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Fish Fauna of the Upper Cumberland River Drainage in Tennessee

John T. Baxter
University of Tennessee, Knoxville

To the Graduate Council:

I am submitting herewith a thesis written by John T. Baxter entitled "Fish Fauna of the Upper Cumberland River Drainage in Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Animal Science.

David A. Etnier, Major Professor

We have read this thesis and recommend its acceptance:

Dewey Bunting, Arthur C. Echternacht

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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FISH FAUNA OF THE UPPER CUMBERLAND RIVER DRAINAGE IN TENNESSEE

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

John T. Baxter, Jr.

December 1997

DEDICATION

This thesis is dedicated to my parents

John Tracy Baxter

and

Carol Macres Baxter

everything I am I owe to you.

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I would like to thank my major professor, Dr. David A. Etnier, for his guidance, encouragement, and tolerance during the writing of this thesis. I also want to express my thanks to the other members of my committee, Dr. Dewey L. Bunting and Dr. Arthur C. Echternacht for their editorial advice on this thesis.

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Most importantly, I want to thank my wife, Stephenie L. Baxter, for her patience support, and love.

ABSTRACT

This thesis reports the findings of an ichthyofaunal survey of the upper Cumberland River drainage in Scott, Campbell, and Claiborne counties, Tennessee. This drainage lies on the Cumberland Plateau in northeastern Tennessee and has been impacted by extensive coal mining activity in the region. Present in the drainage are five listed species of primary concern to this study, *Phoxinus cumberlandensis*, *Ericymba buccata*, *Notropis rubellus rubellus*, *Etheostoma baileyi*, and *Etheostoma sagitta*. An additional species found in this drainage, *Etheostoma nigrum susanae*, is being considered for protected status. Field work for this survey was conducted mainly during May-August 1996 and May-August 1997. Collections by other investigators are also included. Collections cover the majority of streams in the drainage and both seining and electrofishing were employed. A total of 161 collections are included and the findings are presented in the annotated listing of species followed by a discussion of taxonomic and zoogeographical considerations. Included are maps showing locality records for each species occurring in the drainage.

The results of this study reveal a relatively rich upper Cumberland River fish fauna. Of the 58 species that potentially occur in the drainage, 44 were substantiated by collection records. Four of the five protected species (*Phoxinus cumberlandensis*, *Notropis rubellus rubellus*, *Etheostoma baileyi*, and *Etheostoma sagitta sagitta*) appear to have relatively healthy, viable populations in this drainage. The remaining species (*Ericymba buccata*) appears to be in decline and threatened with extirpation from the drainage. *Etheostoma nigrum susanae* is of extremely restricted occurrence in the drainage.

TABLE OF CONTENTS

Abbreviations used in the text

Co.-- county

km-- kilometer

KY-- Kentucky

mi.-- mile

rd. mi.-- road mile(s)

TDOT-- Tennessee Department of Transportation

TN-- Tennessee

TVA-- Tennessee Valley Authority

TWRA-- Tennessee Wildlife Resources Agency

USFWS-- United States Fish and Wildlife Service

UT-- University of Tennessee

UTRCF-- University of Tennessee Research Collection of Fishes

YOY-- young of the year

LIST OF FIGURES

I. INTRODUCTION

This thesis is written to report and discuss the findings of an ichthyofaunal survey of the upper Cumberland River drainage in northeastern Tennessee. The upper Cumberland has been the subject of several collection efforts. However, many of these surveys tended to concentrate on only one of several state or federally listed species or were restricted, site-specific surveys dealing with permitting of coal mining activities. As a result some of these surveys either fail to include the more commonly occurring species or are very limited in scope.

Past Records

Some surveys were more comprehensive (O'Bara, 1985; Bivens & Williams, 1990; TWRA, 1993; Bivens et al., 1995), but have not been combined to address overall ichthyofaunal distributions in the drainage. This thesis will use past collection data and new collections to provide a thorough description of the distribution of all fish species occurring in the drainage within the state of Tennessee.

Records for the Kentucky portion of the drainage are somewhat more inclusive than for the Tennessee portion. The upper Cumberland River drainage in Kentucky contains some fifty-eight species of fishes (Burr and Warren, 1986). All fifty-eight of these species have the potential to occur in Tennessee streams and further collections should result in additional records for those fishes which are not yet known to occur in the Tennessee portion of the drainage.

Listed Species

Included in these fifty-eight species are six species of special concern to this study. The blackside dace, *Phoxinus cumberlandensis,* is listed as an endangered species in Tennessee (Starnes and Etnier, 1980) and is considered Threatened by the U.S. Fish and Wildlife Service (USFWS) (Biggins, 1987). The silverjaw minnow, *Ericymba*

buccata, has been reported from only three localities in the state of Tennessee (Etnier and Starnes, 1993) and is mainly restricted to drainages above Cumberland Falls in Kentucky. The rosyface shiner, *Notropis rubellus rubellus*, is included in Tennessee's list of Species of Special Concern and populations of this fish are potentially threatened by the impacts of surface coal mining (Starnes and Etnier, 1980). Populations of the emerald darter, *Etheostoma baileyi*, in the state of Tennessee are considered in "potential jeopardy" due to coal mining and associated stream impacts on the Cumberland Plateau (Etnier & Starnes, 1993). *Etheostoma sagitta sagitta*, the arrow darter, is on Tennessee's list of Species in Need of Management, primarily due to limited distribution in this drainage (Etnier and Starnes, 1993). *Etheostoma nigrum susanae*, the upper Cumberland form of the johnny darter, is not currently listed by the state of Tennessee or by USFWS. It is currently being considered as a candidate for protection by the state and USFWS (P.W. Shute, pers. comm.)

Remaining Fauna

In addition to these five species, this thesis will provide an accurate picture of the distribution of the remaining thirty-nine species found in the drainage. Two species, *Etheostoma nigrum susanae* and upper Cumberland populations of *Notropis volucellus,* have an extremely limited distribution in the drainge and warrant further study and possible protection in the state of Tennessee. Included in this thesis is an annotated list of fish species collected during this and earlier surveys, with notes on the habitat and distribution of these fishes, and dot-map plots of distribution for each species.

This thesis will provide a baseline survey from which future changes in the fauna and the distribution of individual species may be studied. Field work was conducted in an attempt to systematically catalogue the species occurring in the drainage by sampling areas which had not previously been sampled by other authors or had, in the opinion of

the author, not been adequately sampled. An effort was made to eliminate any gaps in collection coverage within the drainage.

This study is part of a planned ichthyofaunal and benthic macroinvertebrate study of the upper Cumberland River drainage commissioned by the Tennessee Wildlife Resources Agency (TWRA). In 1993, TWRA contracted with the University of Tennessee to study the fish and benthic macroinvertebrates of the upper Cumberland drainage, "with emphasis on obtaining a comprehensive taxonomic inventory from each location" (TWRA contract, 1993).

II. DESCRIPTION OF THE STUDY AREA

Geography and Geology

The Upper Cumberland River can be defined as the portion of the Cumberland River which lies upstream of Cumberland Falls, Williamsburg, Whitley County, Kentucky. Headwater portions of Clear Fork, Jellico, Marsh, and Yellow creeks of the upper Cumberland River drain an area of approximately 380 mi^2 (613 km^2) on the Cumberland Plateau in Scott, Campbell and Claiborne counties, Tennessee (Tennessee Valley Authority (TVA, 1962) (Figure 1). The streams in this area are "generally meandering and deeply incised with low to moderate gradients and have substrates of sand and sandstone and shale bedrock. Waters are clear and low in productivity unless disturbed by siltation from coal surface-mining" (Etnier and Starnes, 1993).

The streams considered in this study lie on the Cumberland Plateau at the border between Tennessee and Kentucky (Figure 2). These streams generally flow northward across the Tennessee-Kentucky state line and empty into the Cumberland River at points above Cumberland Falls. The majority of streams constitute portions of the Clear Fork system of the upper Cumberland River. The Clear Fork enters the Cumberland River proper approximately 10.0 miles northwest of Williamsburg. The remaining streams are part of the Jellico Creek watershed and have their confluence with the Cumberland River approximately 6.0 miles east of Williamsburg.

Geological data is summarized from Tennessee Department of Transportation (TDOT) Geological Maps (TDOT, 1991). Existing streams in the upper Cumberland drainage in Tennessee flow mainly over areas composed of the Pennsylvanian Slatestone Formation and the Crooked Fork Group. These formations contain shale, sandstone, siltstone, and several important coal beds, including the Jellico and Poplar Creek coals. Most of the existing stream beds have eroded through the more recent strata and stream

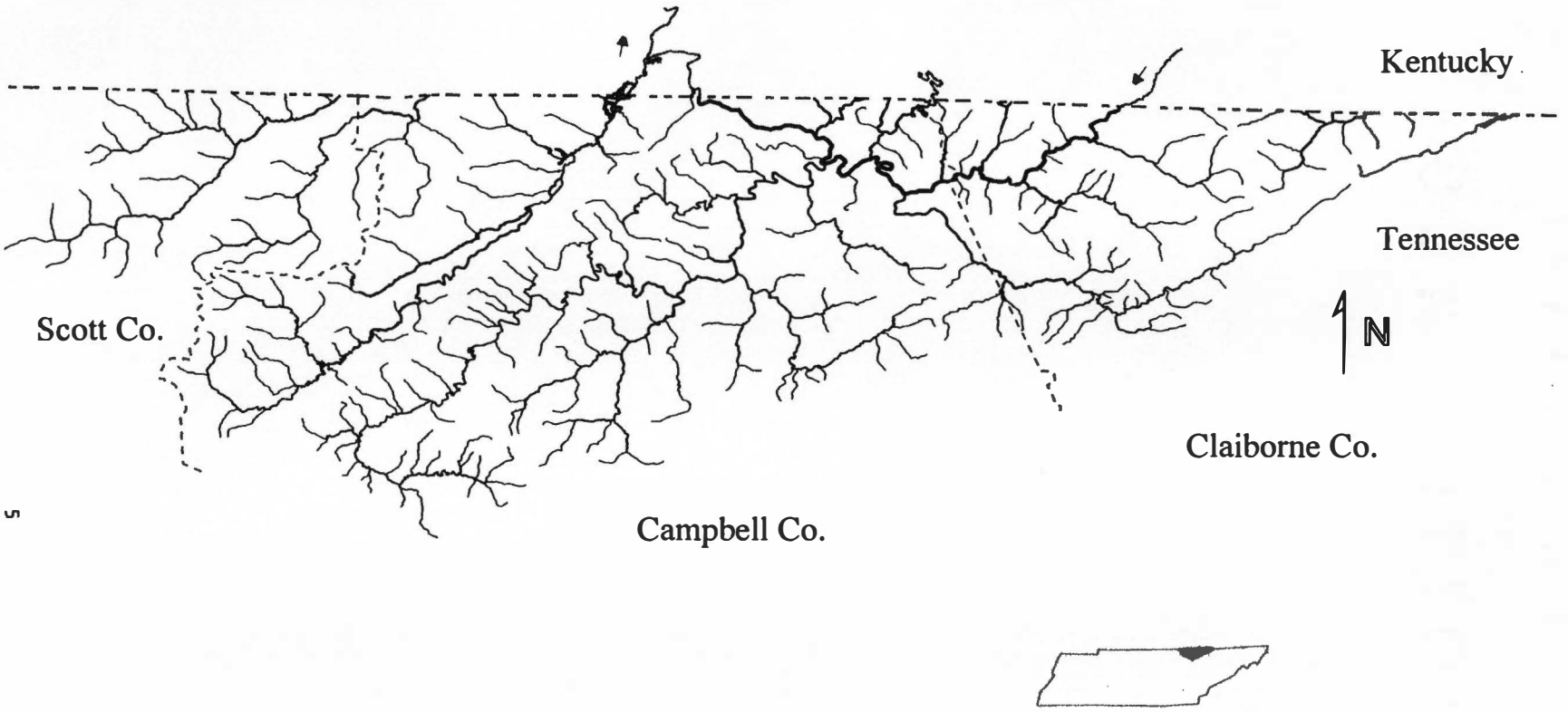

Figure 1. Map of the upper Cumberland River drainage in Tennessee (enlargement of shaded area on inset map).

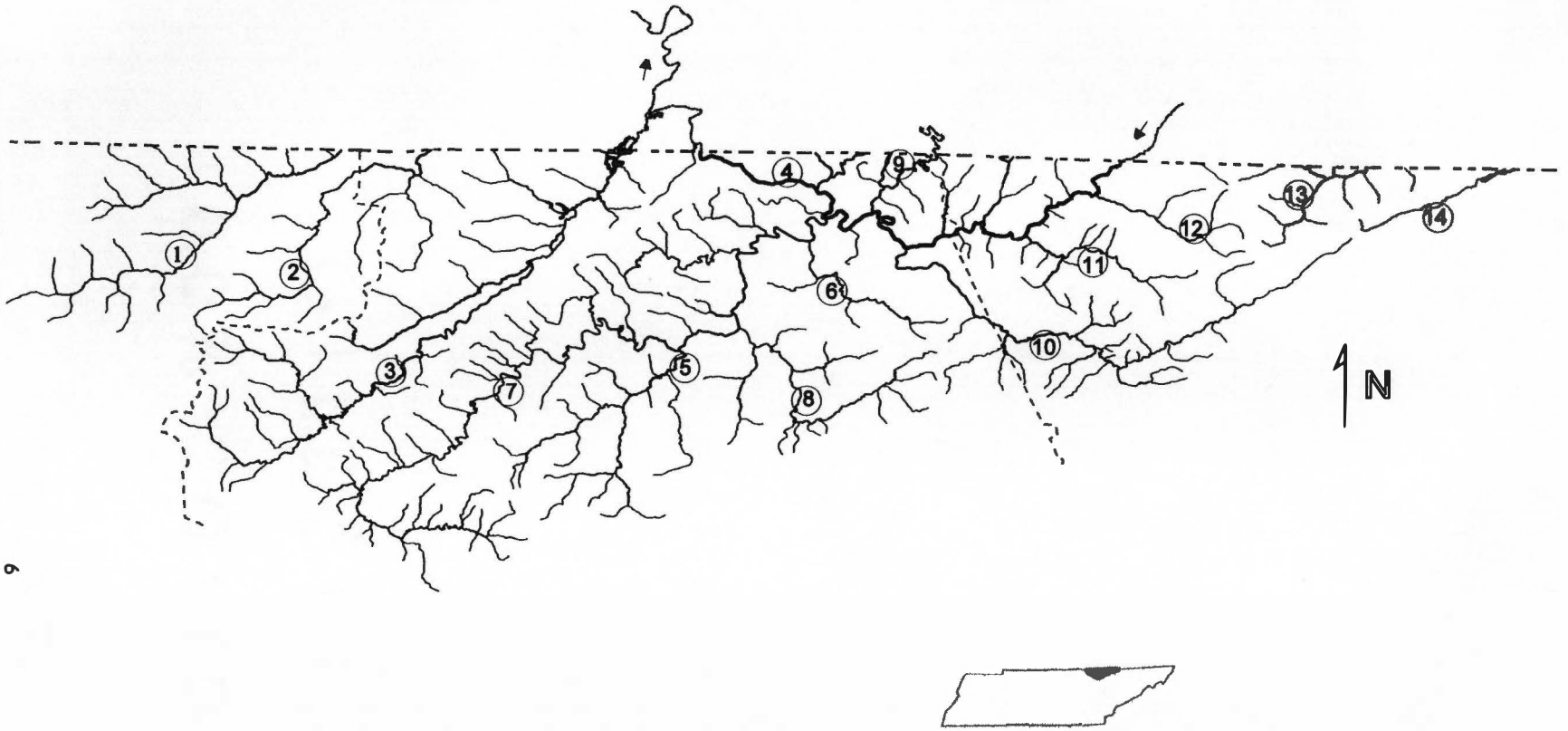

Figure 2. Map of major stream systems within the upper Cumberland River drainage, Scott, Campbell, and Claiborne counties, Tennessee (enlargement of shaded area on inset). 1-Jellico Creek, 2-Capuchin Creek, 3-Elk Fork, 4-Clear Fork, 5-Hickory Creek, 6-White Oak Creek, 7-Stinking Creek, 8-Davis Creek, 9-Laurel Fork, 10-Tackett Creek, 11-Straight Creek, 12-Valley Creek, 13-Burrell Branch, 14-Little Yellow Creek.

beds now lie in the Crooked Fork Group, which is made up of the Poplar Creek Coal, Wartburg Sandstone, Glenmary Shale, Coalfield Sandstone, Burnt Mill Shale, Crossville Sandstone, and Dorton Shale formations. Most of the streams are deeply incised and lie in fairly steep-sided valleys. This is particularly apparent in the gap where the Clear Fork crosses Pine Mountain east of Jellico, Tennessee. This stream has eroded a narrow gorge some 260 feet in depth where it crosses Pine Mountain.

The drainage can be roughly divided into three "geological areas". An area of high relief around Chitwood, Privet, Jellico, and Chimney Mountains in the westernmost end of the region is drained on the west by Jellico and Capuchin creeks and on the east by western tributaries to the Elk Fork.

The Elk Fork runs through a fault valley which defines the western border of the Cumberland or Pine Mountain Block, a large fault block displaced approximately 30 km to the west of its former position by tectonic folding in the late Paleozoic Era (Luther 1959). This uplift resulted in the formation of Pine Mountain, which lies between Elk Fork Creek and Stinking Creek.

Stinking Creek and Hickory Creek lie in the second area which begins to the east side of Pine Mountain in an area which lies on top of the Pine Mountain fault block and which has much less topographic relief than the areas west of Pine Mountain. These streams and their tributaries are typically lower gradient than streams in the areas to the west and east.

A second area of high relief exists in the easternmost portion of the drainage where Valley, Tackett, and Fern creeks drain the area around Leach, Log, Powell, and Cumberland mountains. As in Jellico Creek, the streams in this portion of the drainage are deeply incised and of moderately high gradient.

The extensive mining activity in this section of the Cumberland Plateau has had a major impact on the fish faunas of not only the streams considered in this survey, but also

on the ichthyofauna of streams which flow into the Clinch River (e.g. Coal Creek) and streams which make up parts of the Big South Fork of the Cumberland drainage. Extensive strip-mining on the Cumberland Plateau has resulted in significant stream degradation throughout the drainage. Direct evidence of this is seen in the extirpation of formerly occurring populations of fishes and the current depauperate fauna of many streams in the area (Starnes and Starnes, 1979). Acid and alkaline mine runoff, siltation, and other mining related effects have resulted in the virtual extirpation of fishes from some streams on the Cumberland Plateau. One reason for this study is to provide baseline data to study recovery of streams as new guidelines for mine reclamation take effect and mining impacts on streams are reduced.

A companion study to this work (Evans, unpub. Masters thesis) has revealed that extensive recovery has already occurred in streams in the New River system, where there are a fair number of unimpacted streams supporting a diverse assemblage of fishes. These unimpacted streams may have served as source populations for recent recolonization of other more severely impacted streams. Similar streams are found in the upper Cumberland portion of the drainage although they are scarce. It is hoped that recovery similar to that seen in New River will be seen in this portion of the drainage.

III. MATERIALS AND METHODS

The ichthyofaunal survey for this thesis was conducted mainly during the periods of May-August 1996 and May-October 1997. Preliminary collections were made in October 1994 and May-July 1995.

Collection methods included seining with a 10' X 6' seine with 3/8" mesh, backpack electrofishing, and boat shocking using equipment provided by TWRA. Most sites were collected by 3-5 investigators employing seines and backpack electrofishing; larger sites were collected using a shocking boat or seine. In areas where the presence of particularly rare or sensitive species (e.g. *Phoxinus cumberlandensis* and *Etheostoma nigrum susanae)* were known or suspected, seining was the sole collection method employed. Care was taken to induce the least amount of mortality among these sensitive populations. As a result some collections containing these fishes may not represent the full species complements at these sites, although every effort was made to produce a comprehensive collection at these sites.

