

# A Survey of the Big South Fork Crayfish (*Cambarus bouchardi*)

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Tennessee Wildlife Resources Agency

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*Cambarus bouchardi*

(Photo by Bart D. Carter)

## Introduction

One of nine crayfish species listed endangered by the Tennessee Wildlife Resources Commission, the Big South Fork Crayfish (*Cambarus bouchardi*), a primitive member of the subgenus *Jugicambarus* (Hobbs 1970), has concerned wildlife managers since its description in 1970. Known only from Roaring Paunch Creek and its tributaries, *C. bouchardi* is considered extremely vulnerable to extirpation due primarily to a limited distribution. Originating just north-east of Oneida Tennessee, Roaring Paunch Creek flows north along the Cumberland Plateau roughly 23 miles into McCreary County Kentucky before it empties into the Big South Fork Cumberland River.

Today, several threats to the Big South Fork Crayfish continue to exist within the Roaring Paunch Creek drainage. Habitat loss and poor water quality issues from point and non-point source pollution has plagued this species for many years. During our surveys, we observed heavy siltation from excessive logging activities within the watershed. Also, historical coal surface mining activities occurred within this watershed from the late 1960's and extended into the early 1980's. Some of these abandoned mine sites have been reclaimed, however, many have not (Tim Eagle, TDEC-WPC, pers. comm.), and the adverse effects of runoff is still impacting many streams. In addition, residential developments along riparian zones are on the rise. Lastly, although none were found, the potential for encroachment of nonindigenous crayfish species certainly merits reason for concern.

On 10 April 2002, we surveyed one site on Roaring Paunch Creek proper and one site each on five tributaries (Figure 1). Our surveys focused on the Tennessee portion of Roaring Paunch Creek beginning at the Kentucky state boundary. The objective was to evaluate the status of known *C. bouchardi* populations, and to document its occurrence at new locations within the Tennessee portion of its range.

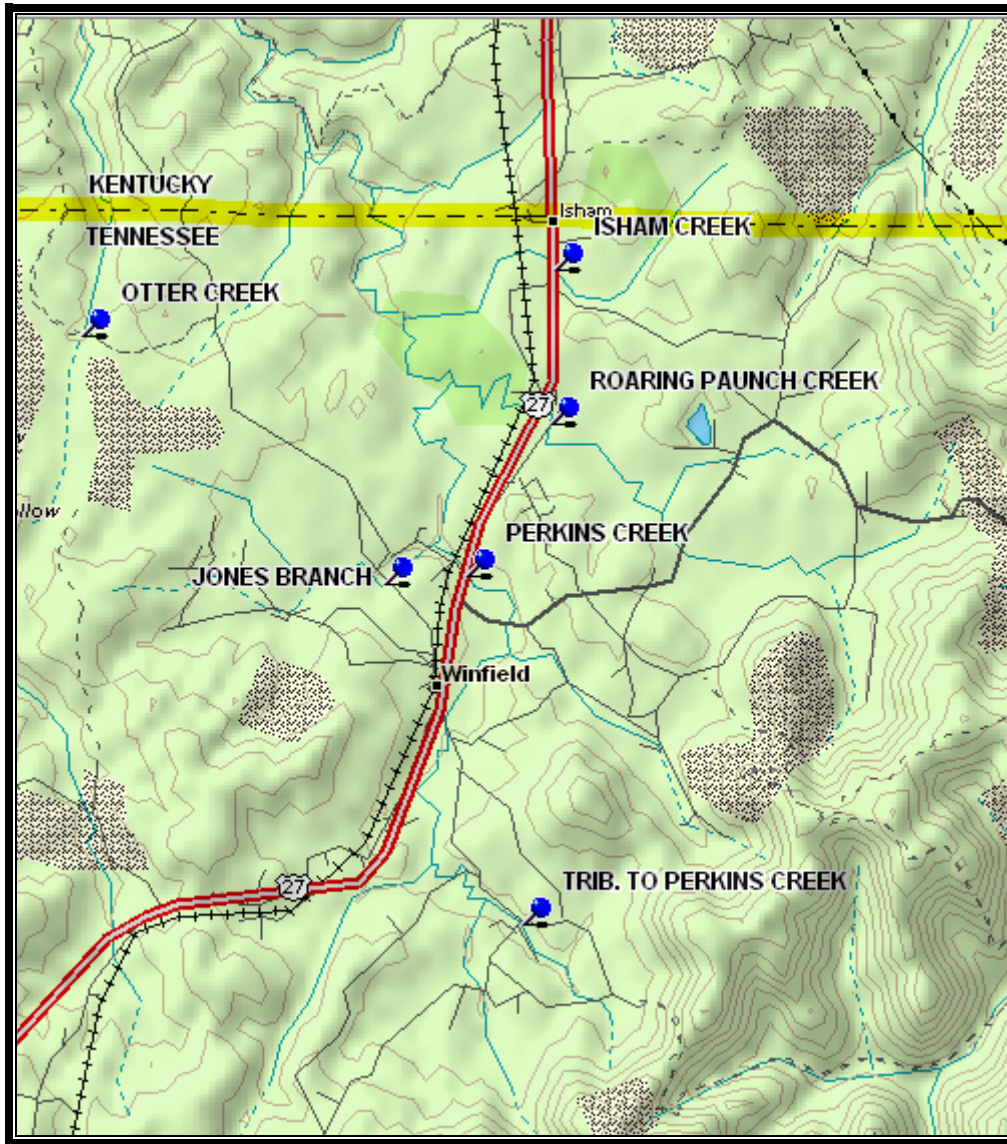


Figure 1. Map depicting the six sample sites surveyed within the Roaring Paunch watershed.

