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NOTES ON CRAYFISHES FROM THE CHICKASAW BASIN[1]

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ABSTRACT

A three-year study of crayfishes within the Chickasaw Basin in western Tennessee is reported. Species distributional and life-history data are provided; relative abundance of individuals and analyses of substrate from selected habitats are recorded for nine taxa.

INTRODUCTION

Faunal elements of surface waters, especially waters within and surrounding metropolitan areas, are subjects of increasing concern. With industrial and urban expansion, road developments, stream channelization and other activities, it is important to characterize these faunal elements with their specific habitats and distributions.

The purpose of this study was threefold: to note all crayfish species found within the major drainages of the Chickasaw Basin, to record relative abundance of each species and to characterize typical substrates for each species noted.

A taxonomic and ecological study of crayfishes from the Nonconnah, Wolf and Loosahatchie drainages in southwestern Tennessee was conducted from March, 1970 through February, 1973.

Several works deal with crayfishes from the central and eastern portions of the state (Hay, 1902; Ortmann, 1931; Hobbs, 1948, 1965, 1969, 1970). Girard (1852), Faxon (1885) and later Fleming (1938-39) recorded certain species from western Tennessee. Hobbs and Marchand (1943) made the first detailed study within the area and examined the distribution and ecology of seven species from the Reelfoot Lake area in northwestern Tennessee. Penn (1963) described a new species, *Procambarus ablusus*, from the Hatchie River drainage in western Tennessee. Hobbs and Fitzpatrick (1970) recorded a new species, *Fallicambarus hortoni*, from the Hatchie drainages in McNairy County.

MATERIALS AND METHODS

Crayfish were captured from open-water habitats with 5 mm mesh seines, fine mesh rectangular and delta-ring dip nets and minnow traps baited with cottonseed mealcake. Specimens were also obtained from many localities by excavations of burrows. After capture, individuals were immediately preserved by placement in 5% formalin; in the laboratory, preserved specimens were washed thoroughly and transferred to 70% ethyl alcohol for permanent storage.

Field data recorded for each sample were: date taken, locality taken from, terrestrial and aquatic vegetation and substrate characteristics. Sample composition was noted as follows: number of form I (breeding) and form II (non-breeding adult) males, number of ovigerous (egg-bearing) and non-ovigerous adult females and number of juveniles. Specimens were judiciously collected; many individuals were returned to the habitats immediately after data were recorded.

Three substrate samples were removed from selected habitates of each taxon; substrate pH and organic (humus) content were determined with a Lamotte soil test kit.

RESULTS

Nine taxa of crayfishes were recorded from 94 localities within the Chickasaw Basin area; 735 specimens were examined. Specimen lots are retained in the invertebrate collections of Memphis State University.

Species distributions for all taxa are indicated in Fig. 1. Relative abundance for these taxa within the three major river drainages are noted in Table 1.

TABLE 1: *Qualitative summary of relative abundance of crayfish species from the major river drainage of the Chickasaw Basin*

SPECIES	NONCONNAH	WOLF	LOOSA-HATCHIE
Procambarus acutus acutus	+ + +	+ + +	+ + +
Procambarus clarkii	+ + +	+	+
Procambarus viaeviridis	+	+	0
Orconectes palmeri palmeri	+ + +	+ +	+
Orconectes lancifer	0	0	+
Cambarus diogenes ludovicianus	+ + +	+ + +	+ + +
Fallicambarus hedgpethi	+ +	+ +	+ +
Cambarellus shufeldtii	0	0	+
Cambarellus puer	0	0	+