The majority of fishes were identified by the investigators and released in the field. Voucher specimens were kept of new or notable finds and some more extensive collections were preserved to provide reference material for the U.T. Research Collection of Fishes (UT). Problematic specimens such as young-of-the-year (YOY) sunfish, possible hybrids, and small cyprinids were retained for identification in the laboratory. All fish were preserved in a 10% formalin solution in the field and transferred to a 50% isopropanol solution for permanent storage. Identifications of problematic specimens were made either by the principal investigator or by Dr. David Etnier (UT) using keys found in Etnier and Starnes, 1993.

In addition to these collections, a survey of other institutions which had conducted field work in the study area yielded additional records. These as well as data from TWRA are included in the findings of this thesis and are plotted on the distribution maps.

Distribution maps were generated using Adobe Illustrator 4.1 and US Census TIGRE map data. Collection localities were plotted and numbered consecutively within systems in the drainage (Figure 3).

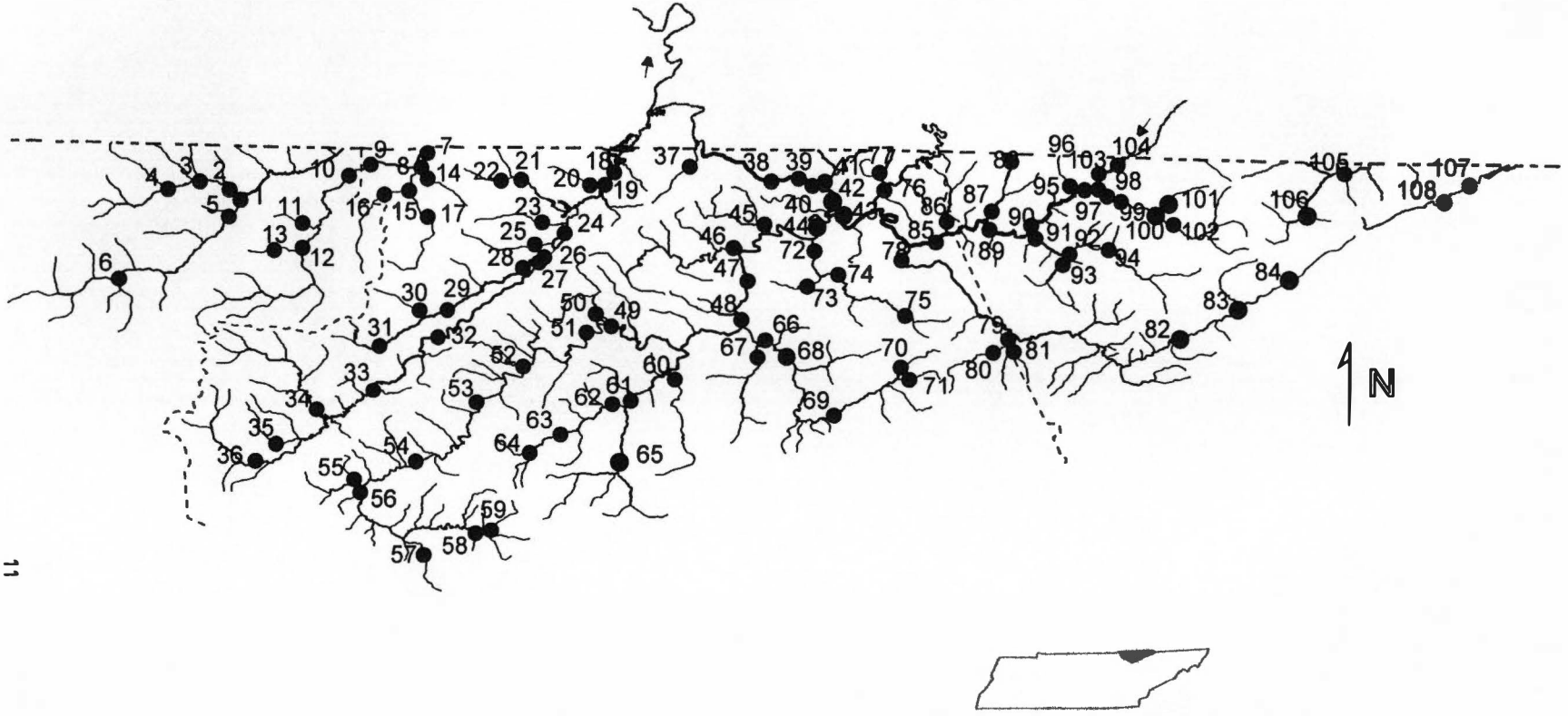

Figure 3. Map of the Tennessee portion of the upper Cumberland River drainage showing collection localities known from the drainage (enlargement of shaded area on insert). Sites are numbered consecutively from east to west in the drainage and from downstream to upstream within stream systems.

IV. ANNOTATED SPECIES LIST

The following is an annotated list of all fish species known to occur in the upper Cumberland River drainage. Several species which occur in the Kentucky portion of the drainage are included as they have the potential to appear in Tennessee streams in the future. Species are listed in the phylogenetic order set forth by Robins et al. (1991).

Family **Petromyzontidae**

1. *Lampetra aepyptera* Abbott--least brook lamprey (Figure A1): One specimen was collected in the main channel of Clear Fork, approximately 1.8 mi. east of Jellico, Campbell County, Tennessee, and one specimen is reported from Stinking Creek above Big Branch, Campbell County, Tennessee. These two records represent the only known occurrences of the least brook lamprey in this drainage in Tennessee. Burr & Warren (1986) did not report this species from Clear Fork in Kentucky. The specimen from Clear Fork was collected from the head of a deep pool. Both specimens are catalogued at UT.

Family **Clupeidae**

2. *Dorosoma cepedianum* (Lesueur)--gizzard shad: Although reportedly stocked in small impoundments above Cumberland Falls (Burr & Warren, 1986), no specimens of gizzard shad were taken from this drainage in Tennessee.

3. *Dorosoma petenense* (Guenther)--threadfin shad: Although reportedly stocked in small impoundments above Cumberland Falls (Burr & Warren, 1986), no specimens of threadfin shad were taken from this drainage in Tennessee.

Family **Cyprinidae**

4. *Campostoma anomalum* (Rafinesque)--central stoneroller (Figure A2): Found throughout the drainage, central stonerollers were one of the more common cyprinids in these collections. This species is common where suitable habitat is found in streams of

all orders with the exception of extreme headwater, first order streams. Specimens were collected over gravel, rubble, and bedrock substrates with moderate to swift current and in pools adjacent to riffles. Recent revision of stoneroller systematics by Dr. David Etnier (pers. comm.) indicates that all stonerollers found in the upper Cumberland represent the taxon *Campostoma anomalum* as opposed to *C. oligolepis*, which occupies the Cumberland drainage below Cumberland Falls except for portions of the Big South Fork system.

5. *Carassius auratus* (Linnaeus)--goldfish: Although reportedly stocked in small impoundments above Cumberland Falls (Burr & Warren, 1986), no specimens of goldfish were taken from this drainage in Tennessee.

6. *Cyprinella galactura* (Cope)--whitetail shiner (Figure A3): Whitetail shiners have a fairly limited distribution in the drainage. This species was collected mainly in second or third order streams in the Clear Fork, Hickory Creek, and Stinking Creek systems. No whitetail shiners were taken from the Elk Fork or Jellico Creek systems. This species is the most widely distributed *Cyprinella* in the Tennessee portion of the drainage. This is in constrast to its distribution in the Kentucky portion of the drainage, where it is represented at three localities above Cumberland Falls (Burr & Warren, 1986). Specimens were collected in swift runs and flowing pools with coarse, firm substrates; they appear to be more tolerant of upland streams than others in the genus (Etnier & Starnes, 1993).

7. *Cyprinella spiloptera* (Cope)--spotfin shiner (Figure A4): Spotfin shiners were found in only six localities in the Upper Cumberland River drainage in Tennessee; three in the Clear Fork and three in Elk Fork. This is, as in *C. galactura*, the opposite situation of the Kentucky portion of the drainage, where *C. spiloptera* is widely distributed (Burr & Warren, 1986). Specimens were collected in main channel areas with swift runs and

running deep pools with firm, coarse substrate. Distribution is limited by lack of suitable big stream habitat.

8. *Cyprinella whipplei* Girard--steelcolor shiner (Figure A5): Specimens of steelcolor shiner were collected in only three localities- Elk Fork above the bridge at Webb Lane, Elk Fork at the mouth of Little Elk Fork and Clear Fork east of Jellico. *Cyprinella whipplei* was found only in main channel areas with deep pools with firm, coarse substrate. This species has a very limited distribution in the drainage, probably due to its preference for larger streams and rivers.

9. *Cyprinus carpio* Linnaeus--common carp: This species has been introduced into various upper Cumberland systems in Kentucky (Burr & Warren, 1986). No specimens were collected in the Tennessee portion of drainage. It is possible that common carp will be encountered in large pool habitats in the main channel of Clear Fork.

10. *Ericymba buccata* Cope--silverjaw minnow (Figure A6): Etnier (1991) reported the silverjaw minnow common from Clear Fork below the mouth of Straight Creek. Recent collections did not include this species in that area. A single specimen of *E. buccata* was collected in Clear Fork above the mouth of Buffalo Creek, Claiborne County, Tennessee. Silverjaw minnows are extremely uncommon, known from only four collections in Claiborne County, Tennessee. Burr & Warren (1986) report *E. buccata* as common in the Kentucky portion of the drainage above Fishing Creek.

11. *Hemitremia flammea* (Jordan & Gilbert)--flame chub: Burr & Warren (1986) report a pre-1920 occurence in Clear Fork in Kentucky. The species is assumed to be extirpated from this portion of its range.

12. *Luxilus chrysocephalus* (Rafinesque)--striped shiner (Figure A7): Common in collections from Clear Fork and its direct tributaries, Hickory Creek and Elk Fork, this

species was absent from Jellico Creek. Striped shiners were collected in pool areas with gravel, silt, and bedrock substrates.

13 *Lythrurus fasciolaris* (Gilbert)--rosefin shiner (Figure A8): Rosefin shiners, formerly known as *Lythrurus ardens* or *Notropis ardens*, were found only in Elk Fork at and above Little Elk Fork, Stinking Creek, Hickory Creek at the mouth of Stinking Creek, and Tackett Creek. This species was found most abundantly in breeding aggregations in and below riffle habitats with gravel substrates. Rosefin shiners were not as frequently encountered when not aggregated for breeding and most records consist of a single specimen.

14. *Nocomis micropogon* (Cope)--river chub: Burr & Warren (1986) reported this species from the Clear Fork system in Kentucky. There are no records from the Tennessee portion of the upper Cumberland.

15. *Notemigonus crysoleucas* (Mitchill)--golden shiner: Burr & Warren (1986) reported bait bucket introductions above Cumberland Falls. There are no records from the Tennessee portion of the upper Cumberland.

16. *Notropis rubellus rubellus* (Agassiz)--rosyface shiner (Figure A9): The rosyface shiner is common throughout the drainage, and is the most abundant cyprinid in many collections. Specimens were taken in a variety of habitats, from deep pools to runs and riffles with moderate to swift current.

17. *Notropis volucellus* (Cope)--mimic shiner (Figure A10): This species is known from only four localities in the drainage. The mimic shiner was collected only from pool areas in the main channel of Clear Fork over gravel, sand, and silt substrates. It appears to be very uncommon in the drainage. Whether this is due to difficulty in collecting this small minnow from large stream habitats or from actual rarity is uncertain. Efforts specifically directed at obtaining specimens of *N. volucellus* in August 1997 resulted in the capture of only five specimens from four localities.

18. *Phoxinus cumberlandensis* Starnes & Starnes--blackside dace (Figure A11): Blackside dace were relatively abundant where found but primarily restricted to first or second order streams with sand, sandstone, and shale substrates, adequate cover, and extensive canopy coverage. Good riparian vegetation and cool year-round temperatures seem to be prerequisites for this species (Starnes and Starnes, 1979, 1981). This fish appears to be restricted to the higher gradient streams found in the westernmost and easternmost sections of the study area. It was not present in Stinking or Hickory creeks, both of which are of lesser gradient than other streams in the drainage. O'Bara (1985) reported one historic locality on upper Stinking Creek. No specimens were found in Stinking Creek during the most recent surveys and it is assumed that this population has been extirpated.

19. *Phoxinus erythrogaster* (Rafinesque)--southern redbelly dace: *Phoxinus erythrogaster* was reported from two collections in the Tennessee portion of the drainage (O'Bara, 1985). These specimens are not available for examination and it is possible that they represent a misidentification of another species or some other error. If this is the case, there are no valid reports of *P. erythrogaster* occurring in this drainage. If these records are valid, southern redbelly dace have probably been extirpated from the upper Cumberland by coal mining activities (Etnier & Starnes 1993).

20. *Pimephales notatus* (Rafinesque)--bluntnose minnow (Figure A12): The bluntnose minnow is very common throughout the drainage. This species was collected in moderate numbers in pool habitats or slow-moving portions of most streams.

21. *Pimephales promelas* Rafinesque--fathead minnow (Figure A13): This species is uncommon in Kentucky (Burr & Warren, 1986) and is reported from only three localities in the Tennessee portion of the drainage. A popular bait fish, the fathead minnow has been introduced into many Tennessee systems via bait bucket and deliberate

introductions (Etnier and Starnes, 1993). This is probably the route by which they arrived in the upper Cumberland.

22. *Rhinichthys atratulus* (Hermann)--blacknose dace (Figure A14): The blacknose dace is common in small, first and second order, spring-fed headwater streams throughout the drainage. It is usually found in second order or larger streams only in close proximity to the mouths of first order headwater streams.

23. *Semotilus atromaculatus* (Mitchill)--creek chub (Figure A15): The creek chub is the most common minnow in the drainage. This species is abundant throughout its range in streams ranging from first order to the main channel of Clear Fork.

Family **Catostomidae**

24. *Catostomus commersoni* (Lacepede)--white sucker (Figure A16): Relatively common throughout the drainage, white suckers were primarily collected from pool and riffle habitats of first and second order streams with gravel, bedrock, sand, and silt substrates.

25. *Hypentelium nigricans* (Lesueur)--northern hogsucker (Figure A17): This species is the most commonly occurring and widespread of the three catostomids found in the Tennessee portion of the drainage. Northern hogsuckers were found typically in pool areas and runs with gravel and sand substrates in second and third order streams. Northern hogsuckers were found across the drainage, wherever there was suitable pool habitat.

26. *Moxostoma duquesnei* (Lesueur)--black redhorse: Black redhorse are reported from only three localities above Cumberland Falls in Kentucky (Burr & Warren, 1986). No specimens of black redhorse were taken from the Tennessee portion of the drainage. Golden redhorse, *M. erythrurum*, which has similar habitat requirements, is relatively common in the Tennessee portion of the drainage.

27. *Moxostoma erythrurum* (Rafinesque)--golden redhorse (Figure A18): Golden redhorse were relatively common in Clear Fork, Hickory Creek, Stinking Creek, and Elk Fork in the Tennessee portion of the drainage. This species was collected in deep pool and run habitats in larger streams in the drainage. Tuberculate males and gravid females were collected in pool areas in smaller tributaries with cobble and gravel substrates.

Family **Ictaluridae**

28. *Ameiurus melas* (Rafinesque)--black bullhead: Black bullheads are reported from Kentucky by Burr and Warren (1985). This species has yet to be collected in the Tennessee portion of the drainage.

29 *Ameiurus natalis* (Lesueur)--yellow bullhead (Figure A19): An uncommon fish in the Tennessee portion of the upper Cumberland drainage, *Ameiurus natalis* was collected at four sites-- upper Elk Fork, Stinking Creek, and two tributaries to Clear Fork. The specimens were taken from deep pool areas with abundant cover.

30. *Ictalurus punctatus* (Rafinesque)--channel catfish (Figure A20): Numerous specimens of channel catfish were collected in the Clear Fork east of Jellico and from Laurel Fork and Hickory Creek at Chaska. These collections represent a recent addition to the fauna of the upper Cumberland in Tennessee (TWRA, 1993). A popular gamefish, channel catfish have probably been deliberately introduced by fishermen. The presence of multiple age classes suggests that the fish has become established in the drainage.

31. *Noturus miurus* Jordan--brindled madtom (Figure A21): One specimen of brindled madtom is recorded from No Business Creek in Campbell County, Tennessee, 2 November 1977. (TVA in Etnier & Starnes, 1993). There is some doubt as to the accuracy of locality information for this collection. The fish is catalogued at UT and the record is accepted as valid at this time. Burr and Warren (1986) do not report any records for this species above Cumberland Falls.

32. *Pylodictus olivaris* (Rafinesque)--flathead catfish (Figure A22): One specimen was taken from a deep pool in Clear Fork, east of Jellico, Campbell County, Tennessee. This specimen probably represents a deliberate introduction to the drainage. This species is typically found only in larger systems and is previously unknown from the Tennessee portion of the drainage. Burr and Warren (1986) report flathead catfish present only in the main channel of the upper Cumberland River in Kentucky.

Family **Salmonidae**

33. *Oncorhynchus mykiss* (Walbaum)--rainbow trout (Figure A23): Rainbow trout were present in three localities in the drainage. All *O. mykiss* collected appeared to be stocked fish, with no evidence of reproduction occurring in the drainage. Specimens were collected in deep pool areas of streams which had moderate spring influence. Intolerance of high water temperatures and poor water quality will probably limit trout populations and there appear to be no streams suitable for establishing a sustainable population of this species in the drainage.

34. *Salvelinus fontinalis* (Mitchill)--brook trout: Burr & Warren (1986) reported this species from extreme headwater streams in the Kentucky portion of the drainage, where they had been introduced. This species has not been collected in the Tennessee portion of the drainage.

Family **Poeciliidae**

35. Gambusia affinis (Baird & Girard)--western mosquitofish: Burr & Warren (1986) state that this fish has been introduced into the upper Cumberland drainage in Kentucky, probably for mosquito control. The species has not been reported from the Tennessee section of the drainage. It is entirely possible that it will be present in the future, either due to dispersal or deliberate introduction.

Family **Atherinidae**

36. *Labidesthes sicculus* (Cope)--brook silverside (Figure A24): A single specimen of brook silverside was collected from a deep pool on the Clear Fork east of Jellico, Campbell County, Tennessee (Bivens et al., 1995). This represents a recent addition to the fauna in the Tennessee portion of the drainage. This species is an uncommon inhabitant of the Kentucky portion of the Upper Cumberland River drainage (Burr and Warren, 1986).

Family **Moronidae**

37. *Morone chrysops* (Rafinesque)--white bass: Burr & Warren (1986) report introduction of this species into the Kentucky portion of the drainage above Cumberland Falls. Introduction or dispersal into Tennessee streams is a possibility, although there are no records of this species from the upper Cumberland River drainage in Tennessee.

Family **Centrarchidae**

38. *Ambloplites rupestris* (Rafinesque)--rock bass (Figure A25): Relatively common throughout the drainage, rock bass are found in pool areas and slow moving runs with areas of suitable cover, i.e. boulders, bedrock shelves, root masses, woody debris, and aquatic vegetation. This species seems to occur wherever there is suitable habitat.

39. *Lepomis auritus* (Linnaeus)--redbreast sunfish (Figure A26): Introduced throughout its range in the Kentucky and Tennessee portions of the upper Cumberland River drainage (Burr & Warren, 1986), redbreast sunfish are common in the upper Cumberland in Tennessee. Redbreast sunfish are taken in pool and backwater areas with abundant cover throughout the drainage in Tennessee.

40. *Lepomis cyanellus* Rafinesque--green sunfish (Figure A27): The green sunfish is found uncommonly throughout the drainage. Green sunfish are most common in and below settling ponds associated with coal-mining operations. They are very

very tolerant of adverse stream conditions (Etnier and Starnes, 1993) and have done quite well in some heavily impacted streams. The prescence of pre-1920 records for this species in the Kentucky portion of the drainage (Burr and Warren, 1986) suggest that this fish is native to the drainage.

41. *Lepomis gulosus* (Cuvier)--warmouth (Figure A28): Warmouth were collected in only four localities in the Tennessee portion of the upper Cumberland; one record from Clear Fork and three from Elk Fork. Burr and Warren (1986) speculate that all records of *L. gulosus* above Cumberland Falls are the result of introductions. Specimens were collected in pool areas with extensive cover.

