographs of the discovery site, the unnamed tributary-1 site, and the Gin Branch site.

Facility. Approximately 400 feet of this tributary was sampled, which yielded a typical Coosa River spring run fauna of rainbow shiners, creek chubs, stonerollers, mountain shiners, Alabama hog suckers, Coosa darters, banded sculpins, and five species of centrarchids. Site 21 was a reach of Little Canoe Creek dominated by pool habitat. Shoal areas were found approximately 1,000 feet upstream of the bridge and were sampled intensely but no darters were found.

December 4, 2008 - Three individuals were found by UAIC and USFWS along the margins of mid-channel bars in slow moving, shallow water with leaf packs over a silt substrate in the main channel of Little Canoe Creek. This site (18) is about 2.2 miles upstream of the discovery site (12) and close to Ala. Hwy. 23. About 3,000 feet of stream was sampled and stream level was increasing from recent rains.

December 17, 2008 - Stream flow in Little Canoe Creek was up substantially from previous sampling days due to recent rains but several sites were sampled. Three trispot darters were taken very near the shore in the riffle/shoal complex just downstream of the bridge at site 12. One individual was taken near shore at the mouth of Gin Branch (site 11) and two individuals were taken about 250 feet upstream in Gin Branch (site 7). Little Canoe Creek was sampled from Gin Branch downstream about 1,500 feet, where another individual was taken at the mouth of an unnamed tributary (site 6). The unnamed tributary, labeled as unnamed tributary-1, was scouted and noted for additional future sampling because it was similar in character to off-channel breeding habitats used by slackwater darters (*Etheostoma boschungi*) in the Cypress Creek (Tennessee River) system. Upper Little Canoe Creek (site 1) was also sampled this day but habitat was not suitable for trispot darters and high stream flow resulted in a poor collection.

January 28, 2009 - The riffle/shoal complex at site 12 was sampled and no darters were found. Gin Branch (site 8) was sampled from its mouth to approximately 300 feet upstream of BCR. Three trispot darters were taken in a small plunge pool downstream of the culvert under BCR. The unnamed tributary-1, discovered on 17 December, was

sampled from its mouth at Little Canoe Creek upstream to near BCR (site 4) and 9 trispot darters were taken in about 1,200 feet of stream. The unnamed tributary-1 widened into a series of wide, shallow pools with a thin silt layer over coarse particulate matter (site 5) until it narrowed and ran under BCR about 1,000 feet north of where Gin Branch runs under BCR. Twenty-one trispot darters were found in these sluggish pools, 15 females and 6 males, all in the early stages of nuptial color development. The absence of darters in the main channel of Little Canoe Creek, the high number (30 total) of trispot darters in the small unnamed tributary-1 and shallow pool complex (sites 4 and 5), and the physical similarity of these habitats, to that of the slackwater darter, was the first evidence that the unnamed tributary-1 and Gin Branch were breeding sites, or pathways to breeding sites further upstream.

February 11, 2009 - A crew from Alabama Power Company (APCO) joined us for two days of sampling during this week. One crew sampled site 15, an unnamed tributary flowing through APCO property, for about 1 mile and no darters were found. The lower end of site 15 had significant beaver influence while the upper section was more typical of what we had earlier observed for trispot darters. Several excellent breeding areas were located in the upper section but no darters were found. It is very likely we were too early and darters may not have arrived at this site from downstream. The other crew sampled site 16, another unnamed tributary from the area with beaver activity upstream to the community of St. Clair Springs on Ala. Hwy. 23. This crew did not find trispot darters in either the main tributary channel or in several headwater springs. Both crews then traveled to the western loop of BCR and sampled Gin Branch from BCR upstream about 2,000 feet. Seventeen darters, 9 males and 8 females in good nuptial color, were found in this reach confirming that darters were indeed moving upstream in Gin Branch to breed.

February 12, 2009 - The same two crews that sampled on February 11 were joined by another crew from the UAIC. These crews sampled sites 4 and 9 in the morning collecting 54 darters in the unnamed tributary-1 and upper Gin Branch (the catch was combined from both sites). That afternoon the APCO crew sampled another unnamed

tributary (unnamed tributary-2) on APCO property, site 13 (fig. 4), and found 53 darters, all in very good nuptial colors, in a short reach of stream from its mouth to about 200 feet upstream of the bridge. The GSA crew sampled another site (unnamed tributary-3) on APCO property (site 14) the same afternoon and did not find trispot darters. Site 14 was a larger flowing stream with a sand, gravel, and rubble substrate and increased velocity that was not suitable breeding habitat for trispot darters. All individuals collected this day were in brilliant nuptial coloration (fig. 5).

