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CURRENT DISTRIBUTION AND STATUS OF THE UPPER CUMBERLAND RIVER JOHNNY DARTER, *ETHEOSTOMA NIGRUM SUSANAE*

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ABSTRACT

I sampled 70 locations within 38 lotic systems to determine the current status of the upper Cumberland River johnny darter, *Etheostoma nigrum susanae*. Fifteen locations were found to contain the subspecies of which six were new distributional records. The 15 locations represent eight distinct populations isolated by either poor quality reaches, impoundments, or natural barriers. Habitat consisted of shallow, low velocity reaches with a sand or sand and gravel substrate. The major limiting factor to the subspecies' continued existence is siltation attributed to coal mining and related activities. The restricted distribution and isolation of *E. nigrum susanae* populations warrant concern for the subspecies' future.

INTRODUCTION

The upper Cumberland River johnny darter, *Etheostoma nigrum susanae* is restricted to the upper Cumberland River system of Kentucky and Tennessee. The subspecies was first reported from tributaries of the Clear Fork of the Cumberland River, Kentucky (Jordan and Swain 1883), and later from Gum Fork, Scott County, Tennessee (Shoup and Peyton 1940). Burr and Warren (1986) reported on recent (post 1970) collections of the species from Wolf Creek, Youngs Creek, Sanders Creek, Marsh Creek, Bunches Creek, Poor Fork, and Martins Fork. Starnes and Starnes (1979) provided a review of the species' taxonomic status.

The subspecies was reported rare and apparently jeopardized primarily by coal mining activities (Starnes and Starnes 1979). A recent status survey of *Phoxinus cumberlandensis* failed to collect *Etheostoma nigrum susanae* at eight historic locations (O'Bara 1985), thus raising an additional concern for the subspecies' continued existence. The specific objectives of my study were to determine the current distribution of *Etheostoma nigrum susanae* and to identify possible threats to the subspecies.

STUDY AREA

The upper Cumberland River system has been traditionally defined as the drainage upstream from Cumberland Falls. The falls are the result of the erosion of a 72 km gorge by the Cumberland River from the hypothesized origin near Burnside, Kentucky (McGrain 1966). The system drains an area of 5,120 km2. Major tributaries are Poor Fork, Clover Fork, Straight Fork, Clear Fork, Jellico Creek, and Marsh Creek. A complete review of the study area's geology and geography can be found in McGrain (1966).

METHODS

Field collections were made with seines due to the small size of the specimens and the poor water clarity. Sampling was conducted from April 1986 through September 1986, and from July 1987 through September 1987. Seventy sites were sampled within 38 lotic systems. All preserved specimens were analyzed following meristic and morphometric characteristics described by Starnes and Starnes (1979).

RESULTS AND DISCUSSION

Individuals of *Etheostoma nigrum susanae* were collected at fifteen sites (Table 1, Figure 1): nine historic locations and six new, but previously sampled, locations (see O'Bara 1985; Burr and Warren 1986 for sampling records). The subspecies was found from the headwaters of Poor Fork and Martins Fork to the Cumberland River just upstream of Cumberland Falls (Figure 1). The Cumberland River collections (State Route 90 and mouth of Bunches Creek) are the first reported from the main river. I believe that these 15 locations represent eight distinct populations

Table 1. Current distribution of *Etheostoma nigrum susanae*, 1986-1987.

Stream Code[1]	Stream Name	Location	County, State
1.	Cumberland River[2]	State Route 90	Whitley, KY
2.	Cumberland River[2]	mouth of Bunches Creek	Whitley, KY
3.	Bunches Creek	lower 2.4 km	Whitley, KY
4.	Marsh Creek	confluence of Caddell Branch	McCreary, KY
5.	Marsh Creek[2]	confluence of Big Branch	McCreary, KY
6.	Cal Creek	lower 3.2 km	McCreary, KY
7.	Capuchin Creek[2]	KY and TN state line	Campbell, TN
8.	Jellico Creek[2]	confluence of Gum Creek	Scott, TN
9.	Sanders Creek	lower 1.9 km	Whitley, KY
10.	Youngs Creek	State Route 204	Whitley, KY
11.	Brier Creek	State Route 92	Whitley, KY
12.	Wolf Creek	Wolf Creek Road	Whitley, KY
13.	Martins Fork	confluence of Abner Branch	Harlan, KY
14.	Poor Fork-A	State Route 932	Letcher, KY
15.	Poor Fork-B	Cumberland, KY	Harlan, KY

[1]Stream code refers to Figure 1
[2]Newly reported location

which are isolated by poor quality sections of the Cumberland River, impoundments, or natural barriers, all of which result in restricted gene flow between these populations. These populations are: Poor Fork, Martins Fork, Wolf Creek, Brier Fork, Youngs Creek/Sanders Creek, Jellico Creek/Capuchin Creek, Cal Creek/Marsh Creek, and Bunches Creek/Cumberland River.