+++ abundant; ++ moderate; + rare; 0 absent

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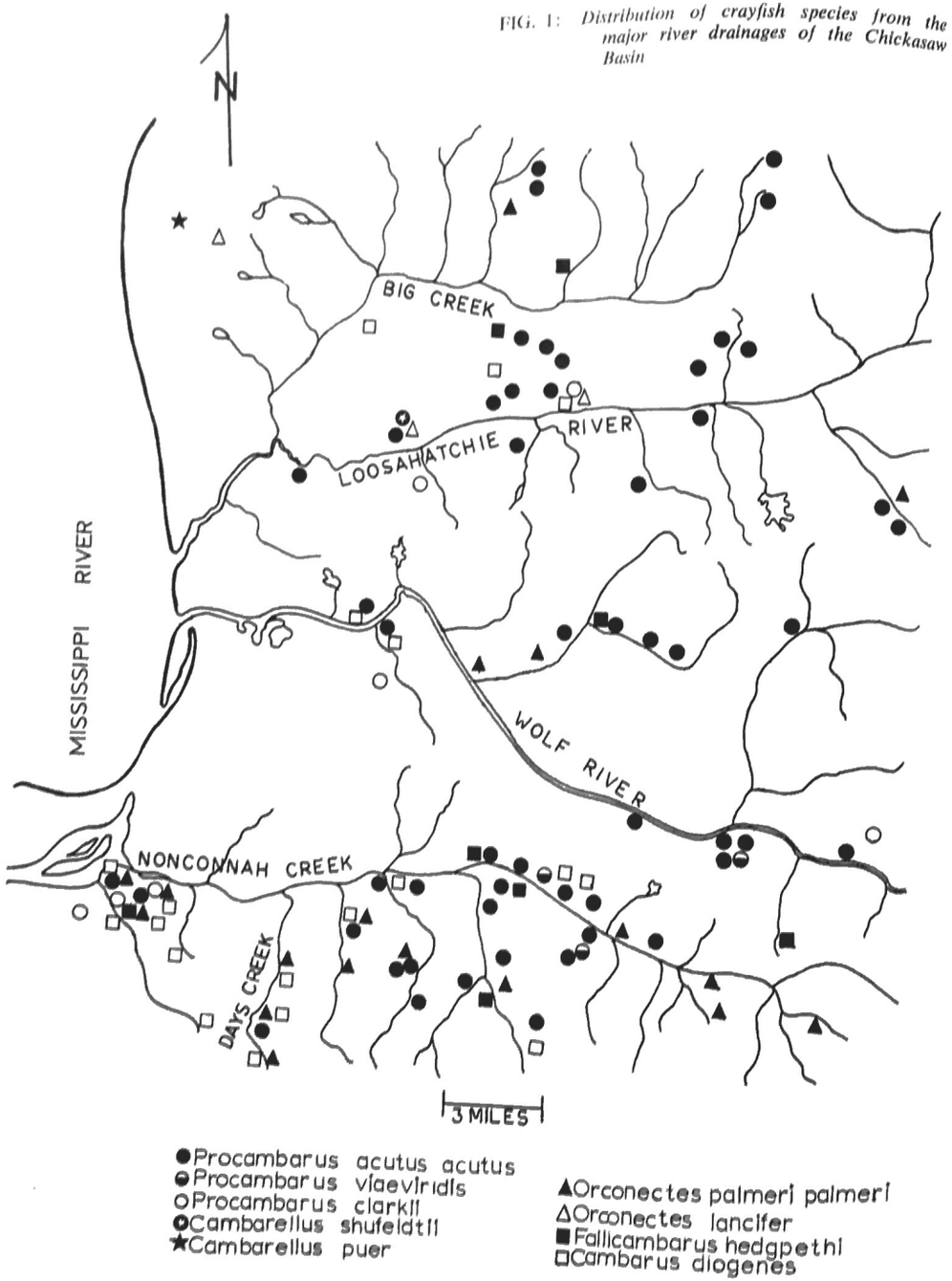
FIG. 1: *Distribution of crayfish species from the major river drainages of the Chickasaw Basin*



ANNOTATED SPECIES LIST

Subfamily CAMBARINAE

1. *Procambarus (Ortmannicus) actus actus* (Girard, 1852).
This species was the most common species from open waters within all three major drainages; 281 specimens from 53 localities were examined. Specimens were most common in slow flowing and standing waters. Form I males were taken in March, April, May, June, August, and October; ovigerous females were extracted from burrows in June and August. Hobbs (1962) described the range of this species from Florida to Texas and Minnesota to Ohio.

2. *Procambarus (Scapulicambarus) clarkii* (Girard, 1852).
Known as the "Louisiana Red Crawfish," this form was taken from a variety of habitats including swamps, ponds, sloughs, creeks and roadside drainage ditches; 51 individuals from nine localities were examined. Form I males were taken in October and June; one ovigerous female was extracted from a burrow during April. Penn (1943) made a detailed study of the life history of this species in Louisiana.

