

# **A Crayfish Survey of Wilkerson Creek and two of its Tributaries Cumberland County Tennessee**

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**Tennessee Wildlife Resources Agency**

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Wilkerson Creek just upstream of the bridge on Mayland Road

(Photo by Bart D. Carter)

## **Introduction**

Located on the Cumberland Plateau, Wilkerson Creek originates along the White County line, and generally flows in an easterly direction just north of Pleasant Hill before it turns south and empties into the headwaters of the Caney Fork River, approximately 7.0 air miles west of Crossville. Crayfish surveys were requested on Wilkerson Creek in response to the proposed construction of a pumping station to withdraw water from the stream by the West Cumberland Utility District to supplement potable water supplies for local residential communities.

On 16 December 2004, the Tennessee Wildlife Resources Agency (TWRA) Region 4 Stream Survey Crew conducted two Catch Per Unit Effort (CPUE) crayfish surveys on Wilkerson Creek proper and two of its tributaries. An additional site was surveyed on Whiteoak Creek to serve as a control site. The objective of our surveys was to check for the occurrence of the state listed crayfish *Cambarus pristinus*, and to compare population densities (CPUE estimates) to those in Whiteoak Creek.



*Cambarus pristinus* from Wilkerson Creek site 1

(Photo by Bart D. Carter)

With approximately 76 described species of crayfish native to Tennessee, *C. pristinus* is one of nine species listed endangered by the Tennessee Wildlife Resources Commission. Perhaps the most primitive member of the genus *Cambarus* (Hobbs 1965), its small range distribution has caused much concern among wildlife managers in recent years. Known only from the headwaters of the Caney Fork River in Cumberland and Van Buren counties and a small disjunct population (currently under review for new species status) occurring in the headwaters of Big Brush Creek (Sequatchie River drainage), it is considered vulnerable to extirpation.