42. *Lepomis macrochirus* Rafinesque--bluegill (Figure A29 Tolerant of a wide range of aquatic habitats, bluegill are found in a variety of streams throughout the drainage. Etnier and Starnes (1993) reported only one occurrence of *L. macrochirus* in the drainage. Its current wide distribution appears to be the result of successful colonization of the drainage by this this species.

43. *Lepomis megalotis* (Rafinesque)--longear sunfish (Figure A30): The longear sunfish is widespread in the Tennessee portion of the upper Cumberland. Whereas it is not as common as bluegill or redbreast, longear sunfish are found throughout the drainage. A 1936 record for *Lepomis megalotis* (Cahn, 1936; in the archives of the University of T ennessee Research Collection of Fishes (UTRCF)) suggests that longear sufish are native to the drainage. This species was collected in a variety of habitats so long as there was adequate cover. Etnier and Starnes (1993) suggested that *L. megalotis* is possibly being replaced by the ecologically similar *L. auritus*. Where the two are found syntopically in the upper Cumberland drainage in Tennessee, they appear to occur in similar numbers and *L. auritus* does not appear to have replaced *L. megalotis*.

44. *Micropterus coosae Hubbs & Bailey*--redeye bass: Redeye bass have been introduced into Martins Fork Lake and its tributaries, Harlan County, KY. No collections have been reported in the Tennessee portion of the drainage.

45. *Micropterus dolomieu* Lacepede--smallmouth bass (Figure A31): Smallmouth bass are widespread in Clear Fork, Hickory Creek, Stinking Creek, and Davis Creek. This species is apparently absent from the Jellico Creek system. An inhabitant of clear upland streams, smallmouth bass are found in areas where extensive cover is available. Most were taken from the main channel of these streams where deep pools and rocks, aquatic vegetation, or woody debris provided adequate cover.

46. *Micropterus punctulatus* (Rafinesque)--spotted bass (Figure A32): Spotted bass are widespread in the Tennessee portion of the drainage, but are not particularly numerous. Spotted bass were encountered in medium to large streams in deep, slow-moving pools.

47. *Micropterus salmoides* (Lacepede)--largemouth bass (Figure A33): Largemouth bass are found infrequently in the drainage. *Micropterus salmoides* is most frequently found in pool areas of larger streams such as Clear Fork, Elk Fork, and Hickory Creek. Clay (1975) suggests that largemouth bass are not native to the Cumberland drainage above Cumberland Falls. Populations in Tennessee probably represent deliberate stocking efforts. Largemouth bass are well established in the drainage and probably compete with *M. punctulatus.*

48. *Pomoxis annularis* Rafinesque--white crappie (Figure A34): One specimen of white crappie was collected from Clear Fork, east of Jellico, Campbell County, Tennessee (TWRA, 1993). This is the first record of *P. annularis* from the drainage in Tennessee and probably represents a deliberate introduction.

Family **Percidae**

49. *Etheostoma baileyi* Page & Burr--emerald darter (Figure A35): The emerald darter is endemic to the upper Cumberland and Big South Fork portions of the Cumberland River drainage. This species is fairly widely distributed within the drainage in Tennessee. *Etheostoma baileyi* was present throughout most systems in the drainage, although population densities never appeared to be particularly high. Emerald darters were captured in small to moderate sized streams in pool or run areas with gravel or cobble substrate.

50. *Etheostoma blennioides* Rafinesque--greenside darter (Figure A36): Greenside darters are an uncommon resident of the drainage in Tennessee. Specimens were collected in swift runs and pools with gravel, cobble, or boulder substrates. Population densities are relatively low, with no more than 10 individuals being taken at any site. This is probably due to the scarcity of suitable habitat for this species in the drainage.

51. *Etheostoma caeruleum* Storer--rainbow darter (Figure A37): Rainbow darters are found in Elk Fork and its tributaries and Clear Fork and its tributaries. This species is not widely distributed in the drainage but where it is found it can be quite abundant. It was collected over gravel and cobble substrates in shallow runs and riffles.

52. *Etheostoma kennicotti* (Putnam)--stripetail darter (Figure A38): The most widespread and abundant darter in the drainage, stripetail darters are found in streams of any order and are common throughout the entire drainage in Tennessee. It is typically found in areas of moderate current with a variety of substrates, from bedrock to cobble to gravel and sand. Male stripetail darters in breeding condition were observed under slabrocks on sand or gravel substrate in several streams.

53. *Etheostoma nigrum susanae* Rafinesque--johnny darter (Figure A39): The upper Cumberland form of the johnny darter has the most restricted range of any of the

fishes found in the drainage. The johnny darter is found in only 1.2 km of stream in Jellico Creek at and above the mouth of Gum Fork, and one locality in Capuchin Creek near the state line (O'Bara, 1988). This darter is found only in pool or slow-moving run areas over sand and silt substrates. Only six specimens of this darter were collected by the author from the Jellico Creek locality in May 1996. While the population is still extant, it is apparent that population levels are low and habitat extremely limited.

54. *Etheostoma sagitta sagitta* (Jordan & Swain)--arrow darter (Figure A40): This species exhibits a very wide distribution throughout the upper Cumberland in Tennessee. Arrow darters are found in areas of moderate to swift current in streams ranging from small, first order streams to the main channel of Clear Fork. This upper Cumberland endemic appears to be more widespread in the drainage than had been previously reported.

55. *Perca flavescens* (Mitchill)--yellow perch: Yellow perch is an introduced species in Kentucky portions of the drainage (Burr & Warren , 1986). This species has not been reported from the Tennessee portion of the drainage.

56. *Percina caprodes* (Rafinesque)--logperch (Figure A41): The logperch is an uncommon inhabitant of this drainage. This darter is found primarily in pool habitats in larger streams. It was also observed in swift run areas at the base of riffles entering these pools. Logperch were collected at only thirteen localities in the Jellico Creek, Elk Fork, and Clear Fork systems. These widely dispersed collection sites probably indicate a lack of suitable habitat in other portions of the drainage. Most specimens taken were older individuals, although one young-of-the-year (YOY) logperch was taken from a pool downstream of the Hickory Creek-Clear Fork confluence.

57. *Percina maculata* (Girard)--blackside darter (Figure A42): Another uncommon darter in the drainage, this species is typically found in moderate to deep pool habitats with a substrate of bedrock, rubble, and sand or silt. Due to the depth of the

preferred habitat this darter was often difficult to collect using electrofishing or seining techniques. Distribution may be greater than illustrated by this survey and I expect this species to occupy most areas where the above habitat characteristics are found and water quality and silt loads are at acceptable levels..

58. *Stizostediom vitreum* (Mitchill)--walleye (Figure A43): One specimen of walleye was collected in Clear Fork approximately 1.8 miles east of Jellico, Campbell County, Tennessee. This is the only record of the species from the drainage and almost certainly represents a deliberate introduction.

V. DISCUSSION

Taxonomic Considerations

The recent elevation to species status of former subspecies of *Lythrurus ardens*, rosefin shiner (Dimmick, et al., 1996), has resulted in the name *Lythrurus fasciolaris* (Gilbert) being applied to specimens previously considered as *Lythrurus ardens* found throughout the upper Cumberland River drainage. The common name rosefin shiner is retained for the species *Lythrurus fasciolaris.*

The specimens of *Notropis volucellus,* mimic shiner, collected from Clear Fork during this study (and presumably all populations above Cumberland Falls) may represent a taxon distinct from others in the state (Dr. David Etnier, pers. comm.). Nuptial males collected appear to differ from other *N. volucellus* in breeding tubercle pattern. Both sexes differ from other populations of mimic shiner in anal fin ray counts (a mode of nine versus eight in all other populations of *N. volucellus*). An effort will be made by the author to collect more males in breeding condition in order to further address these differences.

The Fauna of the upper Cumberland River drainage in Tennessee

The fish fauna of the Tennessee portion of the upper Cumberland River drainage comprises eight families, twenty-seven genera, and forty-four species, and includes five species of special interest to this survey-- *Ericymba buccata, Notropis rubellus rubellus, Phoxinus cumberlandensis, Etheostoma baileyi,* and *Etheostoma sagitta sagitta.* Fifty-eight species of fishes are reported from the Kentucky portion of the drainage. All of these species have the potential to occur in Tennessee waters.

The differences between the faunas of Kentucky and Tennessee appear to be the result of the lack of significant riverine and lacustrine habitats in the Tennessee portion of the drainage and the introduction of non-native fishes in Kentucky. Streams in the

Tennessee portion of the drainage tend to be smaller and higher gradient than those found in lower reaches of the drainage in Kentucky. Species that occur in Kentucky, but do not occur in Tennessee are those which are more typical of a riverine or lacustrine habitat (*Nocomis micropogon, Moxostoma duquesnei*, and *Ameiurus melas*) or are species which have been stocked or otherwise introduced into the Kentucky portion of the drainage (*Dorosoma cepedianum, D. petenense, Carassius auratus, Cyprinus carpio, Notemigonus crysoleucas, Salvelinus fontinalis, Gambusia affinis, Morone chrysops, Micropterus coosae,* and *Perca flavescens*) (Burr & Warren, 1986).

Listed Species

The presence of state and federally listed species in the drainage indicates a need for careful management in order to preserve both these species and overall diversity in the drainage. Several of these fish are extremely restricted in occurrence in the state and should be offered continued protection. Populations of these species of concern show varying degrees of success in the Upper Cumberland and the survival or loss of these sensitive species is a good measure of the health of the drainage as a whole. The following will discuss the overall status of the five species of special concern to this study-- *Ericymba buccata*, *Notropis rubellus rubellus*, *Phoxinus cumberlandensis*, *Etheostoma baileyi*, and *Etheostoma sagitta sagitta*.

Ericymba buccata, silverjaw minnow (Figure A6), is currently considered threatened by the state of Tennessee. Reported from only four localities (in Straight Creek, Claiborne County, and Clear Fork, Claiborne County) in the upper Cumberland in Tennessee (Figure A6), silverjaw minnow is on the verge of extirpation in the state. A recent survey of a locality in Clear Fork at the mouth of Valley Creek., Campbell County, Tennessee, failed to produce a single specimen. In a 1991 survey of the same locality, Dr. David Etnier reported this fish as common (Etnier, 1991). This population is certainly in jeopardy, as are all populations of *Ericymba buccata* in the state. Recent surveys report

only 10 individuals from Clear Fork at and above the confluence with Tracy Branch (TWRA, 1993) and one specimen from Clear Fork at the mouth of Buffalo Creek. Poor water quality in the drainage and the lack of suitable habitat (sandy substrates in flowing water) result in an extremely limited distribution for *E. buccata* in this drainage.

Further degradation of stream quality in Clear Fork would have a significant impact on this species and would possibly result in its extirpation from the state. Recently, fuel companies have proposed a renewal of strip-mining and deep-mining activities within the Valley Creek and Straight Creek systems in Tennessee. If this mining is not properly managed it could have a serious impact on silverjaw minnow populations in the state.

Notropis rubellus rubellus, rosyface shiner (Figure A9), is currently on Tennessee's list of Species of Special Concern. This species has apparently shown a great deal of recovery from previous population levels. Collected from systems throughout the drainage, it is now one of the more common cyprinid species occurring in the upper Cumberland. Rosyface shiners were typically the most abundant minnow in streams where they occur. Barring serious changes in the watershed *Notropis r. rubellus* should show continued recovery. Due to its widespread occurrence and high population densities this species should not be considered a Species of Special Concern in Tennessee.

Phoxinus cumberlandensis, blackside dace (Figure A11), is considered Endangered by the State of Tennessee and Threatened by the USFWS; it is restricted to the Cumberland Plateau portion of the upper Cumberland River in Tennessee and Kentucky. Recorded from some twenty-two sites in Tennessee, this upper Cumberland endemic certainly warrants continued protection. Previously known from only six small populations in the state (Starnes and Starnes, 1981; O'Bara , 1985) this species appears to be showing some recovery over previously depressed population levels.

Blackside dace have very specific habitat requirements, including extensive cover, periphyton as a food supply, fairly low summertime water temperatures, and fairly extensive riparian vegetation. These conditions are very uncommon in the drainage and habitat for this species is very restricted. Populations in Capuchin Creek at the Scott/Campbell County line and Lick Fork, Campbell County seem to be particularly healthy. These streams appear to be relatively unimpacted by mining or other anthropogenic influences and suitable habitat is plentiful. Approximately 100 specimens, representing several age classes, were collected in Capuchin Creek during 1995 by the author and 135 were collected by TWRA in Lick Fork (Bivens et al., 1995).

The presence of apparently healthy populations in these streams gives hope that the Tennessee portion of the upper Cumberland River drainage will continue to support this species. Its dependence upon very specific habitat requirements and its limited distribution in the state indicates the need for continued protection in the state of Tennessee.

Conservation Fisheries, Incorporated of Knoxville, Tennessee (CFI), has been working on the captive propagation and reintroduction of this species into upper Cumberland streams. On 29 October 1993, 160 captive-reared juveniles were introduced into No Business Branch, a relatively unimpacted tributary to Clear Fork in Campbell County, Tennessee, and 100 juveniles were released into Mud Creek, Whitley County, Kentucky. Subsequent surveys of these streams have failed to find any specimens of blackside dace in these streams. (Shute, et al., 1993) Efforts will continue and it is hoped that captive breeding and propagation of the young will enable wild populations to be bolstered and/or new localities with suitable habitat to be repopulated with blackside dace.

Etheostoma baileyi, emerald darter (Figure A35), is a widespread but relatively uncommon darter in the drainage. A species considered In Need of Management in

Tennessee, the emerald darter is an inhabitant of "rock-bottomed, current-swept pools of small to large streams" (Page & Burr, 1982). This darter seems to be limited primarily by habitat availability. Many streams within the drainage are impacted by siltation and coal fines and previously suitable stream substrates have been seriously degraded. Several areas which might once have harbored *E. baileyi* are now filled in with silt and coal fines and present very little suitable habitat. In streams where there has been less impact (i.e., Laurel Fork, an eastern tributary to Hickory Creek) population levels are very high and may be indicative of population levels throughout the drainage prior to mining impacts. Most collections produced fewer than ten individuals at any given site and are a truer indication of overall population status than the few streams where this species is common. The presence of streams such as Laurel Fork offer a hopefully stable refugia from which *E. baileyi* may disperse as stream conditions within the drainage continue to improve.

At the present time, despite wide distribution in the drainage, the emerald darter appears to be in at least moderate danger of further population decline if stream conditions are impacted adversely. It would seem wise to continue to consider this species as In Need of Management due to its relatively low apparent population densities.

The upper Cumberland form of the arrow darter, *Etheostoma sagitta sagitta* (Figure A40), is also considered a Species in Need of Management by the state of Tennessee. Essentially restricted to the upper portion of the Cumberland drainage in Tennessee, with the exception of one population of this species reported in the Big South Fork section of the Cumberland River drainage in Tennessee (Comiskey & Etnier, 1972), this species seems to be doing quite well in the drainage. It is currently found throughout the Upper Cumberland River drainage in the state of Tennessee.

The arrow darter, like the emerald darter, is an inhabitant of streams with rubble, boulder, and sand substrates. The biology of this darter was studied by Lowe (1979), who

found it to be perhaps more tolerant of siltation than the emerald darter. Arrow darters also prefer smaller streams than emerald darter. This puts the arrow darter at an advantage in weathering siltation and acid or alkaline runoff from mining activity. They are possibly able to retreat to smaller, unaffected streams and then recolonize when stream conditions improve.

While *Etheostoma sagitta sagitta* is found throughout the drainage, population densities are in many cases relatively low. It is hoped that this species will continue to show recovery and will not be significantly jeopardized by further mining impacts. Arrow darters could be considered for removal from the list of Species of Special Concern in the state, although they are restricted to the coal producing region in the upper Cumberland River drainage and are therefore subject to potential habitat loss due to mining impacts.

Other Species

Notropis volucellus, mimic shiner (Figure A10), is a rare inhabitant of this drainage in Tennessee. Found only in pool habitats in the main channel of Clear Fork, Campbell and Claiborne counties, it is the most uncommon cyprinid in these collections. If this population does indeed represent a distinct taxon from other *N. volucellus* it should be afforded some protection. The number of endemic fishes in the Upper Cumberland makes it seem likely that this population may in fact differ taxonomically from mimic shiners in the rest of their range.

The extremely restricted occurrence of this fish in the Tennessee portion of the upper Cumberland indicates a need to resolve this question quickly. If it does represent a distinct taxon, it may be in jeopardy due to its limited range and apparently low population levels. Burr and Warren (1986) report *N. volucellus* as relatively common above Cumberland Falls, but restricted to the main channel of the Cumberland River and Clear Fork system.

Etheostoma nigrum susanae, the upper Cumberland subspecies of the johnny darter (Figure A39), is extremely rare in the Tennessee portion of the upper Cumberland. Known from only three streams in Tennessee and rare in the upper Cumberland drainage in Kentucky (Starnes and Starnes, 1979; O'Bara, 1988), this darter has been recently collected in Tennessee only from Jellico Creek in Scott County This subspecies is on the verge of extirpation from the state.

This species is extremely habitat specific, found only over substrates of clean sand in relatively unimpacted streams in the drainage. Due to its extremely limited distribution in the state and heavy dependence on these habitat requirements, *Etheostoma nigrum susanae* should be considered for protection by the state of Tennessee.

Conclusions

The upper Cumberland River in Tennessee supports a relatively rich fish fauna of forty-four species. It appears that these forty-four species represent basically the entire complement of species to be expected in the drainage. The sixteen species found in the Kentucky portion of the drainage but not in the Tennessee portion, chiefly represent species that have been introduced into the Kentucky portion or are riverine and lacustrine species for which there is little or no suitable habitat in the Tennessee portion of the drainage. It is possible that some of these species will be found in Tennessee waters in the future, but it is no surprise that they are not found at this time. These records will probably be the result, as in Kentucky, of deliberate introductions rather than movement by the fishes.

Continued coal-mining and gas-mining activity in the region are sure to have an impact on the aquatic communities in the upper Cumberland River drainage in Tennessee. It is hoped that through careful mining practices and good regulation of these mines, stream impacts will be kept to a minimum and the streams of this drainage will continue to show signs of recovery.

Most of the species of concern to this study seem to show signs of recovery over previously reported population levels. Whether this is a result of actual recovery, or results from the fact that the region has not been comprehensively surveyed in the past is unclear. Whatever the case in the upper Cumberland, definite signs of recovery can be seen in other portions of the Cumberland drainage which have seen similar mining pressures. The New River drainage, which lies just to the southwest of the area considered in this study and constitutes a portion of the Big South Fork of the Cumberland River drainage, has shown significant recovery in fish communities since 1978. This recovery is seen especially among darter species. Darter species richness has increased from 1978 levels at almost every site in a 1996 survey (R. Brian Evans, pers. comm). Since the two drainages are very similar in stream conditions, species composition, and mining impacts, it is reasonable to assume that the upper Cumberland River drainage is undergoing similar recovery to that found in the New River.