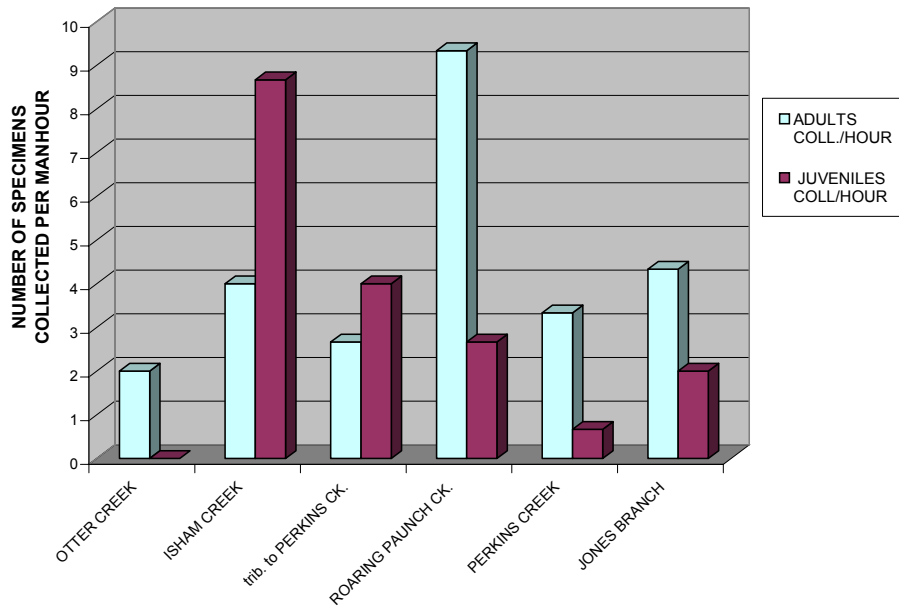
## Sample Methods

Three agency personnel collected crayfish at each site. Large rocks were carefully turned by hand while holding a net just downstream in fast current, often followed with a boot sweeping action. Also effective, in slow current habitats where visibility permitted, specimens were collected by quickly grabbing them with a bare hand. The duration of each sample was documented and the collecting technique was standardized at each site in anticipation that the survey effort can be duplicated and compared (catch per unit effort (#/hour)). Approximate stream width was visually estimated, and silt loads and riparian conditions were usually noted.

## Results and Discussion

Our surveys produced specimens of *Cambarus bouchardi* from Perkins Creek proper (type locality), a headwater tributary to Perkins Creek, and Roaring Paunch Creek. In addition, we documented the Big South Fork Crayfish from 3 new stream localities— Isham Creek, Jones Branch, and Otter Creek. We noted during our surveys that population densities were directly proportional to the presence or absence of cover habitat in the form of large flat rocks. Roaring Paunch Creek was clearly the most productive site for adult (taxonomically preferred) specimens (Figure 2). Good numbers of large flat rocks were available and although siltation was moderately heavy and evidence of organic enrichment was obvious, crayfish specimens were easily collected. Otter Creek, on the other hand, was the most heavily impacted stream we encountered during our surveys. The original substrate has been and is presently being impacted by current logging and historical strip-mine activities within the drainage. Although much of the Roaring Paunch Creek watershed has been adversely impacted, we have a positive outlook for the continued existence of this special species.

Figure 2. CPUE values for crayfish collected at six sampling stations.



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### Management Recommendations

Continue to monitor this species. We recommend periodical surveys of the six sample sites. Additionally, a standardized habitat assessment, and measuring basic water quality parameters (conductivity, pH, temperature, etc.) could provide beneficial data. Encourage universities to conduct extensive life history studies to further increase our knowledge of this species. Also, propagation and restoration techniques should be developed in the event population levels should ever fall dangerously low.

### **Stream Survey Accounts:**

**Stream:** Perkins Creek

**Date:** 10 April 2002

**Field Number:** CEW-02-01

**Quadrangle:** Oneida North

**Coordinates:** 36.56595 – 84.44857

**Elevation:** 1,250 ft.

**Locality:** The site was at the bridge crossing on Hwy. 27, approx. 4.5 miles (by road) north of Oneida, Scott Co., TN.

**Comments:** Here the stream was moderately impacted by siltation. A high degree of human activity within the watershed was evident by the amount of rubbish in and alongside the stream. The riparian zone was vegetated with large trees and shrubs upstream of the bridge and much younger growth downstream with lots of multiflora rose along the banks. Of special interest, the two adult females were ovigerous.