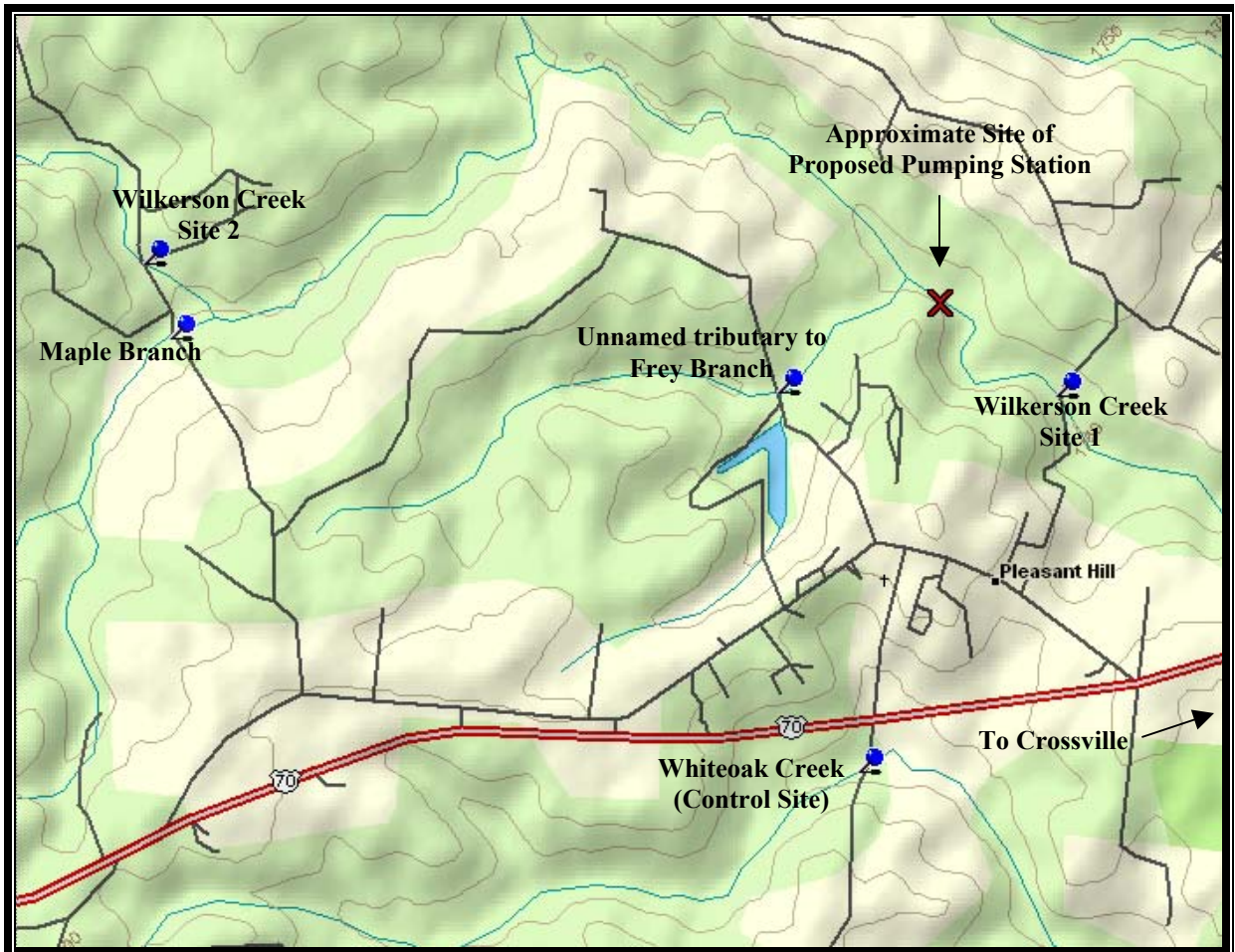


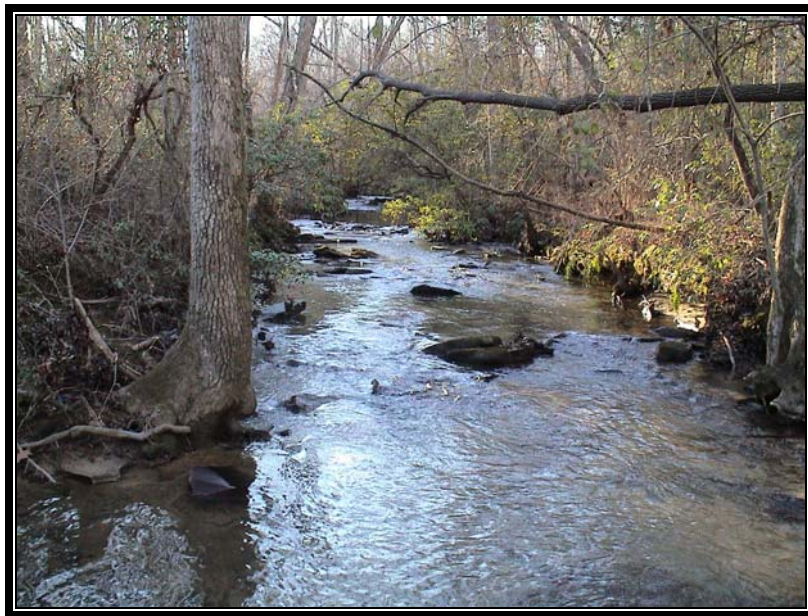
Figure 1. Map depicting the five survey sites and the proposed pumping station site.

### Sample Methods

Three agency personnel collected crayfish at each site employing collecting techniques described by Williams et al. (2002). Large rocks were carefully turned by hand while holding a net just downstream in fast current, often followed with a boot-sweeping action. 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. All specimens were identified and enumerated in the field before being released or preserved in 10% formalin for processing in the lab. Selected preserved specimens were catalogued and voucher specimens repositied in the TWRA Collection of Crayfishes in Morristown, Tennessee. Average stream widths were estimated at all sites. The stream flow (cubic feet per second), pH, and conductivity data were measured at Wilkerson Creek site 1 and at Whiteoak Creek (control site) only (see Stream Survey Accounts).