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APPENDICES

APPENDIX A

SPECIES LOCALITY RECORDS

CONTENTS--APPENDIX A

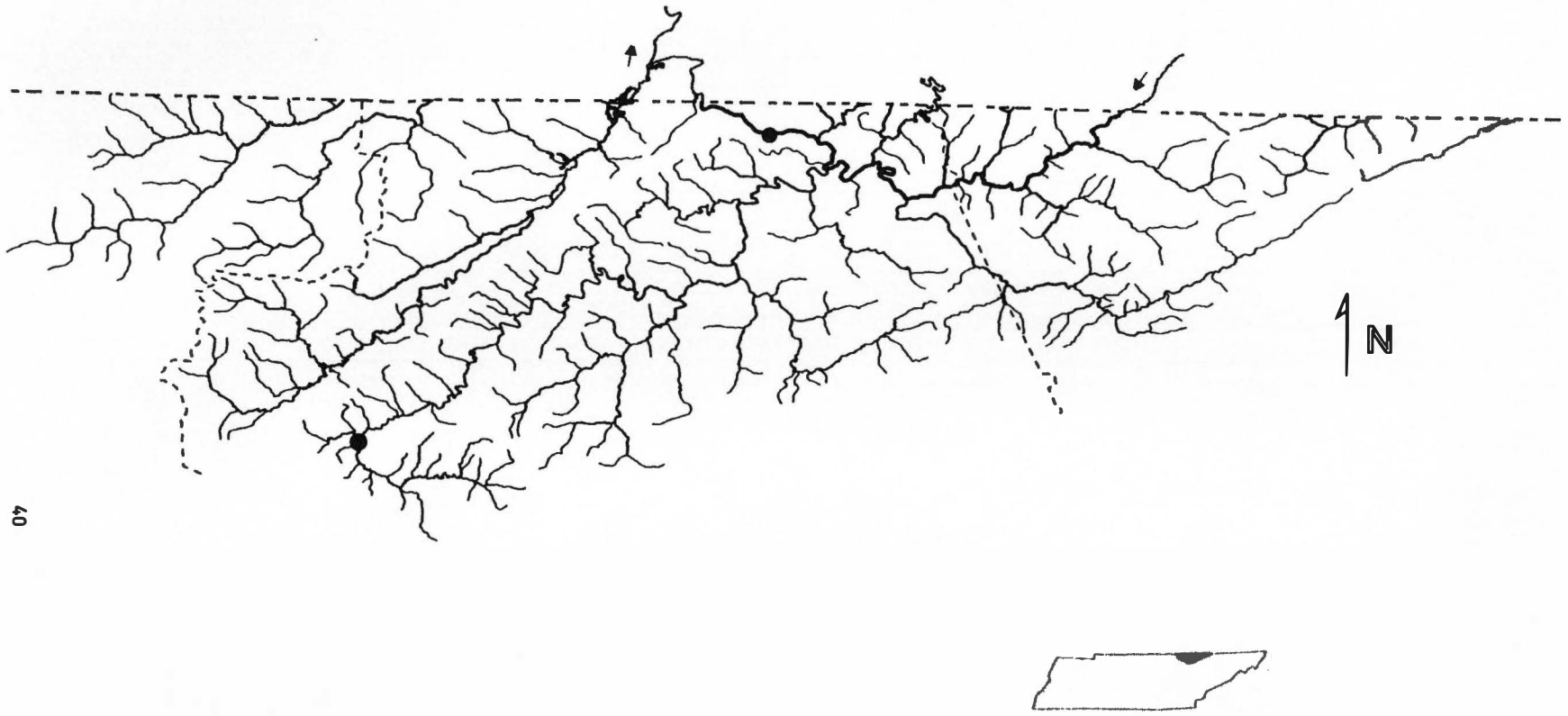


Figure A1. Locality records for *Lampetra aepyptera,* least brook lamprey, in the Tennessee portion of the upper Cumberland River drainage.

Figure A2. Locality records for *Campostoma anomalum*, central stoneroller, in the Tennessee portion of the upper Cumberland River drainage.

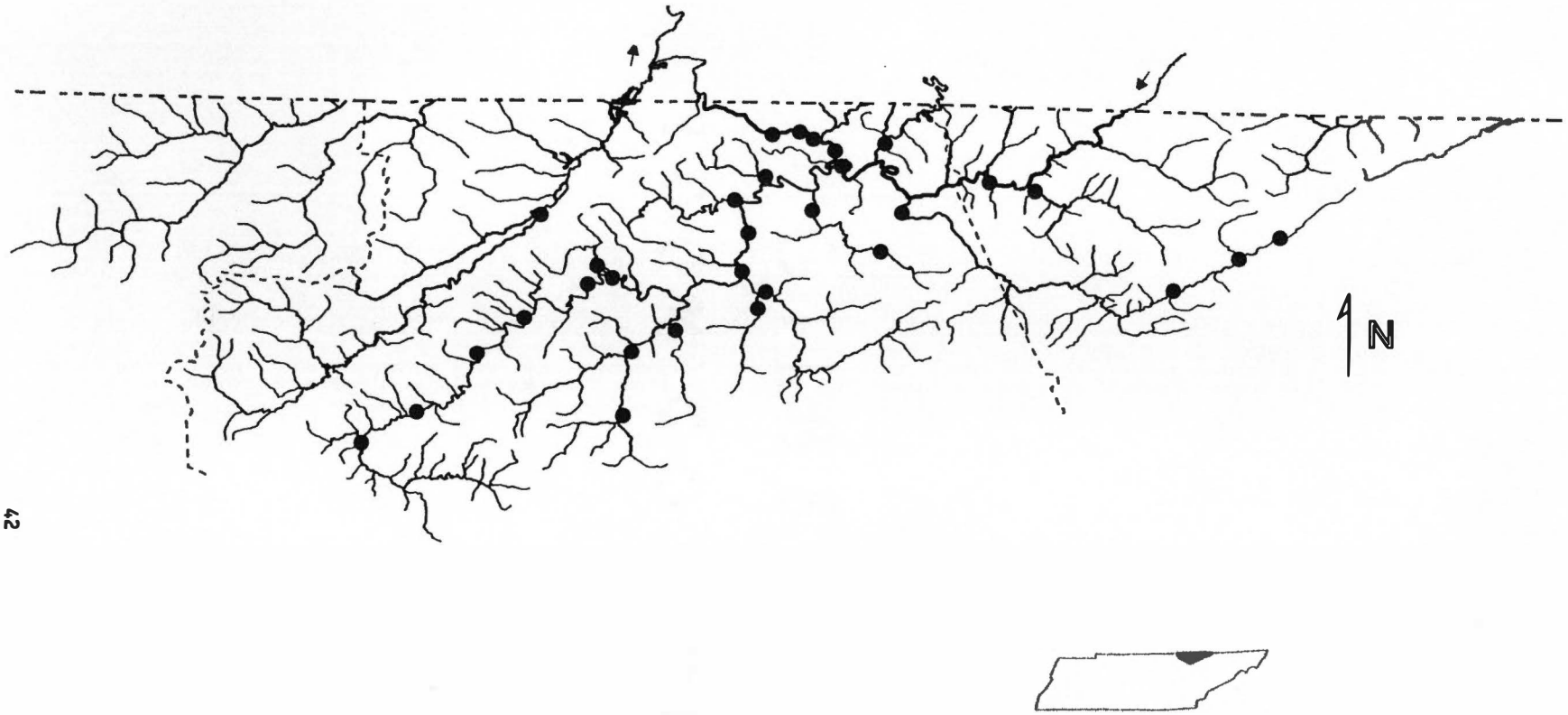


Figure A3. Locality records for *Cyprinella galactura,* whitetail shiner, in the Tennessee portion of the upper Cumberland River drainage.

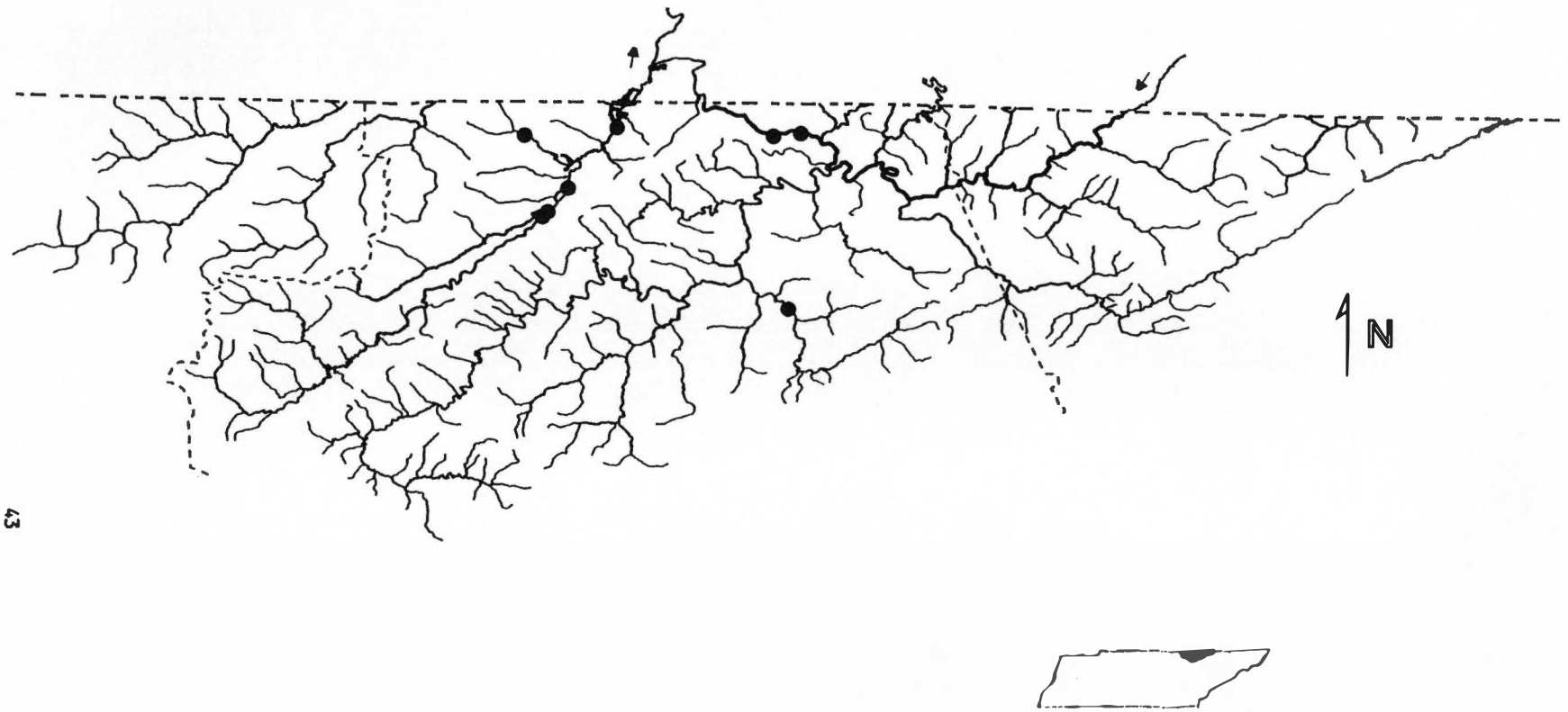


Figure A4. Locality records for *Cyprinella spiloptera,* spotfin shiner, in the Tennessee portion of the upper Cumberland River drainage.

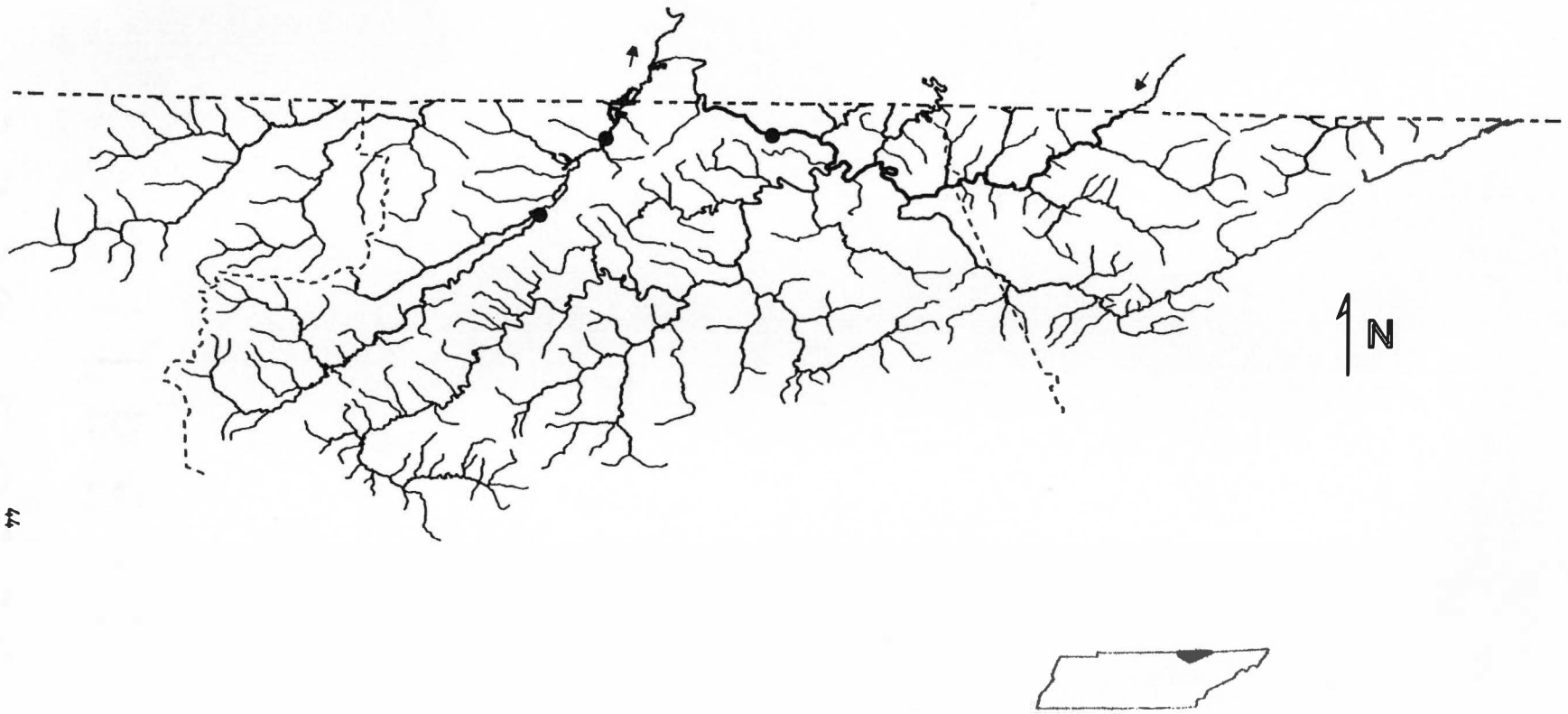


Figure A5. Locality records for *Cyprinella whipplei,* steelcolor shiner, in the Tennessee portion of the upper Cumberland River drainage.

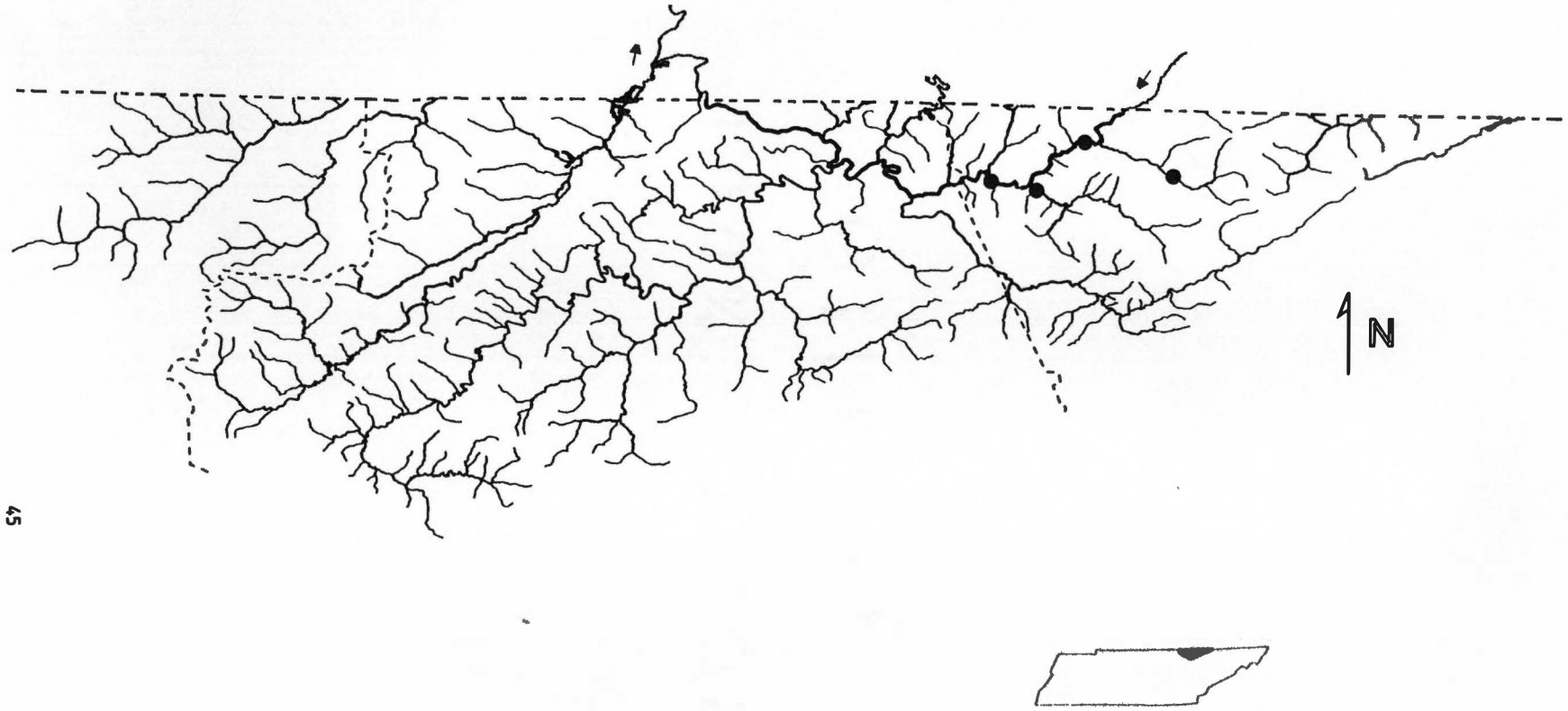


Figure A6. Locality records for *Ericymba buccata,* silverjaw minnow, in the Tennessee portion of the upper Cumberland River drainage.

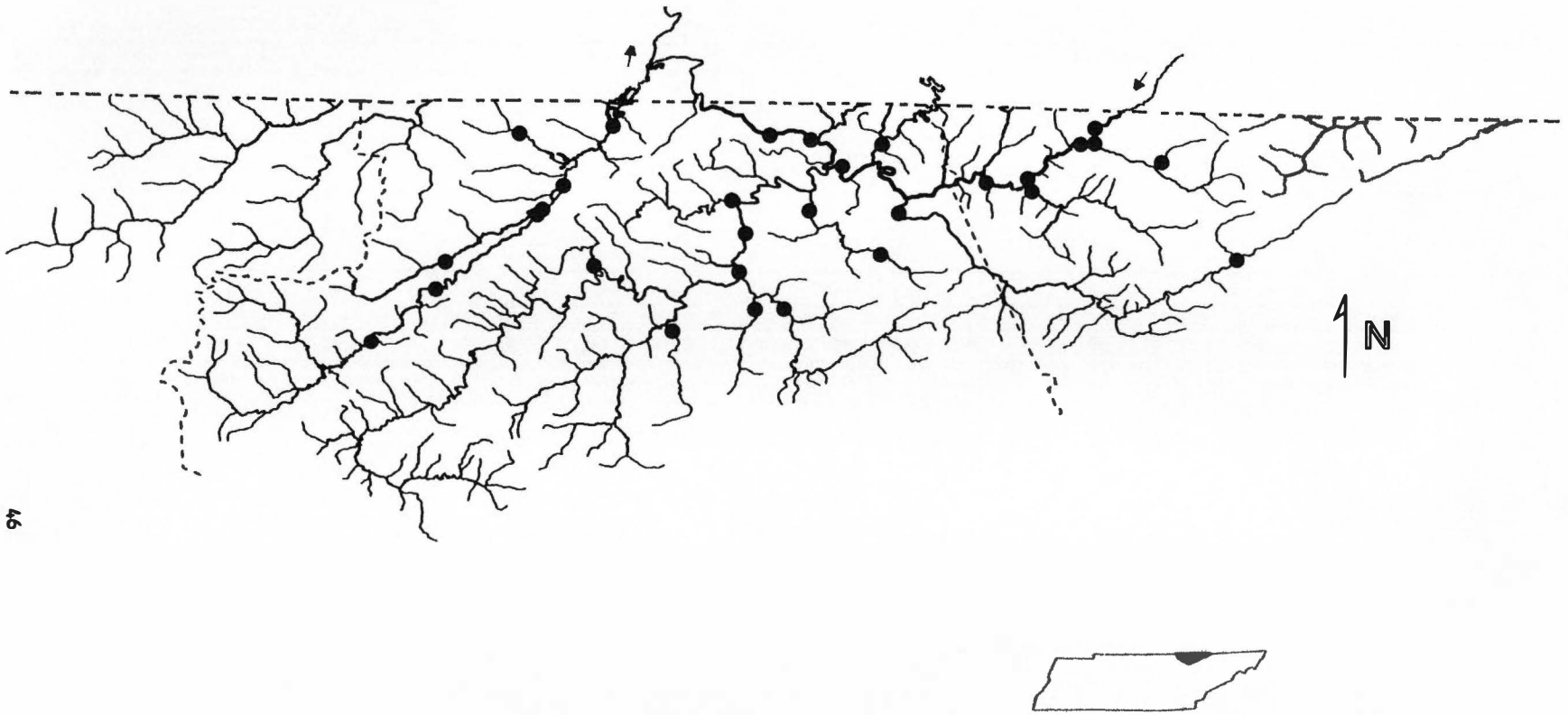


Figure A7. Locality records for *Luxilus chrysocephalus,* striped shiner, in the Tennessee portion of the upper Cumberland River drainage.