**Specimens Collected:** *Cambarus bouchardi* – 2MI, 2F, 6J

**Stream:** trib. to Perkins Creek

**Date:** 10 April 2002

**Field Numbers:** CEW-2002-05

**Quadrangle:** Winfield

**Coordinates:** 36.53529-84.44255

**Elevation:** 1,340 ft.

**Locality:** This site was at the bridge crossing on Pine Hill Road, just south of Piney Grove, approx. 4.5 miles by air E-NE of Oneida, Scott Co., TN.

**Comments:** The stream width is ~ 8-10 feet. The substrate was mostly bedrock with loose flat rocks, and heavily silted. Although, at this time, water clarity was good, we suspect muddy conditions during periods of substantial rainfall. Here the riparian zone is vegetated with shrubs and large trees. The stream meanders through open woods through much of this reach with numerous houses and mobile homes being established in close proximity to the riparian zone. Of special interest, two of the adult females were ovigerous.

**Specimens Collected:** *Cambarus bouchardi* – 3MI, 2MII, 6F, 1J



This gravid female, often termed “in berry” because of its resemblance to a cluster of berries, is carrying dozens of eggs that will help ensure the next generation of Big South Fork Crayfish.

Trib. to Perkins Creek—Photo by R.D. Bivens



TWRA personnel collect crayfish just upstream of the bridge on Pine Hill Road  
Trib. to Perkins Creek—Photo by R.D. Bivens

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**Stream:** Roaring Paunch Creek

**Date:** 10 April 2002

**Field Numbers:** CEW-02-02

**Quadrangle:** Winfield

**Coordinates:** 36.57902 – 84.43944

**Elevation:** 1,280 ft.

**Locality:** At the Old Hwy. 27 bridge crossing located approx. 5.5 miles by road north of Oneida, Scott Co. TN.

**Comments:** Type locality for *Cambarus bouchardi*. The stream width is ~ 15 – 20 feet. The streambed is littered with lots of large rocks providing excellent crayfish habitat. However, siltation was moderately high and mats of filamentous algae blanketed the substrate indicative of organic enrichment.

Due to recent rainfall, the stream was somewhat dingy, and the flow was higher than normal.

**Specimens collected:** *Cambarus bouchardi* – 2MI, 9MII, 3F, 4J  
*Cambarus (Depressicambarus) sp.?* – 1J

**Stream:** Isham Creek

**Date:** 10 April 2002

**Field Number:** CEW-2002-03

**Quadrangle:** Winfield

**Coordinates:** 36.59082-84.43895

**Elevation:** 1,325 ft.

**Locality:** The site was at the Hwy. 27 bridge crossing, just south of the Kentucky state line, approx. 6.9 mi. by road, north of Oneida, Scott Co., TN.

**Comments:** The stream width is ~ 3-5 ft. Substrate was heavily silted and appeared to have a distinct unnatural red/orange color and when disturbed emitted a petroleum like odor. Riparian vegetation upstream of the Hwy. 27 consisted of grasses and small shrubs with little or no canopy. However, downstream of the highway was better protected with an assortment of small to large of trees.

**Specimens collected:** *Cambarus bouchardi* - 1 1<sup>st</sup> form ♂, 2 2<sup>nd</sup> ♂, 2 ♀, and 13 juveniles

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**Stream:** Jones Branch

**Date:** 10 April 2002

**Field Number:** CEW-2002-04

**Quadrangle:** Winfield

**Coordinates:** 36.56449-84.45701

**Elevation:** 1,340 ft.

**Locality:** The site was just upstream of the culvert on Kingtown Road, approx. 5.2 miles by air NE of Oneida, Scott Co., TN.

**Comments:** The stream width is ~ 8 - 10 feet. The substrate is relatively clean with lots of rock habitat. Although large canopy trees were sparse at this site, the stream bank was stable and covered with grass. Our opinion is the stream is in relatively good shape at this site. Of special interest, one of the adult females was ovigerous.

**Specimens collected:** *Cambarus bouchardi* – 2MI, 8MII, 3F, 4J  
*Cambarus* undetermined sp.? – 1F

**Stream:** Otter Creek

**Date:** 10 April 2002

**Field Number:** CEW-2002-07

**Quadrangle:** Winfield

**Coordinates:** 36.58578-84.48927

**Elevation:** 1,330 ft.

**Locality:** The site is at the ford on the rough logging road off Kingtown Road, 6 air miles north of Hwys. 27 and 297 in Oneida, Scott Co., TN.

**Comments:** The stream width is ~ 6 – 8 feet. This stream is currently suffering from the effects of heavy siltation associated with poor logging practices and abandoned surface mines within the watershed. Soil deposits up 1.5 feet deep were observed. Much of the original substrate is buried along with most of the large rocks that provide important habitat for crayfish. However, we were able to collect a few specimens at this site including one ovigerous female.

**Specimens Collected:** *Cambarus bouchardi* – 2MII, 1F

**Literature Source:**

Hobbs, H.H., Jr. 1970. New crayfishes of the genus *Cambarus* from Tennessee and Georgia (Decapoda, Astacidae. Proceedings of the Biological Society of Washington, 83(23):241-260.