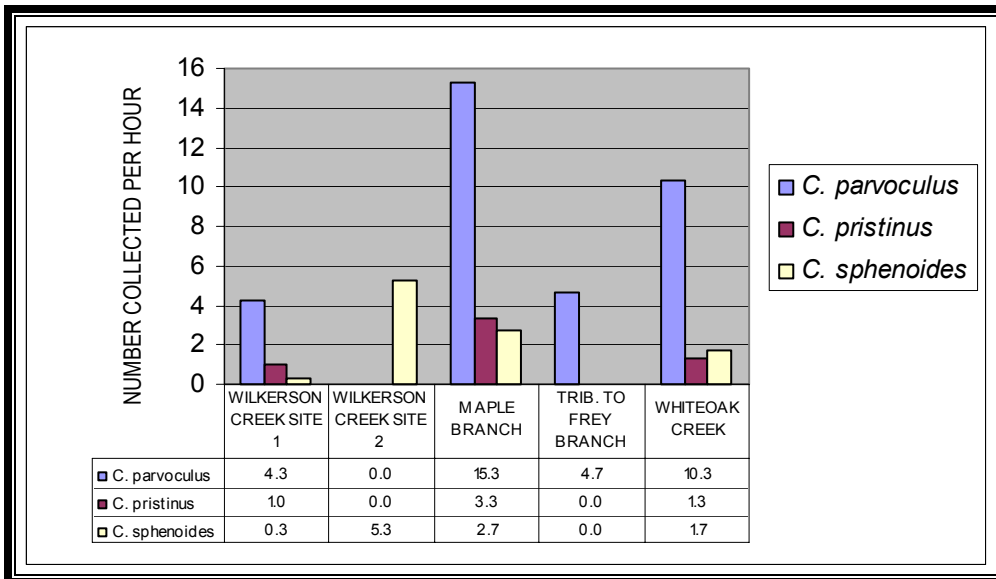
## Results and Discussion

Our surveys produced specimens of *C. pristinus* from two of the four sites sampled within the Wilkerson Creek drainage—Wilkerson Creek site 1, and Maple Branch. We noted during our surveys that the occurrence of *C. pristinus* was directly related to the presence of the preferred cover habitat—large flat rocks in shallow pools with slow current. Maple Creek was clearly the most productive site for *C. pristinus*. Here the stream was small and relatively shallow, large flat rocks were abundant, and crayfish specimens were easily collected. Wilkerson Creek site 1, on the other hand, due to its larger size and above average stream flow from recent rain fall was more difficult to survey. Much of the habitat was too deep to efficiently capture crayfish employing our methods. However, the CPUE estimates for *C. pristinus* at Wilkerson Creek site 1 and Maple Branch, with 1.0 and 3.3 specimens per hour respectively, compared well with our control site on Whiteoak Creek with 1.3 specimens per hour (Figures 2 and 3). Wilkerson Creek site 2 is impacted with heavy sand and silt deposits, and if loose slab rock habitat exists, it is buried beneath these deep deposits. The unnamed tributary to Frey Branch with higher gradient and swift currents probably doesn't provide ideal habitat for *C. pristinus*, at least within the reach of our survey. Incidentally, we estimated CPUE and percent values for two additional crayfish species collected during our surveys—*C. parvoculus*, and *C. sphenoides* (Figures 2 and 3). These two species are common and range throughout much of the Cumberland Plateau.

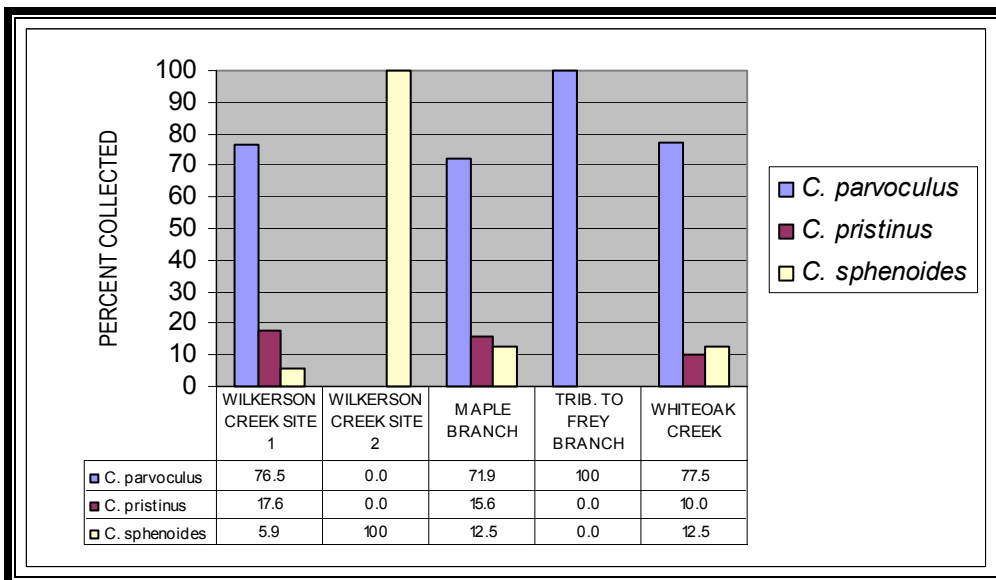


Whiteoak Creek (control site) just upstream of the bridge crossing on Browntown Road  
(Photo by Bart D. Carter)

**Figure 2. CPUE values for crayfish species collected at five survey sites.**



**Figure 3. Percent values for crayfish species collected at five survey sites.**



## Management Recommendations

Continue to monitor this population periodically following established guidelines for listed species and protocols for sampling by Williams et al. (2002). Conduct additional surveys of tributaries within the Wilkerson Creek drainage for possible occurrence of *C. pristinus*. Finally, any efforts to alleviate habitat degradation within this watershed would be beneficial.