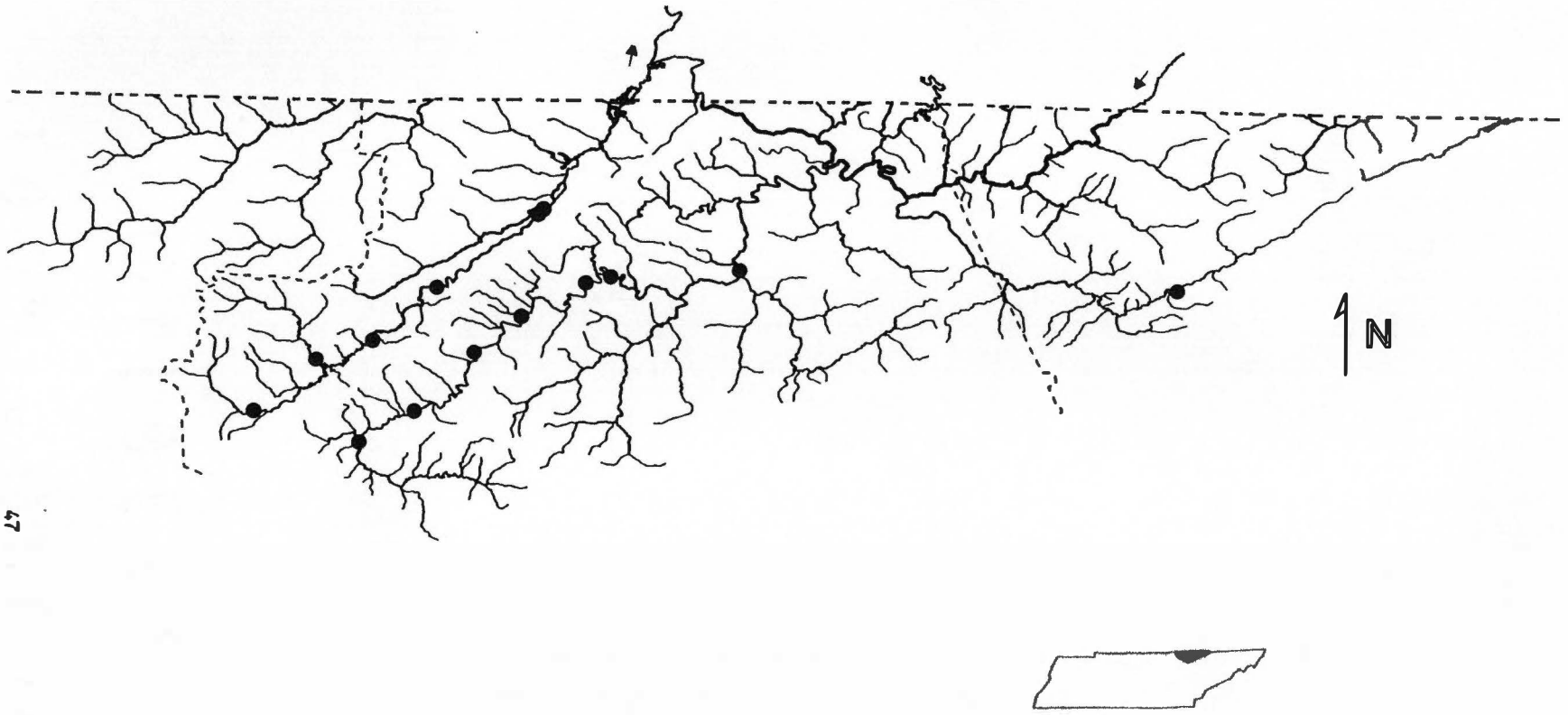


Figure A8. Locality records for *Lythrurus fasciolaris,* rosefin shiner, in the Tennessee portion of the upper Cumberland River drainage.

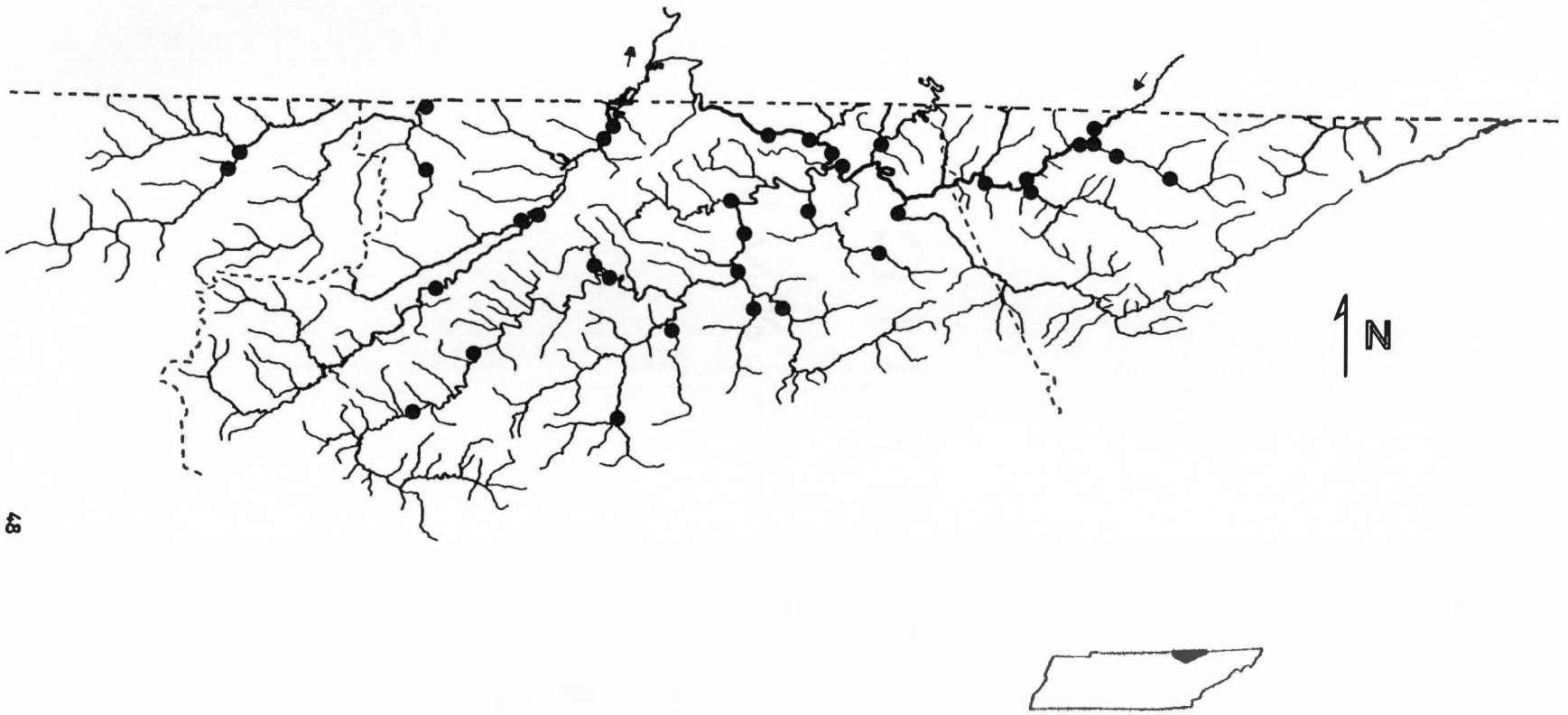


Figure A9. Locality records for *Notropis rubellus rubellus*, rosyface shiner, in the Tennessee portion of the upper Cumberland River drainage.

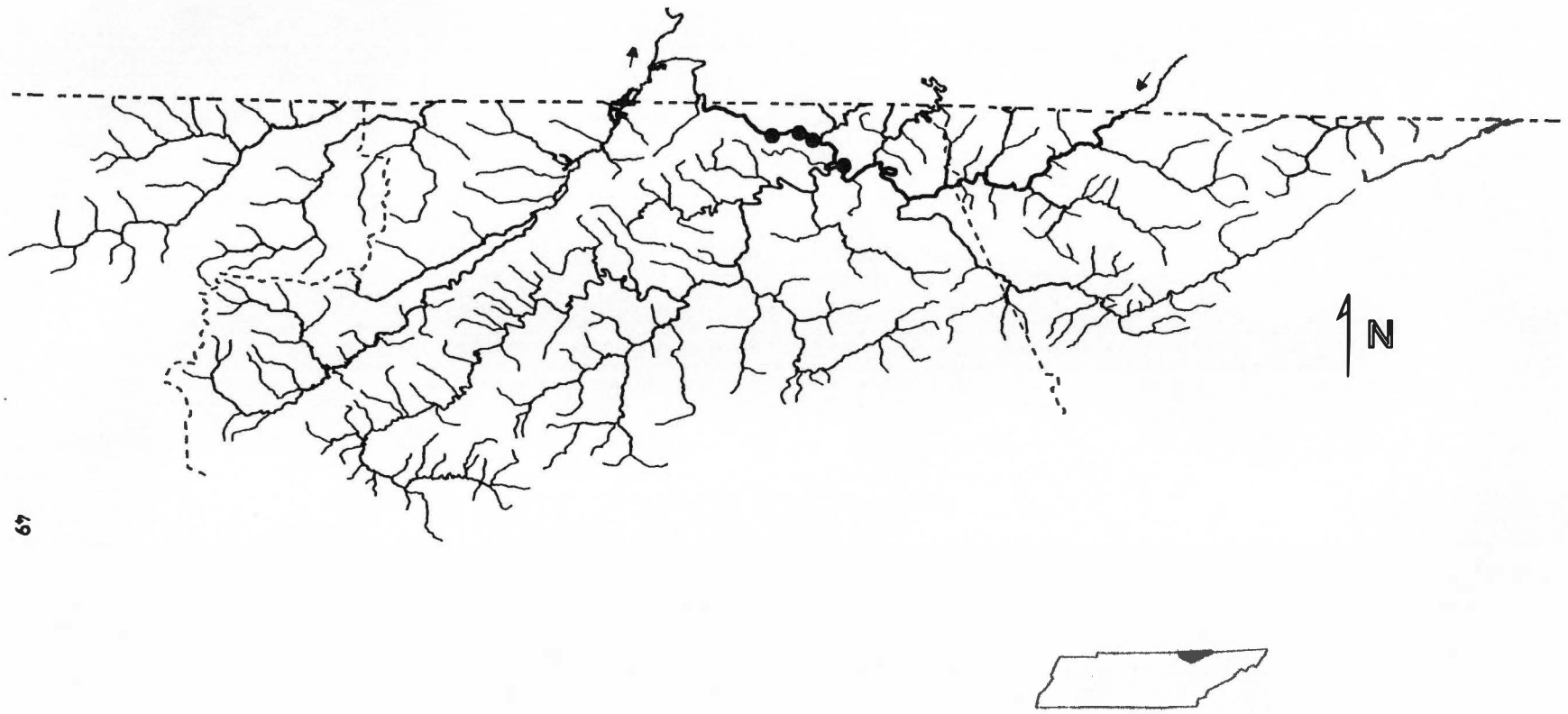


Figure A10. Locality records for *Notropis vollucellus,* mimic shiner, in the Tennessee portion of the upper Cumberland River drainage.

Figure A11. Locality records for *Phoxinus cumberlandensis,* blackside dace, in the Tennessee portion of the upper Cumberland River drainage.

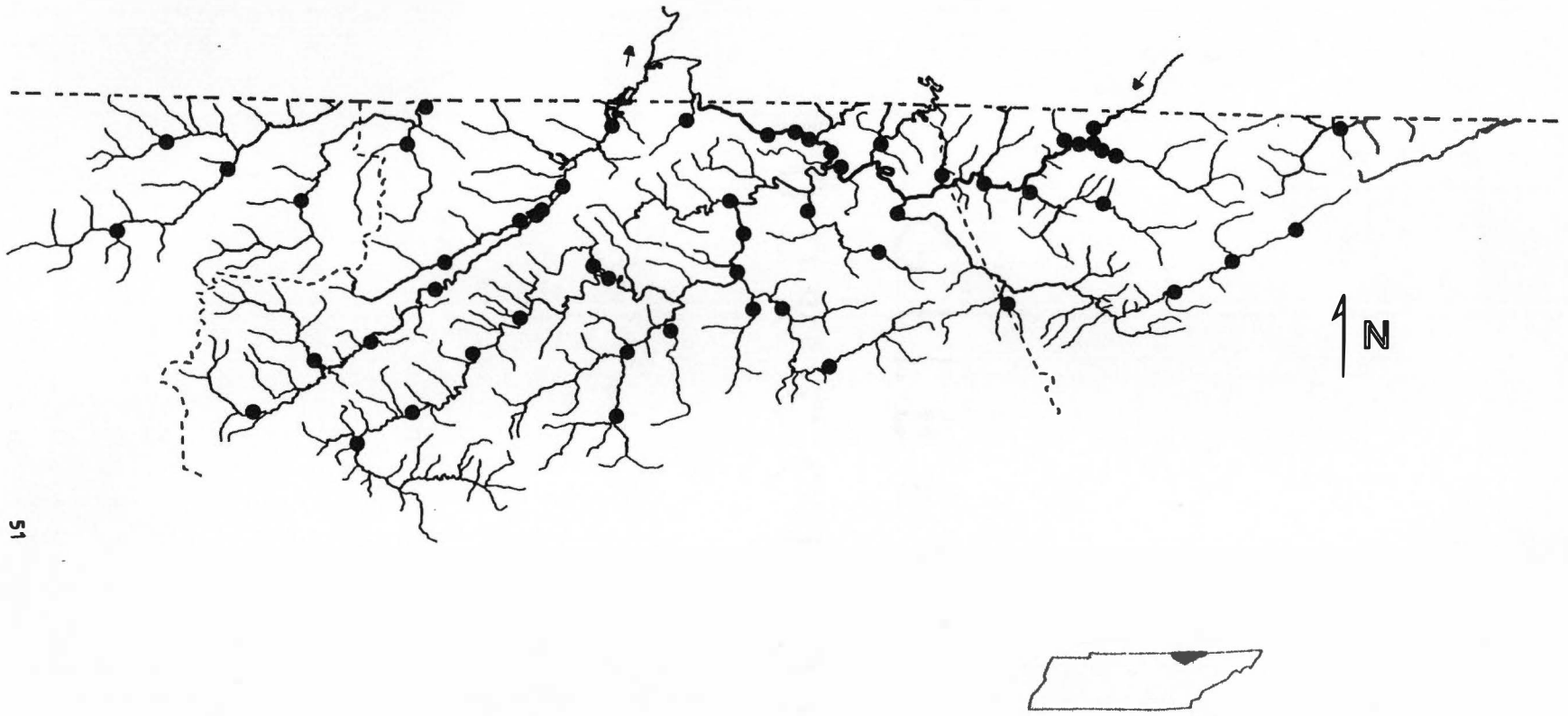
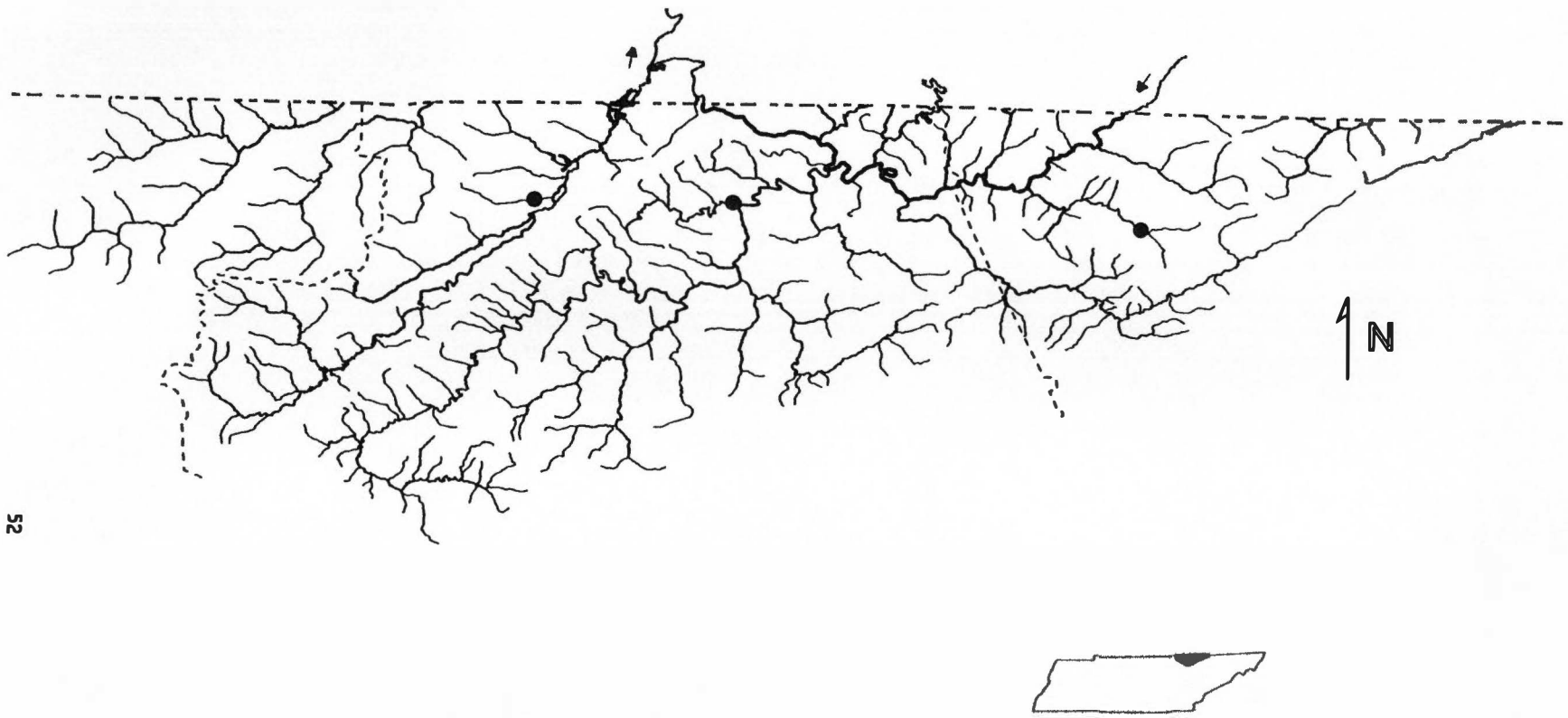


Figure A12. Locality records for *Pimephales notatus,* bluntnose minnow, in the Tennessee portion of the upper Cumberland River drainage.



FigureA13. Locality records for *Pimephales promelas,* fathead minnow, in the Tennessee portion of the upper Cumberland River drainage.