February 19, 2009 - Several sites were sampled on this day by the GSA crew and a WFFD crew. Site 4 was sampled from Little Canoe Creek to the road side pools and no darters were found. Site 5, road side pools, yielded 10 darters in nuptial colors (7 females and 3 males). Three individuals were found at site 9, while two were found in the upper reach of Gin Branch at site 10. Site 20 was sampled for about 1,500 feet and no darters were found. The habitat at site 20 had a typical spring run character with clear water flowing over small gravel and sand shoals. An overflow pool at site 22 was sampled in the afternoon and one male trispot darter was found over a sandy-gravel patch. Discovery of trispot darters at this site expanded the upstream range by 6.5 miles from the rediscovery site (12).

March 4, 2009 - A GSA crew sampled seven sites this day checking on known populations and exploring new streams. No darters were found at site 3, a small, clear direct tributary to Big Canoe Creek at Cool Springs. Habitat was typical of a spring run and was unsuitable for breeding trispot darters. Thirteen darters were found at site 5, road side pools, with females running eggs with light pressure. Four darters were found in upper Gin Branch (site 10), while 14 darters still in breeding color and condition were found at site 13, the APCO site discovered in February. A new site, 17, was sampled near the junction of I-59 and Ala. Hwy. 23. No darters were found which likely was related to the clay and gravel substrate and higher flow velocities. A new tributary site, 19, near the St. Clair County Correctional Facility, yielded no darters while the overflow pool at site 22 yielded 3 darters, confirming it as a possible breeding site.

Looking downstream from bridge

Substrate details

Looking upstream from bridge

Figure 4. Photographs of the unnamed tributary-2 site 13, APCO breeding site.

39 mm SL female

37 mm SL male

Figure 5. Breeding colors of individuals from Gin Branch site 9, February 12, 2009.

April 1, 2009 - Four sites were visited on this day (5, 10, 13, and 22) with only one trispot darter found at site 13. The one male had very little nuptial color and appeared to be spent. Results of sampling this day indicated that the 2008-09 spawning season in Little Canoe Creek was near an end.

CONCLUSIONS

Rediscovery of *Etheostoma trisella* in Alabama waters is a significant addition to the range of this species, will help clarify its conservation status in Alabama, and will provide new conservation opportunities for this species. Based on limited sampling through the 2008-09 breeding season in Little Canoe Creek, we now know the following:

- ❏ The breeding habitat preferences of Little Canoe Creek trispot darters are similar to the Conasauga River population as described by Ryon (1986) and to its cousin the slackwater darter, *Etheostoma boschungi* (Boschung and Nieland, 1986; Johnston, 2004). Darters were found in both nonbreeding and breeding habitat in Little Canoe Creek over the study period. During the prebreeding spawning migration period, darters were found congregated in shoal and riffle areas in the main channel of Little Canoe Creek, sometimes over sand and gravel and at other times associated with leaf packs and debris, while during the breeding season darters were found concentrated in small tributaries with slow to no flow and were associated with leak packs over a mixed gravel and sand substrate. These tributaries are likely reduced to ephemeral pools, or may go dry, in late summer and early fall months.
- ❏ Prebreeding congregations of *E. trisella* were observed from late October through early January in the main channel of Little Canoe Creek with individuals on location in breeding sites from January through March. The exact timing of these events was not determined during this survey but the general collection data supports this time frame.
- ❏ Population densities in breeding sites were high. Over 50 darters in spawning condition were found in short periods of time in each of two distinct breeding sites on one day in February.

- ❑ Breeding sites were characterized by little to no flow, moderate leaf litter over a mixed cobble/gravel/sand/mud substrate, and shallow depths generally less than 1 foot. These sites appeared to be intermittent to partially intermittent, although we have not observed them in low stream flows or in drier seasons.
- ❑ Trispot darters may be widespread in the Big Canoe Creek system. Potential breeding streams and sites were observed throughout the Big Canoe Creek system over the course of this study. The Little Canoe Creek population is likely more widespread beyond the area around Gin Branch based on the collection of individuals in off-channel overflow pools about 6 miles upstream of Gin Branch.

