A Survey for Stoneflies in the Homochitto National Forest, Southwest Mississippi

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Abstract: Streamside blacklight traps, aerial netting, and beating sheet samples of adult stoneflies were taken from streams of the Amite, Bayou Pierre, Buffalo and Homochitto River systems in the Homochitto National Forest of southwest Mississippi. Natchez (*Alloperla natchez*) and/or Chukcho (*Haploperla chukcho*) stoneflies, federal candidates for listing as threatened or endangered species, were found in 19 streams of the Homochitto River system, 3 streams of the Bayou Pierre system, and 1 stream of the Amite River system. Neither species was collected from tributaries of the Buffalo River. Occurrence of both species appears to be associated with stream order and canopy cover.

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Natchez and Chukcho stoneflies are small (5–7 mm) insects in the family Chloroperlidae. Adults were described from specimens collected in Claiborne County, Mississippi (Surdick and Stark 1980); Brown and Stark (1995) present descriptions of the nymphs and eggs for both species. Despite extensive light trap collection effort for aquatic insects in Alabama (Stark 1980, Holzenthal et al. 1982, Stark unpubl. data), neither species has been taken outside an area of southwest Mississippi bordered by Claiborne and Smith counties in the north

and by Forrest and Amite counties in the south (Fig. 1). The negative collection data for Alabama are particularly supportive of Brown and Stark's (1995) suggestion that these species are Mississippi endemics. Harris et al. (1991) collected light trap samples from 575 localities throughout Alabama, including 89 samples from counties adjacent to Mississippi. Although these collections were directed primarily toward adult caddisflies, more than 70 samples included chloroperlid adults (Stark and Harris 1986, Stark unpubl. data) representing 6 *Alloperla* and a single *Haploperla* species, but Natchez and Chukcho stoneflies were absent.

In 1991, one of us (Stark, unpubl. data) collected both species in the Homochitto National Forest from Tallys Creek, and (Stark, unpubl. data) identified several additional specimens which had been collected in 1992 by personnel of the Mississippi Entomological Museum, Mississippi State University, from Porter, McGehee, and Middleton Creek watersheds. In 1993, a U.S. Fish and Wildlife Service status review of Natchez and Chukcho stoneflies (Hartfield unpubl. rep. Jackson, Miss.) recommended continued surveys to determine the range of these species. The report also recommended invitation of a pre-listing agreement to identify threats, facilitate recovery, and preclude need for listing of these species as endangered or threatened. A 2-year survey was then initiated by the U.S. Department of Agriculture (USDA) Forest Service on the Homochitto National Forest to determine distribution of these species and to begin documenting their habitat parameters.

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Methods

The Homochitto National Forest encompasses 76,378 ha of upland pine, pine-hardwood, and bottomland forest in southwest Mississippi. The Homochitto River serves as the main watershed of this forest, in addition to a few headwater streams of the Amite, Bayou Pierre, and Buffalo systems.

Because nymphs of Natchez stoneflies are hyporheic and difficult to collect (Brown and Stark 1995) we chose to survey for the presence of adults. Adult stoneflies were collected from April to June by sweeping streamside vegetation with a standard aerial net or with a beating sheet during daylight (0800–1700 hours). During evening hours, battery powered blacklights were placed over a white tray of alcohol at streamside and allowed to operate from about 30 minutes prior to sunset to 1–2 hours after sunset. Samples were preserved in isopropyl alcohol, stoneflies were sorted, and chloroperlids were identified by B. P. Stark at Mississippi College, Clinton, Miss. Voucher specimens were placed in the U.S. National Museum of Natural History, Washington, D.C., and the Mississippi Entomological Museum, Starkville, Mississippi.