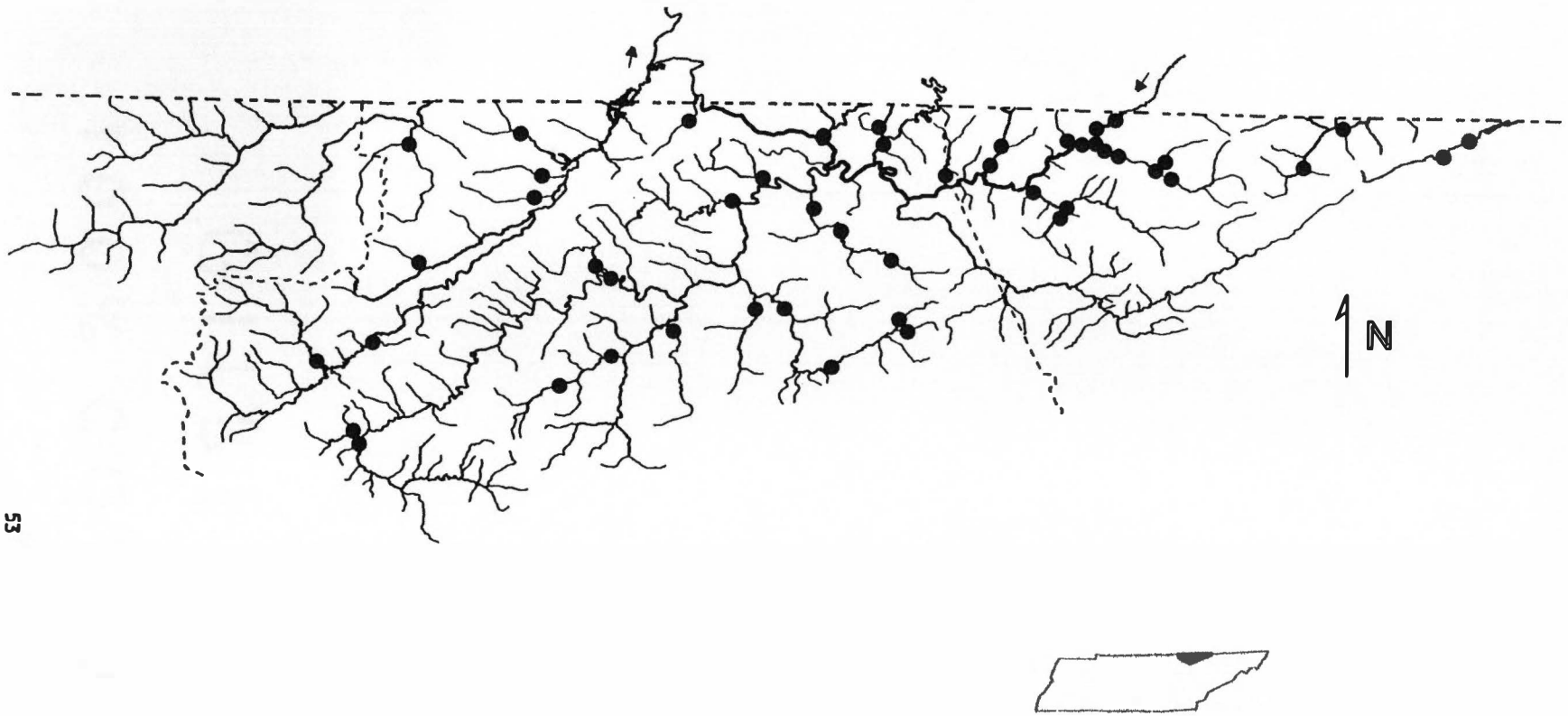


Figure A14. Locality records for *Rhinichthys atratulus*, blacknose dace, in the Tennessee portion of the upper Cumberland River drainage.

Figure A15. Locality records for *Semotilus atromaculatus,* creek chub, in the Tennessee portion of the upper Cumberland River drainage.

Figure A16. Locality records for *Catostomus commersoni,* white sucker, in the Tennessee portion of the upper Cumberland River drainage.

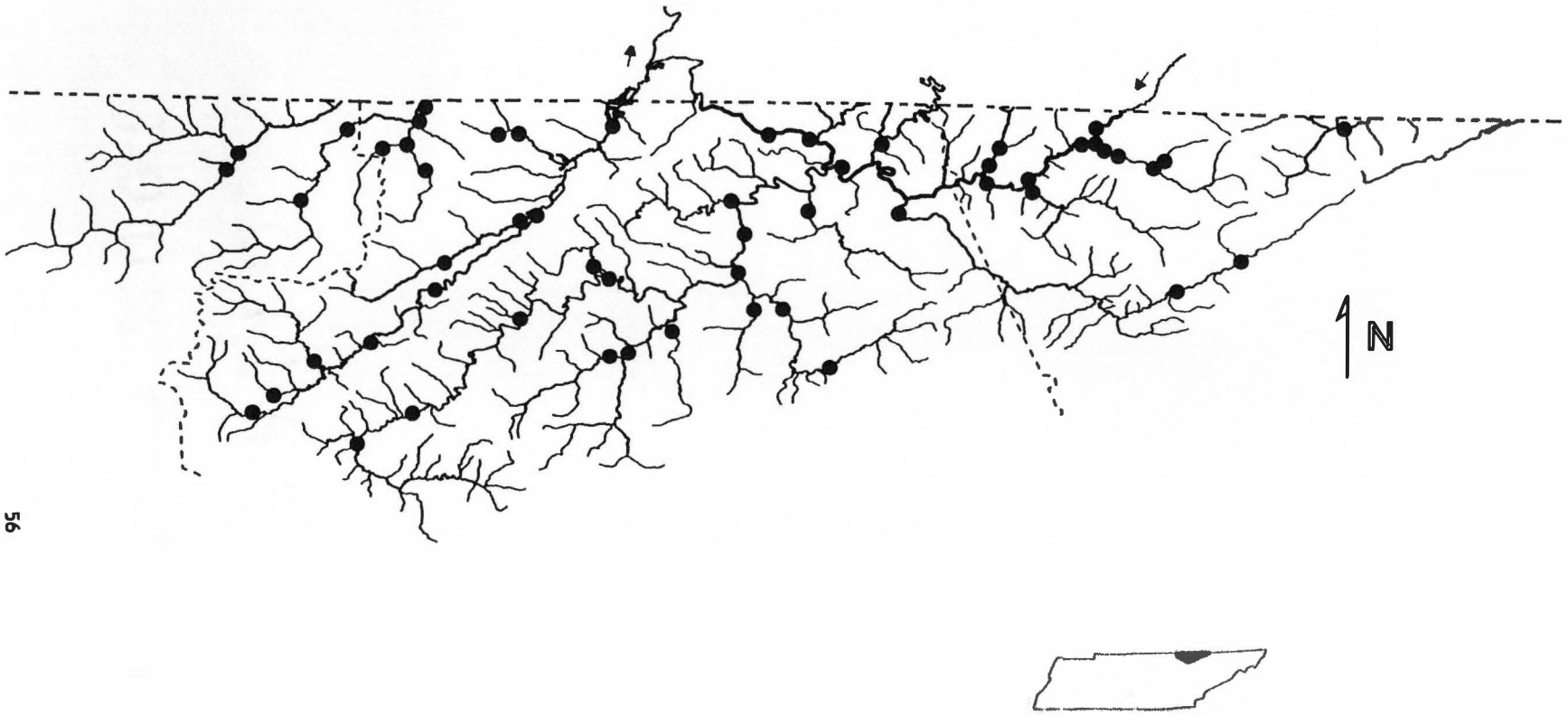


Figure A17. Locality records for *Hypentilium nigricans,* northern hogsucker, in the Tennessee portion of the upper Cumberland River drainage.

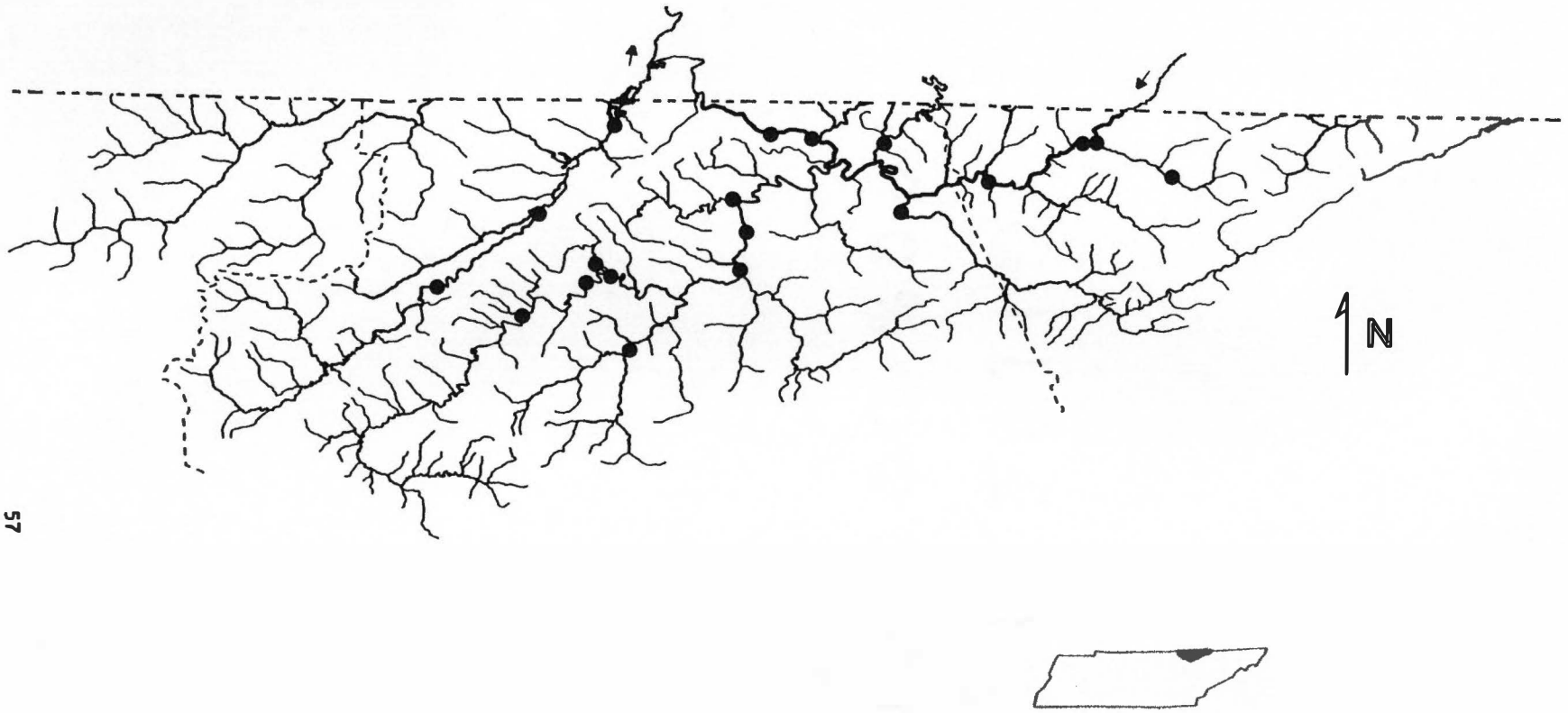


Figure A18. Locality records for *Moxostoma erythrurum*, golden redhorse, in the Tennessee portion of the upper Cumberland River drainage.

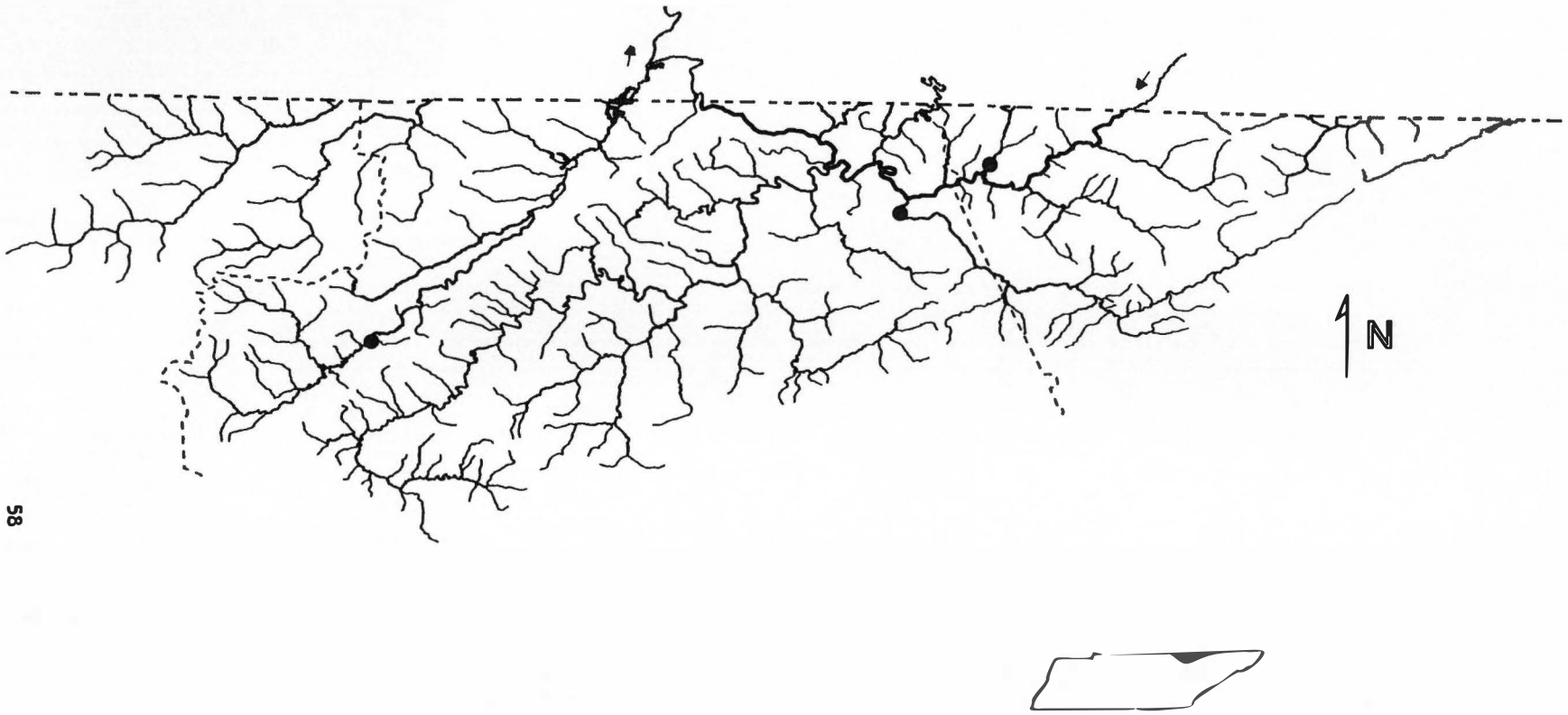


Figure A19. Locality records for *Ameiurus natalis,* yellow bullhead, in the Tennessee portion of the upper Cumberland River drainage.

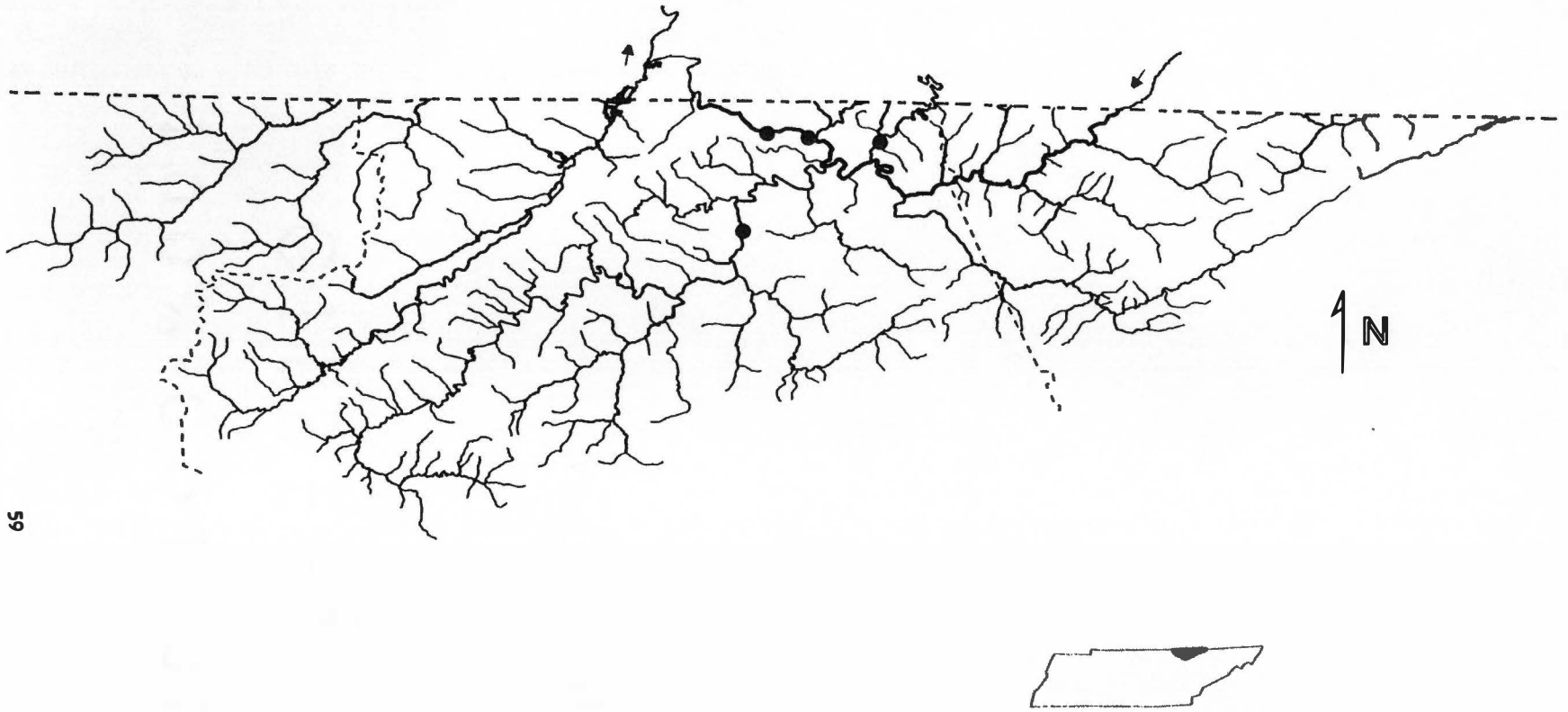


Figure A20. Locality records for *Ictalurus punctulatus*, channel catfish, in the Tennessee portion of the upper Cumberland River drainage.