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Appendix

List of fish species collected in the Big Canoe Creek system, 2008-09

Species - common name	Sampling sites																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Petromyzontidae - lampreys																						
Ichthyomyzon gagei - southern brook lamprey	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--
Lampetra aepyptera - least brook lamprey	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--
Cyprinidae - carps and minnows																						
Campostoma oligolepis - largescale stoneroller	--	X	X	--	X	--	--	X	X	X	--	X	X	X	X	X	X	--	X	X	X	X
Cyprinella callistia - Alabama shiner	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	X	--
Cyprinella trichroistia - tricolor shiner	--	--	--	--	--	--	--	X	--	--	--	X	--	--	--	X	--	--	--	--	X	--
Cyprinella venusta - blacktail shiner	--	X	--	--	X	--	--	X	--	--	--	X	--	X	--	--	--	--	--	--	X	--
Lythrurus lirus - mountain shiner	--	--	--	--	X	--	--	--	--	--	--	--	--	--	X	X	--	--	X	X	X	X
Notemigonus crysoleucas - golden shiner	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--
Notropis chrosomus - rainbow shiner	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	X	X	--	--	X	--	--
Notropis stilbius - silverstripe shiner	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--
Notropis xaenocephalus - Coosa shiner	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	X	--	--	--	--	--	--
Phenacobius catostomus - riffle minnow	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	X	--
Pimephales vigilax - bullhead minnow	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Semotilus atromaculatus - creek chub	--	--	--	--	--	--	--	X	X	--	--	--	X	X	X	X	--	--	X	X	X	X
Catostomidae - suckers																						
Hypentelium etowanum - Alabama hog sucker	--	X	--	--	--	--	--	--	--	--	--	X	--	X	--	X	X	--	--	X	X	--
Minytrema melanops - spotted sucker	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	X
Moxostoma poecilurum - blacktail redhorse	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--
Ictaluridae - bullheads and catfishes																						
Ictalurus punctatus - channel catfish	--	X	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Noturus leptacanthus - speckled madtom	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	X	--	--	--	--	X	--
Esocidae - pickerels and pikes																						
E. niger - chain pickerel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--
Fundulidae - topminnows																						
Fundulus olivaceus - blackspotted topminnow	--	X	--	--	--	--	--	X	--	--	--	X	--	X	--	X	--	--	--	X	X	--
Poecillidae - livebearers																						
Gambusia affinis - western mosquitofish	--	X	--	--	X	--	--	X	--	--	--	X	X	--	--	X	--	--	--	X	--	--

Species - common name	Sampling sites																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Cottidae - sculpins																						
Cottus carolinae - banded sculpin	--	X	X	--	X	--	--	X	--	--	--	X	--	--	--	--	--	--	--	X	X	--
Centrarchidae - sunfishes																						
Ambloplites ariommus - shadow bass	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--
Lepomis auritus - redbreast sunfish	--	X	--	--	--	--	--	--	--	--	--	X	--	X	--	X	--	--	--	X	--	--
Lepomis cyanellus - green sunfish	--	--	X	--	--	--	--	X	--	X	--	X	--	--	--	X	--	--	X	X	X	X
Lepomis gulosus - warmouth	--	--	--	--	X	--	--	--	--	--	--	X	--	--	X	X	--	--	--	X	--	--
Lepomis macrochirus - bluegill	--	X	--	--	X	--	--	X	--	--	--	X	X	X	X	--	--	--	X	X	--	X
Lepomis megalotis - longear sunfish	--	X	--	--	X	--	--	X	--	--	--	X	X	X	X	X	--	--	--	X	X	--
Lepomis microlophus - redear sunfish	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	X
Lepomis miniatus - redspotted sunfish	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	X	--	--	--	--	--	--
Micropterus coosae - redeye bass	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	X	X	--	--	--	--	--
Micropterus punctulatus - spotted bass	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--
Micropterus salmoides - largemouth bass	--	--	--	--	X	--	--	--	--	--	--	X	--	--	X	X	--	--	--	X	--	--
Percidae - darters																						
Etheostoma coosae - Coosa darter	--	X	--	--	X	--	--	--	--	--	--	X	--	X	--	X	X	--	X	X	X	X
Etheostoma ditrema - coldwater darter	--	--	--	--	--	--	--	X	--	--	--	X	--	X	X	X	--	--	X	--	--	--
Etheostoma jordani - greenbreast darter	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	X	--
Etheostoma stigmaeum - speckled darter	--	X	--	--	--	--	--	--	--	--	--	X	--	X	--	X	--	--	--	X	X	--
Etheostoma trisella - trispot darter	--	--	--	X	X	X	X	X	X	X	X	X	X	--	--	--	--	X	--	--	--	X
Percina nigrofasciata - blackbanded darter	--	X	--	--	--	--	--	--	--	--	--	X	--	--	--	X	--	--	--	--	X	--
Sciaenidae - drums																						
Aplodinotus grunniens - freshwater drum	--	--	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	--	--

GEOLOGICAL SURVEY OF ALABAMA
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Berry H. (Nick) Tew, Jr., State Geologist

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