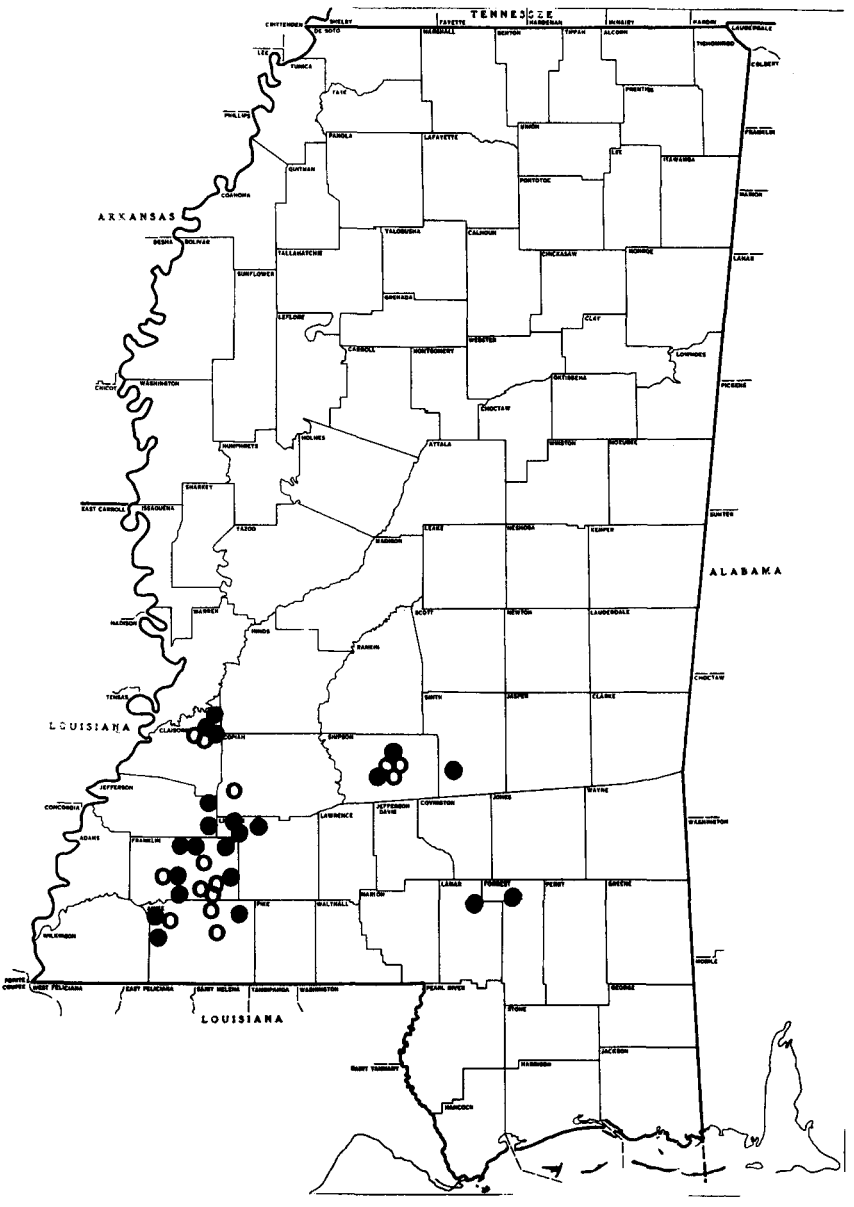

Figure 1. Known distribution of Natchez and Chukcho stoneflies. Closed circles = Natchez only, open circles = both species. Claiborne, Simpson, Smith, Lamar, and Forrest County records are from Brown and Stark (1995), Stark (1980), Stark (unpubl. data), and Surdick and Stark (1980).

Time of day, air temperature, and water temperature were taken at the beginning and end of each sample period. Stream sites were classified as perennial or intermittent from U.S. Geological Survey 7.5-minute topographic maps at 1:24,000 scale. Stream order for each site was determined from a U.S. Geological Survey planimetric map at 1:100,000 scale. Width and depth of stream channel and distance of stream surveyed (when sampled during daylight hours) was measured. Ocular estimates of percent canopy cover, dominant forest type, and understory vegetation were made. In addition, the presence of houses, roads, and evidences of other potential impacts on water quality were recorded.

Results and Discussion

Sixty-six stream sites in the Homochitto National Forest were sampled for adult stoneflies over the 4-year period from 1991 through 1994. Natchez stoneflies were found at 23 sites on the Amite, Bayou Pierre, and Homochitto River systems and Chukcho stoneflies were found at 9 sites on the Bayou Pierre and Homochitto River Systems (Table 1). Prior to this study, the only published records for these species were from the Big Black and Bayou Pierre systems in Claiborne County and the Pearl River (Strong River watershed) in Simpson County (Stark 1980, Surdick and Stark 1980, Brown and Stark 1995). Stark collected Natchez stoneflies in the upper Pascagoula-Leaf River system in Smith, Forrest, and Lamar counties in 1991, but neither species was found at sample sites in the DeSoto National Forest during the same survey (Stark, pers. commun.). The known distribution for these species is presented in Figure 1.

Because habitat parameters were a secondary objective, data collected were considered preliminary in nature and statistical tests were not performed. However, several characteristics appeared with enough frequency to warrant mention.