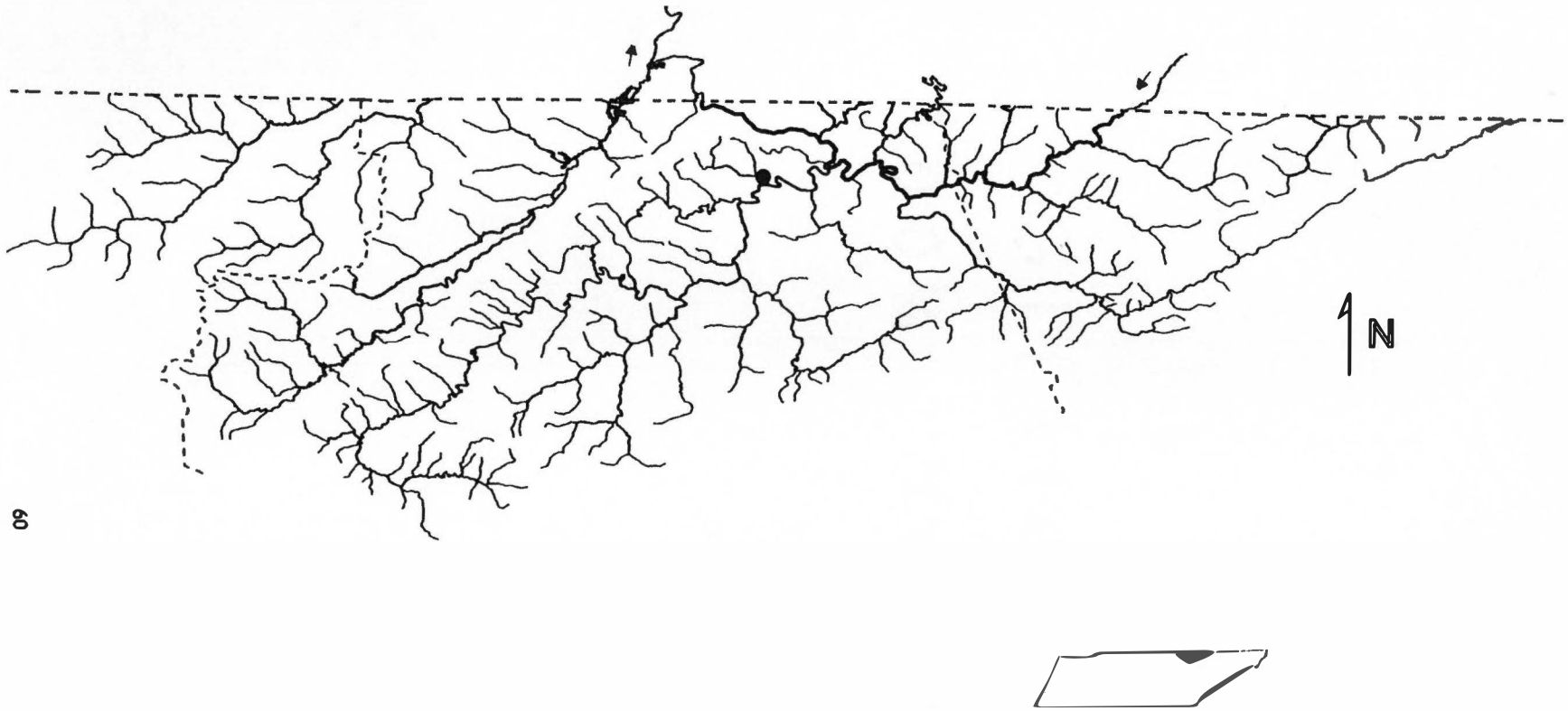


Figure A21. Locality records for *Noturus miurus,* brindled madtom, in the Tennessee portion of the upper Cumberland River drainage.

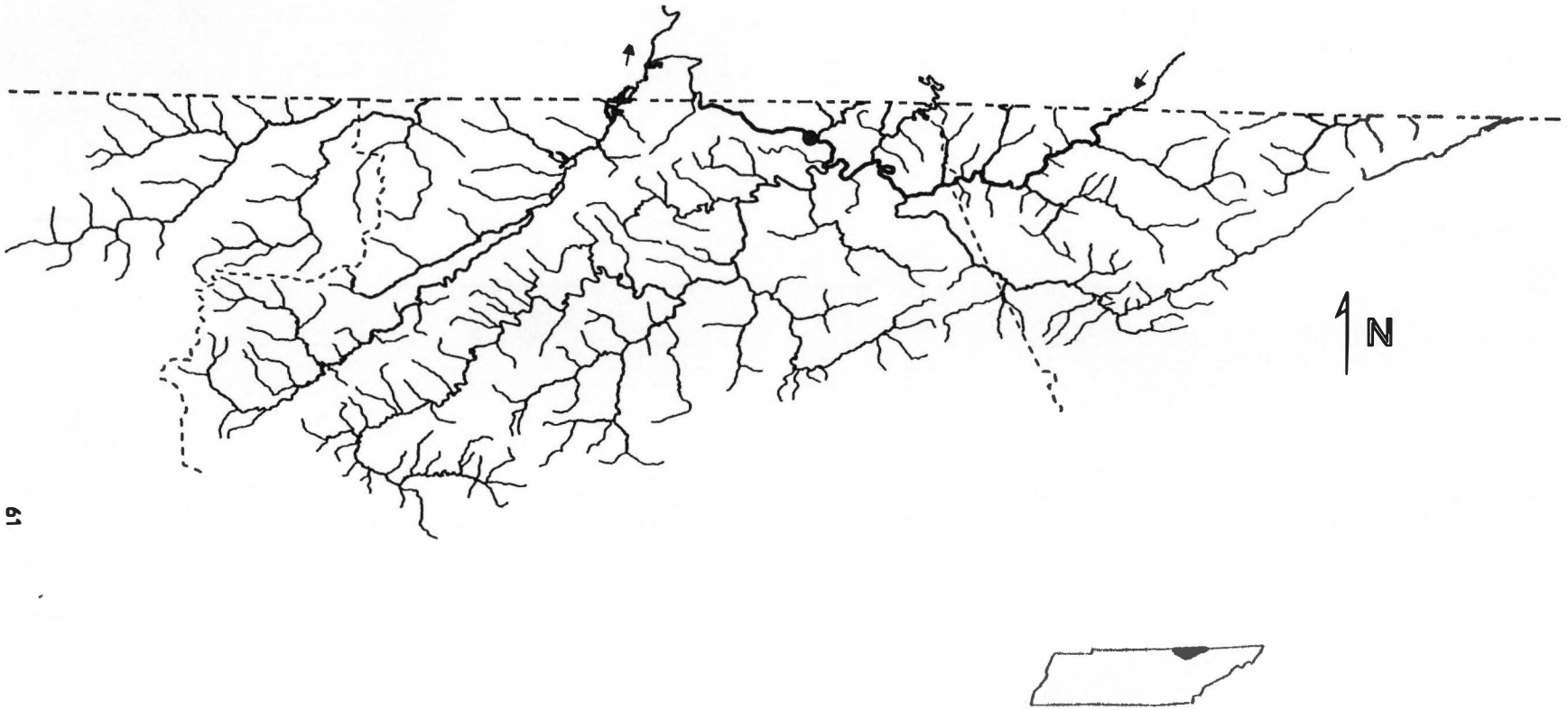


Figure A22. Locality records for *Pylodictus olivaris*, flathead catfish, in the Tennessee portion of the upper Cumberland River drainage.

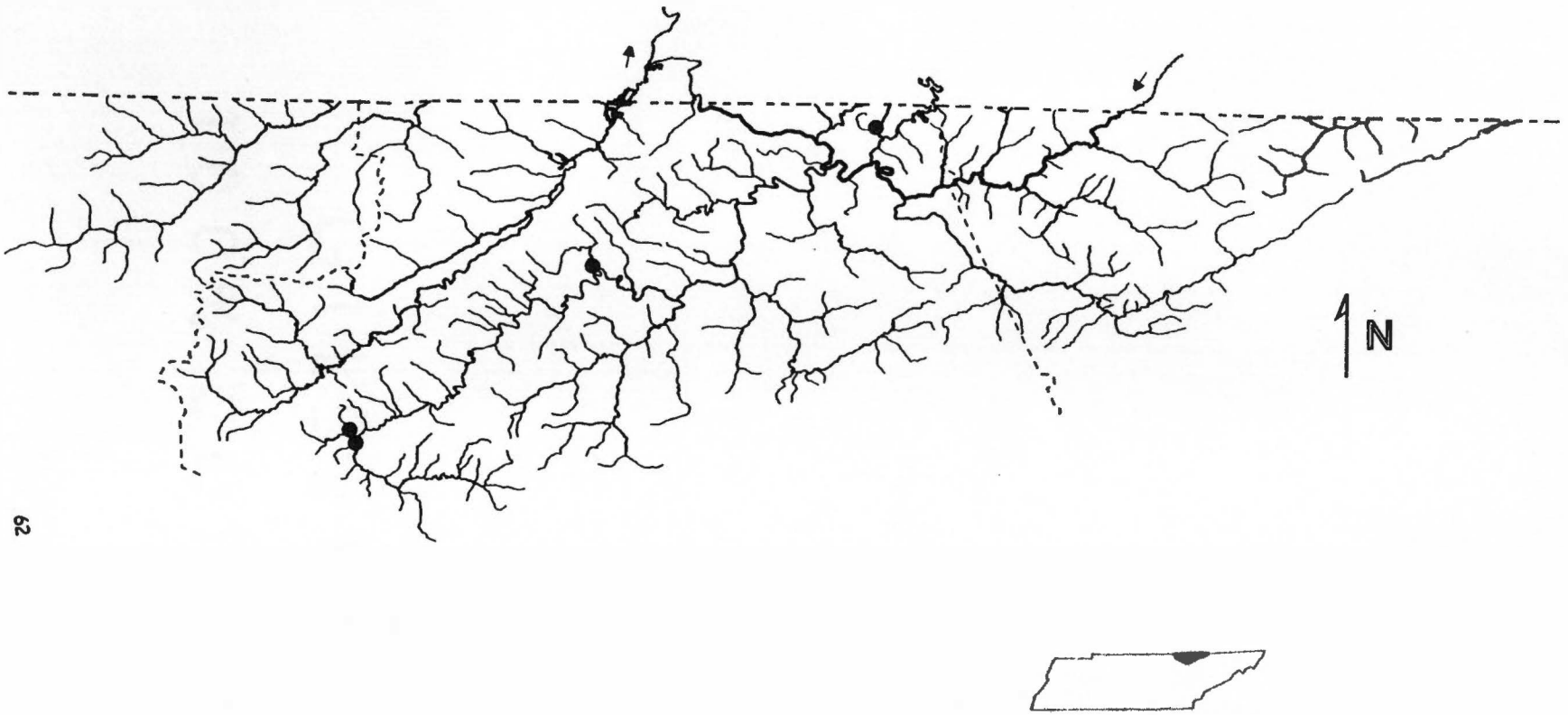


Figure A23. Locality records for *Oncorhynchus mykiss,* rainbow trout, in the Tennessee portion of the upper Cumberland River drainage.

Figure A24. Locality records for *Labidesthes sicculus,* brook silverside, in the Tennessee portion of the upper Cumberland River drainage.

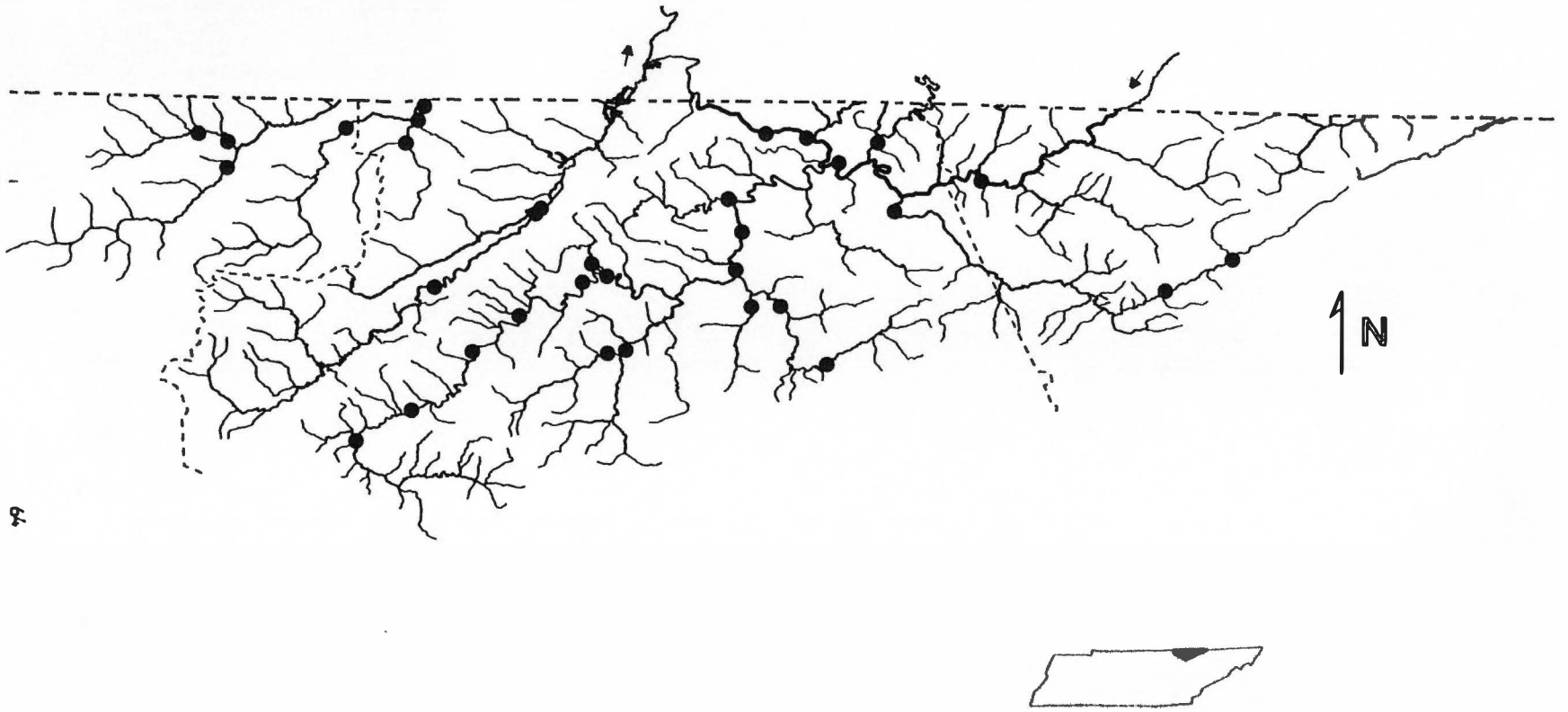


Figure A25. Locality records for *Ambloplites rupestris,* rockbass, in the Tennessee portion of the upper Cumberland River drainage.

Figure 26. Locality records for *Lepomis auritus,* redbreast sunfish, in the Tennessee portion of the upper Cumberland River drainage.

Figure A27. Locality records for *Lepomis cyanellus,* green sunfish, in the Tennessee portion of the upper Cumberland River drainage.

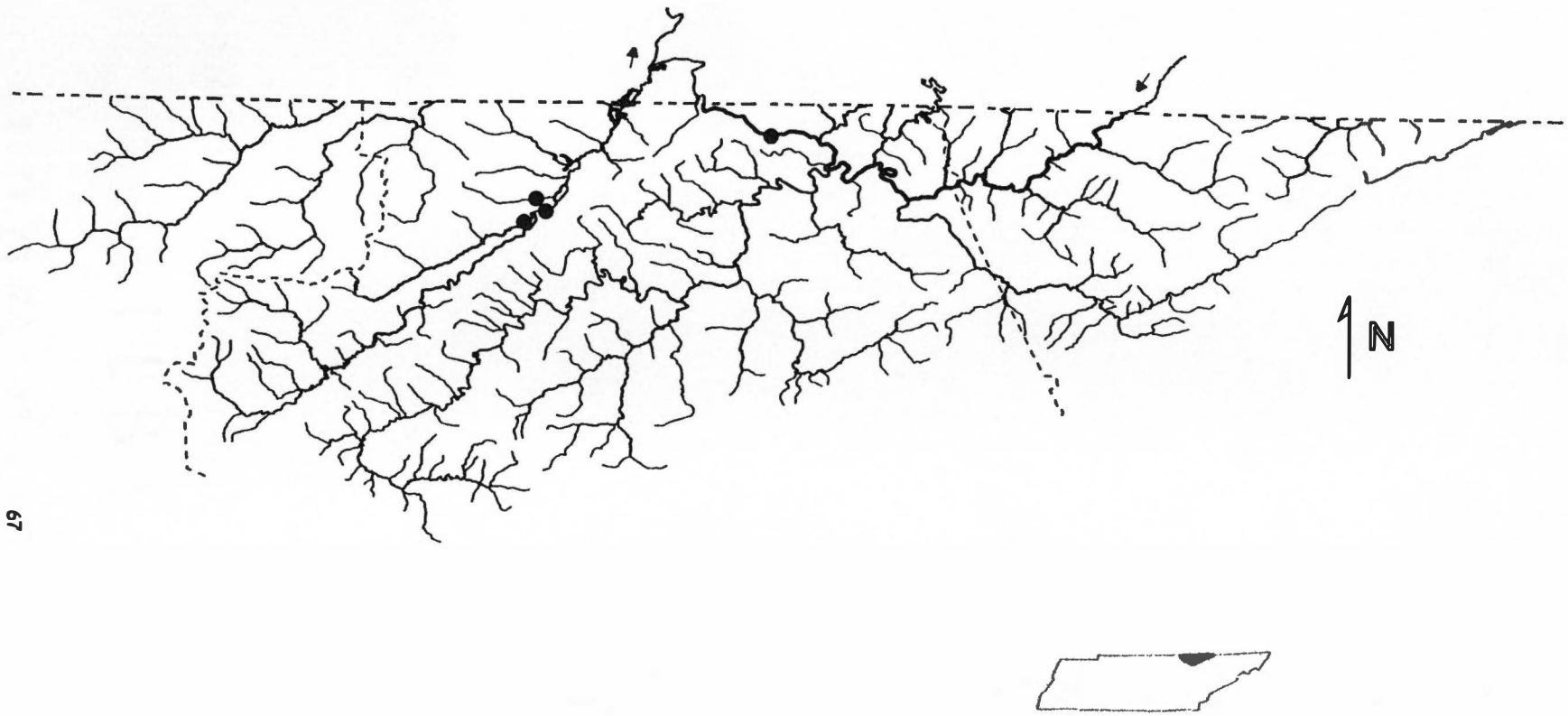


Figure A28. Locality records for *Lepomis gulosus,* warmouth, in the Tennessee portion of the upper Cumberland River drainage.

Figure A29. Locality records for *Lepomis macrochirus*, bluegill, in the Tennessee portion of the upper Cumberland River drainage.

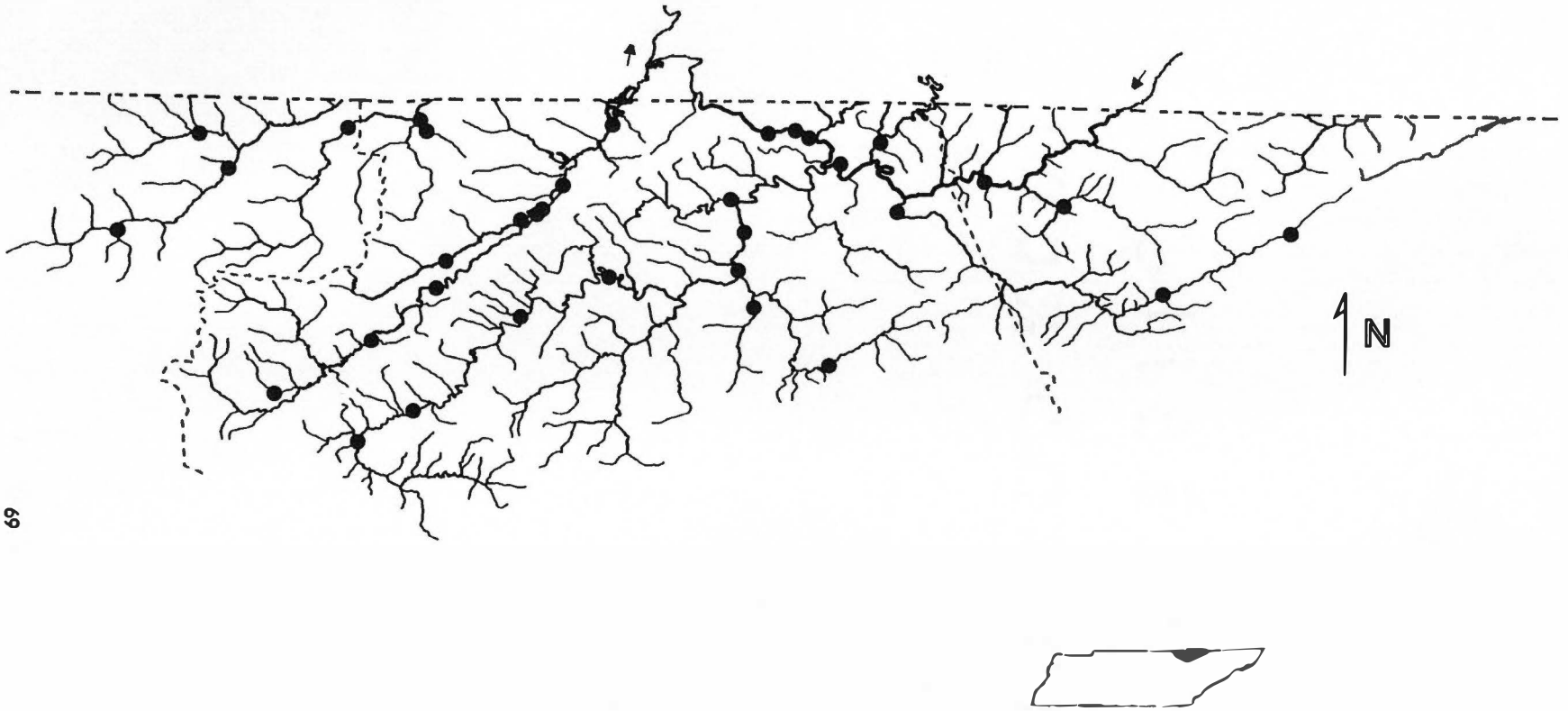


Figure A30. Locality records for *Lepomis megalotis,* longear sunfish, in the Tennessee portion of the upper Cumberland River drainage.