General habitat present at all *Etheostoma nigrum susanae* collection sites except the Cumberland River, consisted of shallow, low velocity reaches adjacent to riffles within small upland streams. All specimens were collected in less than 15 cm of water in streams ranging in width from three to ten meters. Specimens were only found in reaches with sand, or a sand and gravel substrate. Similar habitat characteristics (substrate, depth, gradient) were found at the two Cumberland River collection sites, but specimens were collected outside the influence of the main river.

I believe that the topography of the basin probably has dictated the natural distribution of *Etheostoma nigrum susanae*. High-gradient streams are prevalent in the Cumberland Mountain section, as well as in the Pottsville Escarpment. The moderate relief of the Cumberland Plateau in the basin near Williamsburg, Kentucky, is conducive to the development of low- to moderate-gradient streams. In addition, streams within the Cumberland Mountain section or the Pottsville Escarpment have cobble and boulder substrate. Therefore, I believe that the section

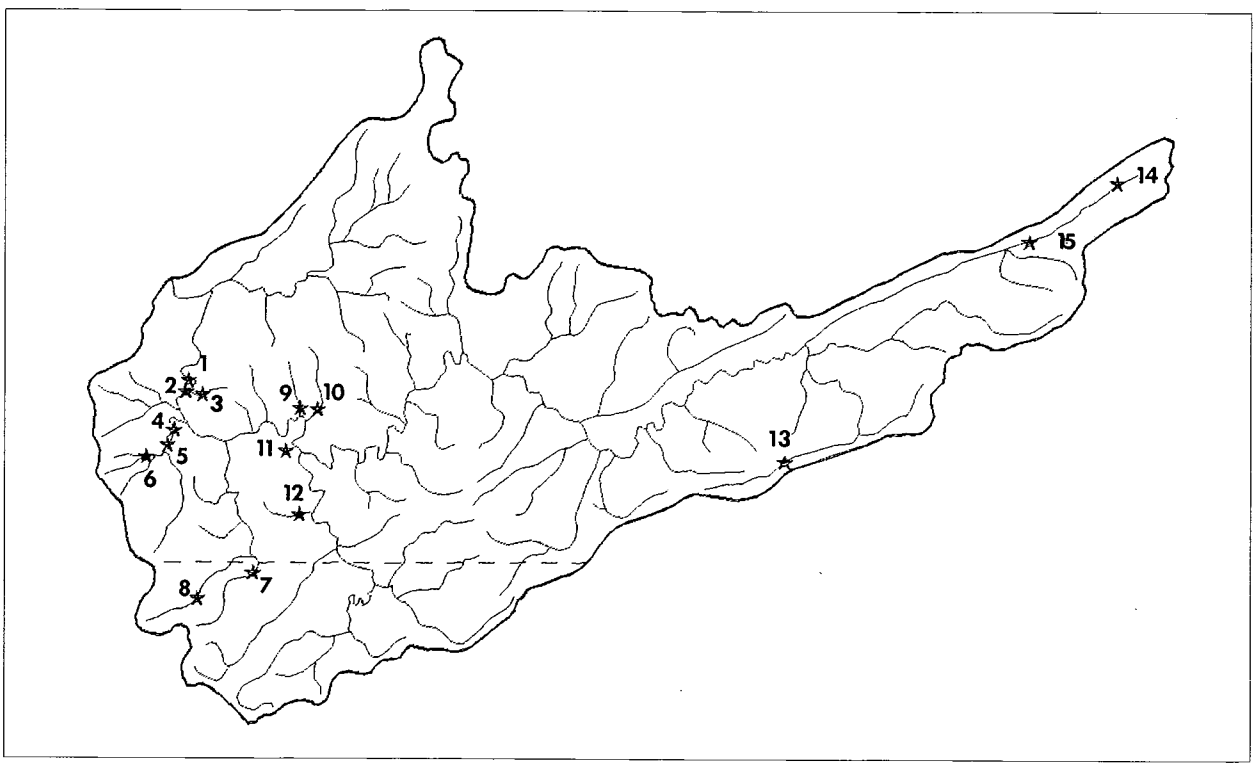

Figure 1. Map of the upper Cumberland River system depicting locations of known populations of *Etheostoma nigrum susanae*. Stream code refers to Table 1.

of the system from Cumberland Falls upstram to the confluence of Straight Creek represents most of the potential range of *Etheostoma nigrum susanae*. The presence of the subspecies in Poor Fork and Martins Fork is probably the result of the incised nature of these basins, leading to the development of suitable habitat. Lotic systems outside this area did not contain physical habitat in which the subspecies was primarily found.