Occurrence of both species in the Homochitto National Forest appears to be associated with stream order and canopy cover. Thirteen (56.5%) of sites where 1 or both species were collected are first order streams, 7 (30.4%) are second order, 3 (13%) are third order, and 22 (95.6%) had full or full-to-partial canopy. Neither species was collected from localities such as lower McGehee Creek (site 5, Table 1) where stream order was at least 4, even though both species occur in the watershed at site 65.

Many of the sites (30%) where Natchez and Chukcho stoneflies were collected in the Homochitto National Forest are classified as intermittent. Both species occur with some frequency in perennial streams but intermittent streams may be more important to Chukcho stoneflies. Four of 9 streams in the Homochitto National Forest and 2 of 5 streams outside the forest where Chukcho stoneflies occur are intermittent. Occurrence in intermittent streams appears to be atypical of the Chloroperlidae. *Haploperla brevis* (Banks), a widely distributed relative of the Chukcho stonefly, is often found in spring-fed second or third order streams in the Ozark and Ouachita mountains (Ernst and Stewart

Table 1. Sample sites for Natchez (N) and Chukcho (C) stoneflies on the Homochitto National Forest, 1991–1994[a]. A = Amite River, B = Buffalo River, BP = Bayou Pierre, H = Homochitto River.

Site No.	Stream	River system	County	Species
1	Porter Creek tributary	H	Franklin	N, C
2	Porter Creek	H	Franklin	N, C
3	Porter Creek	H	Franklin	N, C
4	McGehee Creek tributary	H	Franklin	N, C
9	Lick Creek	H	Lincoln	N
10	Cedar Creek	H	Lincoln	N
13	Fosters Creek tributary	BP	Jefferson	N
14	Hurricane Creek	H	Lincoln	N
15	Burl Branch	H	Jefferson	N
17	Foster Creek	BP	Copiah	N, C
18	Fifteenmile Creek	H	Franklin	N
18A	Fifteenmile Creek tributary	H	Franklin	N, C
19	Moore Branch	H	Franklin	N
20	Cool Spring Branch	H	Franklin	N
22	Molls Creek tributary	H	Franklin	N
27	Middleton Creek	H	Franklin	N
28	Middleton Creek	H	Franklin	N
30	Birdman Branch	H	Amite	N, C
33	Coles (?) Creek	H	Amite	N
34	Foster Creek tributary	H	Amite	N, C
35	Redding Creek	H	Franklin	N
43	Tallys Creek	H	Franklin	N, C
59	Tanyard Creek	H	Franklin	N, C
60	Cane Mill Branch	H	Franklin	N
63	East Fork	A	Amite	N
65	McGehee Creek tributary	H	Franklin	N, C

[a]Complete data information is available from the authors.

1985, Poulton and Stewart 1991) and has been reported from the Athabasca River and tributaries, Alberta, Canada (Barton 1980). Ten *Alloperla* species occur in either Arkansas or Alabama (Poulton and Stewart 1991, Stark and Harris 1986, Stark unpubl. data) and only *A. caddo* (Poulton and Stewart 1987) is known from intermittent stream sites.

Chukcho stoneflies were sampled more effectively by netting during daylight hours than by light trapping, but Natchez stoneflies were effectively sampled by both methods. Thirty-seven specimens of Chukcho (88% of our total catch) from 7 sites were taken by netting, and only 5 specimens from 3 sites were captured in light traps. Of 390 Natchez specimens collected during the survey, 79% were taken at 12 light trapping sites and 21% were taken at 17 netting sites. Collection data from sites 1 and 2 (Table 2) show this pattern.

Although more data on Natchez and Chukcho stoneflies and their associated habitat requirements are needed in order to assess threats and determine protection measures, this study has revealed at least 2 important considerations that need to be addressed. First order intermittent streams are potentially important habitat components for these species. These streams have not received

Table 2. Light trap (LT) and netting (N) catches of stoneflies made 13 April 1993 at Porter Creek tributary (Site 1) and Porter Creek (Site 2), Franklin County, Mississippi.

Site No.	Natchez		Chukcho	
	LT	N	LT	N
1	15	4	0	9
2	17	5	0	1

as much attention as perennial streams in previous attempts to determine appropriate management models for the National Forests in Mississippi (USDA 1986). A partial to full riparian canopy also appears to be important to the success of both species. Perhaps the extension of buffer zones around intermittent streams as a management tool will provide adequate protection for these species and for small stream ecosystems.

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