3. *Procambarus (Ortmannicus) viaeviridis* (Faxon, 1914).
This crayfish is apparently rare within the study area; 24 specimens from two localities were examined. Form I males were taken in May; no ovigerous females were found. Both habitats were roadside ditches with mud substrata.

4. *Orconectes palmeri palmeri* (Faxon, 1884).
This species was common in many lotic habitats; 280 specimens from 13 localities were examined. Form I males were captured in April, May, June, July and October; one ovigerous female was taken from open water in February. Specimens were noted as rare in small streams with increased sedimentation and turbidity due to construction along the banks. At certain sites, especially along Days Creek, specimens were abundant before construction projects were initiated.

5. *Orconectes lancifer* (Hagen, 1870).
Apparently rare within the study area, this species was taken only from the Loosahatchie River drainage. Ten juvenile specimens from two localities were examined; habitat preference appeared to be larger bodies of lotic water.

6. *Cambarus (Lacunicambarus) diogenes* subsp. (Girard, 1852).
Status of this taxon is tenuous and according to Hobbs (1972) unquestionably represents a species complex. Two subspecies, *C. d. diogenes* and *C. d. ludovicianus*, occur within the drainages surveyed. Marlow (1960) conducted a morphometric analysis of population variation within these subspecies and presented data concerning their distribution.

C. diogenes was common to all drainages and existed as a primary burrowing form along the margin of sloughs, small streams and lowland meadows. Form I males were found in March, April and May; ovigerous females were taken from open water in March and April. Juveniles were common in shallow burrows during all months of the year.

7. *Fallicambarus hedgpethi* (Hobbs, 1943).
Moderately abundant in shallow waters (0.3 m to 1.5 m deep) in all drainages, specimens were frequently extracted from simple burrows near roadside ditches and sloughs. Thirteen specimens were examined from eight localities; form I males were taken from burrows in March. No ovigerous females were found.

Subfamily CAMBARELLINAE

8. *Cambarellus shufeldtii* (Faxon, 1884).
This dwarf species was recorded from one locality, a slough adjacent to the Loosahatchie River. Although none were recorded, other populations may exist in low-lying areas along the Mississippi River. Seventeen specimens were examined; form I males and ovigerous females were taken in March, April and May from this single locality.

9. *Cambarellus puer* (Hobbs, 1945).
This crayfish was taken from a single locality, a shallow pond, which drains directly into the Mississippi River. Eleven specimens were examined from one collection date in July; form I males were present in the July sample.

DISCUSSION

A variety of crayfish habitats exist within the Chickasaw Basin although increased urban expansion is apparently eliminating certain local populations. Two species, *Procambarus acutus acutus* and *Cambarus diogenes*, are most abundant in the drainages studied. *P. acutus acutus* occurs primarily in standing or slowly flowing, open water; *C. diogenes* is abundant in a variety of burrows along the margins of most bodies of water. These two species are often locally abundant together in a single habitat and by virtue of their separate positions within this habitat avoid interspecific competition. *Fallicambarus hedgpethi* is second in abundance for primary burrowing forms. *Orconectes palmeri palmeri* is present in most unsilted, lotic situations within the Basin; this species is common especially in steams of the Nonconnah drainage. *O. palmeri palmeri* specimens noticeably decreased in certain locations during this study; this decline in numbers was judged a response to increased construction along streams once moderately forested.

Attempts to correlate crayfish distribution and chemical environment are tenuous since two or three species often exist within the same locality. Forms such as *Procambarus acutus acutus* should be tolerant of wide pH ranges since it is widespread within the drainages of the Basin as well as over much of eastern North America. Certain preferences or distinctions are noted from substrate data gathered (Table 2). All substrates analyzed had low humus content except those of *Cambarellus* species. *Procambarus viaeviridis* showed greatest tolerance toward acidic conditions.

TABLE 2: *Substrate characterization of single selected habitats of crayfish species from the Chickasaw Basin*

SPECIES	pH	HUMUS
Procambarus acutus acutus	6.0	low
Procambarus clarkii	6.0	low
Procambarus viaeviridis	5.5	low
Orconectes palmeri palmeri	6.5	low
Orconectes lancifer	6.5	low
Cambarus diogenes ludovicianus	6.0	low
Fallicambarus hedgpethi	6.4	low
Cambarellus shufeldtii	8.2	medium
Cambarellus puer	7.7	medium