The most widespread threat to the lotic integrity of the upper Cumberland River basin and, therefore, the continued existence of *E. nigrum susanae*, is degradation resulting from coal mining and related activities (Harker et al. 1979, Starnes and Starnes 1979, Harker et al. 1980, O'Bara 1985). Only 15 of the 70 sampling locations had not been impacted by mining and six (Bunches Creek, Sanders Creek, Youngs Creek, Brier Creek, Martins Fork, Poor Fork-A) of these 15 sampling locations contained *E. nigrum susanae*. The remaining nine locations non-impacted by mining were too small, influenced by an impoundment, or outside the theorized range of *E. nigrum susanae*. The Cal Creek, Wolf Creek and Marsh Creek watersheds were previously mined for coal, but only the Poor Fork-B, Jellico Creek, and Capuchin Creek watersheds are currently mined. Although the Cumberland River collection sites are impacted by coal mining activities, the large size of the Cumberland River and the proximity to a high quality tributary (Bunches Creek) may provide a refuge. While forestry and agricultural practices occur in all of the watersheds and may contribute to decreased lotic integrity, the subspecies is able to exist under these marginally impacted conditions. The Bunches Creek, Youngs Creek, Sanders Creek, Brier Creek, Martins Fork, and upper Poor Fork watersheds are subjected to both forestry and agricultural practices, but still contain the subspecies.

A major degrading factor within the Appalachian Province that is attributed primarily to coal mining activities is siltation (Harker et al. 1980). The physical habitat in which *E. nigrum susanae* was primarily found is extremely susceptible to siltation. The low to moderate gradient, low velocity, shallow depth, and backwater nature of this habitat leads to this susceptibility. I believe that siltation is the major limiting factor for both the continued existence of *E. nigrum susanae* or the colonization from existing populations into new lotic systems.

If the unique upper Cumberland River fauna (two endemic fish and several rare fish, mussels, and crayfish) is to exist and recover from past environmental insults, concern must be given to improving instream conditions. This should include increased restraints on coal mining and other land use activities within watersheds which drain into streams inhabited by jeopardized species, as well as a commitment to provide the greatest environmental protection to lotic systems from all land use activities. The current restricted distribution of *E. nigrum susanae* and the isolated populations of the subspecies within the upper Cumberland River system warrant this concern.

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RANGE EXTENSION AND FIRST REPORTED FEMALE LEAST WEASEL IN TENNESSEE

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While attempting to collect cotton rats, *Sigmodon hispidus,* on May 12th, 1989, we captured two least weasels *(Mustela nivalis).* Sherman live traps were set bordering on land in the edge of a hay field located in Claiborne Co., Tennessee, at an elevation of 1200 ft. On the morning of May 12th a male least weasel was trapped in the southeast edge of the field, bordering a low lying boggy area, next to a small abandoned barn, and several feet from the road. When traps were checked again in the late afternoon a female least weasel was captured in an area of honeysuckle growing along the southern border of the field next to a small creek. Both animals were kept for weighing and photographing. Our other trapping results indicated the primary prey available in this area was southern bog lemmings *(Synaptomys cooperi),* house mice *(Mus domesticus), Peromyscus sp.,* and possibly young cotton rats.

The female weighed 35 grams and was returned to the place of capture after photographing. The male weighed 35.5 grams and its other standard measurements were 188, 40, and 23mm. The male was retained as a type specimen and is available at Lincoln Memorial University, Harrogate, Tennessee. Based upon weight and condition, both appeared to be young adults.

Figure 1. Photograph of one of the two least weasels captured by author.

These captures represent an extension of the known range of least weasels in Tennessee. Least weasels were first reported in Carter Co., Tennessee by Tuttle (1968). Subsequent reports of least weasels have been made by Nagel (1972), Smith et al. (1974), and Anderson (1988). However, this is the first reported capture of a female and represents a lower elevation capture than that previously reported by Nagel (1972) of 1700 ft.

We wish to thank Drs. Ronald Caldwell and John Copeland, Lincoln Memorial University for their assistance in locating trapping sites, Mr. Alexander for allowing us to trap on his property, and Nancy Cushing for her comments on this manuscript. Finally, we wish to thank Lincoln Memorial University for allowing us the use of their new associated field station, Cumberland Mountain Research Center, as a base of operation.

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