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### Field Collection Crew:

TWRA Personnel: Bivens, R.D., Carter, B.D., Williams, C.E.

### Stream Survey Accounts:

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#### Wilkerson Creek (site 1)

Field Collection Number: CEW 121604-36

16 December 2004

Conducted a 3 man hour crayfish survey of all habitat types at the bridge crossing on Mayland Road, just N of Pleasant Hill, approximately 9.5 air mi. WNW of Crossville.

Cumberland Co., TN

Pleasant Hill Quad.

Coordinates: N35.98295 – W85.19104

Elevation: 1710 ft.

Temperature – 4 degrees °C

pH – 6.2

Conductivity – 15 micromhos/cm

Average Stream Width – 8 meters

Stream Flow – 27.2 cfs

#### Specimens Collected:

*Cambarus (Jugicambarus) parvovulus* – 4 male 1<sup>st</sup> form, 5 female, 3 male juveniles, 1 female juvenile

*C. (Depressicambarus) sphenoides* – 1 female juvenile

*C. (Veticambarus) pristinus* – 1 male 1<sup>st</sup> form, 1 adult female, 1 male juvenile

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**Maple Branch**

Field Collection Number: CEW 121604-37

16 December 2004

Conducted a 1.5 man hour crayfish survey of all habitat types just upstream of the bridge crossing on Glade Creek Road, WNW of Pleasant Hill, approximately 11.8 air mi. W of Crossville.

Cumberland Co., TN

Pleasant Hill Quad.

Coordinates: N35.98545 – W85.23171

Elevation: 1775 ft.

Average Stream Width – 3.5 meters

Specimens Collected:

*Cambarus (Jugicambarus) parvocolus* – 4 male 1<sup>st</sup> form, 2 male 2<sup>nd</sup> form, 15 females, 2 male juveniles

*C. (Depressicambarus) sphenoides* – 1 female, 2 male juveniles, 1 male juvenile

*C. (Veticambarus) pristinus* – 3 male 1<sup>st</sup> form, 2 adult females

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**Wilkerson Creek (site 2)**

Field Collection Number: CEW 121604-38

16 December 2004

Conducted a 1.5 man hour survey of all habitat types at the bridge crossing on Glade Creek Road, WNW of Pleasant Hill,, approximately 11.9 air mi. W of Crossville.

Cumberland Co., TN

Pleasant Hill Quad.

Coordinates: N35.98815 – W85.23254

Elevation: 1770 ft.

Average Stream Width – 5.5 meters

Specimens Collected:

*C. (Depressicambarus) sphenoides* – 1 male 1<sup>st</sup> form, 4 male juveniles, 3 female juveniles

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**Unnamed tributary to Frey Branch**

Field Collection Number: CEW 121604-39

16 December 2004

Conducted a 1.5 man hour survey of all habitat types just downstream of the culvert crossing on W. Lake Road, near Pleasant Hill, approximately 10.2 air mi. W of Crossville.

Cumberland Co., TN

Pleasant Hill Quad.

Coordinates: N35.98335 – W85.20366

Elevation: 1765 ft.

Average Stream Width – 1.5 meters

Specimens Collected:

*Cambarus (Jugicambarus) parvocolus* – 2 male 1<sup>st</sup> form, 2 male 2<sup>nd</sup> form, 3 females

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**Whiteoak Creek**

Field Collection Number: CEW 121604-40

16 December 2004

Conducted a 3.0 man hour survey of all habitat types just upstream of the culvert crossing on Browntown Road, just south of Hwy. 70 near Pleasant Hill, 9.8 air mi. W of Crossville.

Cumberland Co., TN

Pleasant Hill Quad.

Coordinates: N35.96941 – W85.20009

Elevation: 1750 ft.

Average Stream Width – 3.5 meters

**Specimens Collected:**

*Cambarus (Jugicambarus) parvoculus* – 2 male 1<sup>st</sup> form, 1 male 2<sup>nd</sup> form, 15 females, 4 male juveniles, 9 female juveniles

*C. pristinus* – 1 male 1<sup>st</sup> form, 2 females, 1 female juvenile

*C. sphenoides* – 1 female, 4 female juveniles

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**Literature Sources:**

Hobbs, H.H., Jr. 1970. A New Crayfish of the genus *Cambarus* from Tennessee with Emended Definitions of the Genus (Decapoda. Astacidae) Proceedings of the Biological Society of Washington, 78:265-274.

Williams, C.E., R.D. Bivens, and B.D. Carter. 2002. A Survey of the Big South Fork Crayfish (*Cambarus bouchardi*). Tennessee Wildlife Resources Agency, Nashville, TN.