Figure A31. Locality records for *Micropterus dolomieu*, smallmouth bass in the Tennessee portion of the upper Cumberland River drainage.

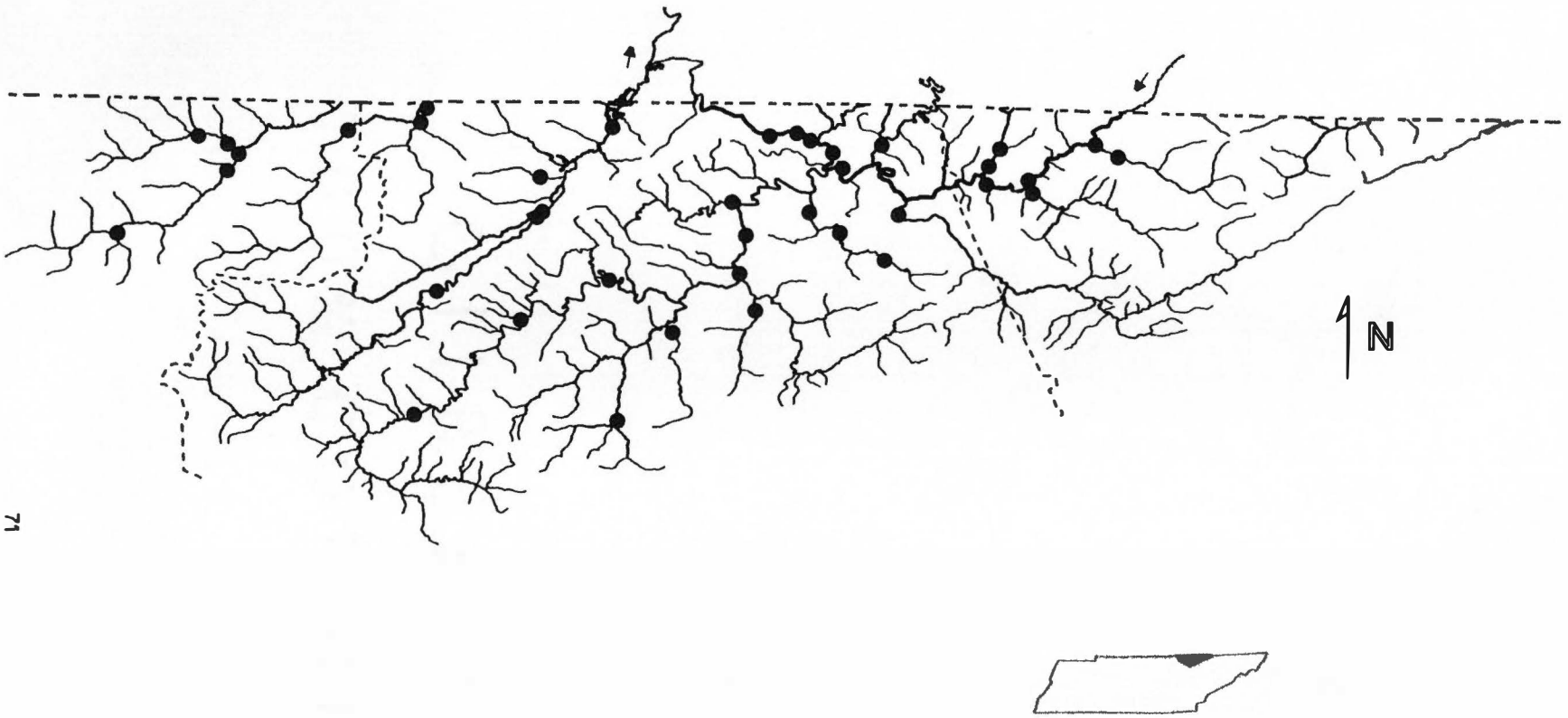


Figure A32. Locality records for *Micropterus punctulatus,* spotted bass, in the Tennessee portion of the upper Cumberland River drainage.

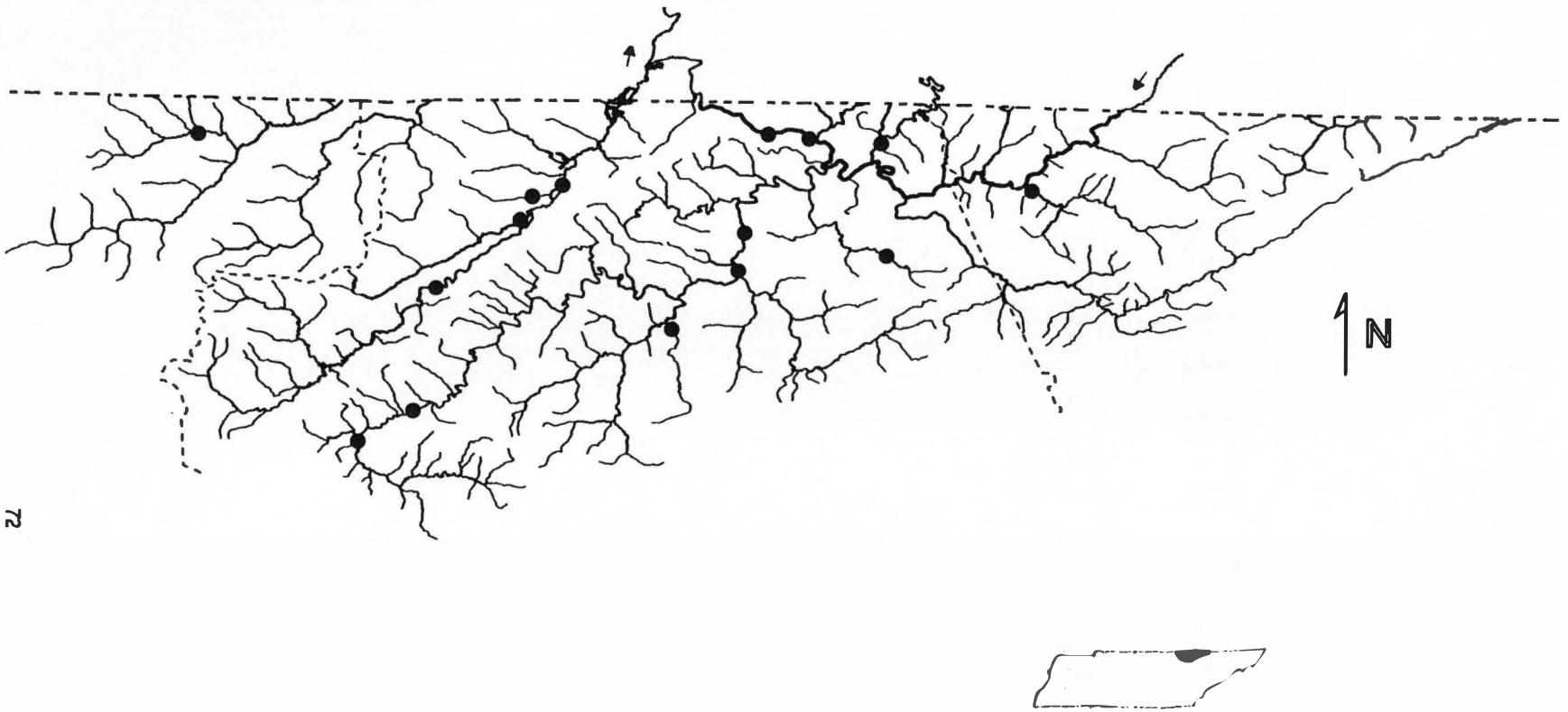


Figure A33. Locality records for *Micropterus salmoides*, largemouth bass in the Tennessee portion of the upper Cumberland River drainage.

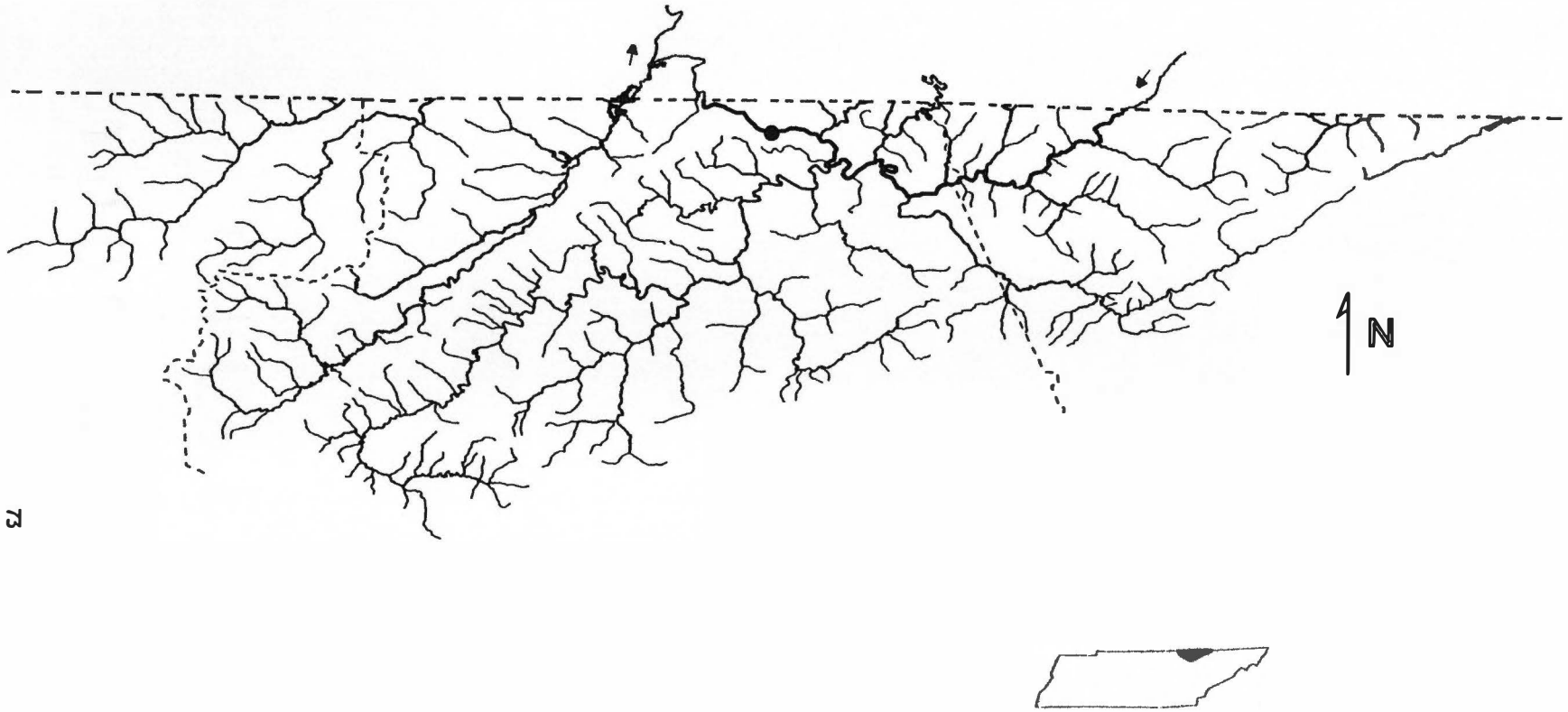


Figure A34. Locality records for *Pomoxis annularis,* white crappie, n the Tennessee portion of the upper Cumberland River drainage.

Figure A35. Locality records for *Etheostoma baileyi,* emerald darter,in the Tennessee portion of the upper Cumberland River drainage.

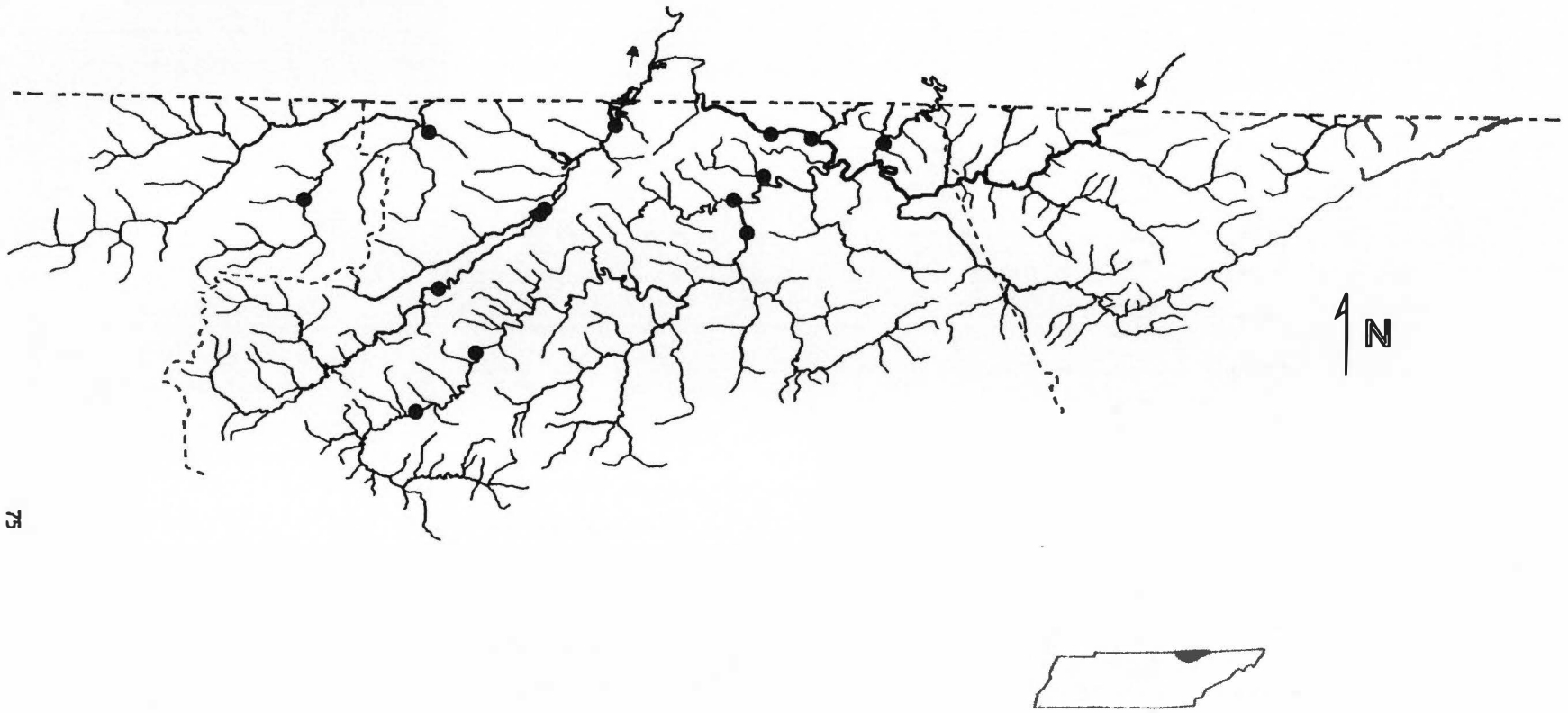


Figure A36. Locality records for *Etheostoma blennioides,* greenside darter, in the Tennessee portion of the upper Cumberland River drainage.

Figure A37. Locality records for *Etheostoma caeruleum,* rainbow darter, in the Tennessee portion of the upper Cumberland River drainage.

Figure A38. Locality records for *Etheostoma kennicotti,* stripetail darter, in the Tennessee portion of the upper Cumberland River drainage.

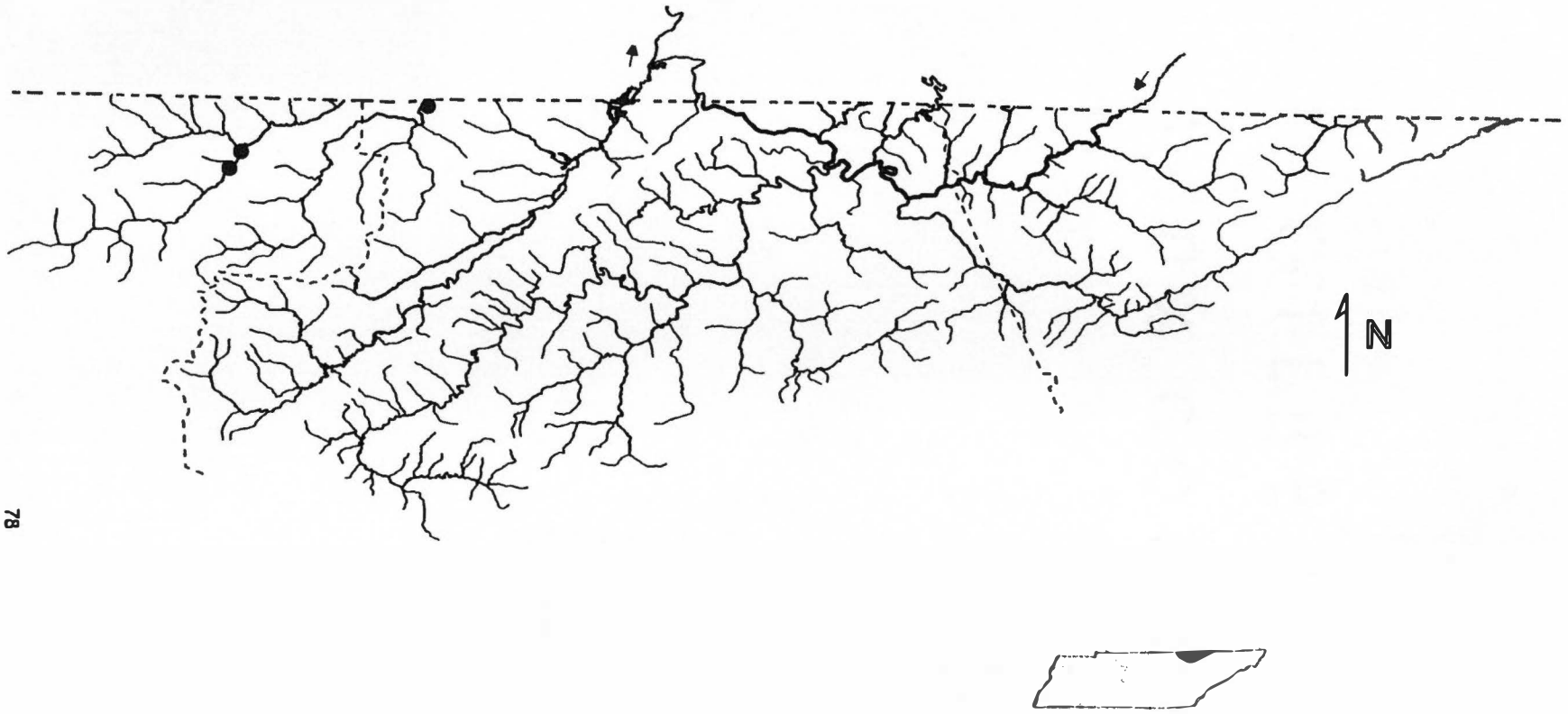


Figure A39. Locality records for *Etheostoma nigrum susanae,* johnny darter, in the Tennessee portion of the upper Cumberland River drainage.

Figure A40. Locality records for *Etheostoma sagitta sagitta,* arrow darter, in the Tennessee portion of the upper Cumberland River drainage.

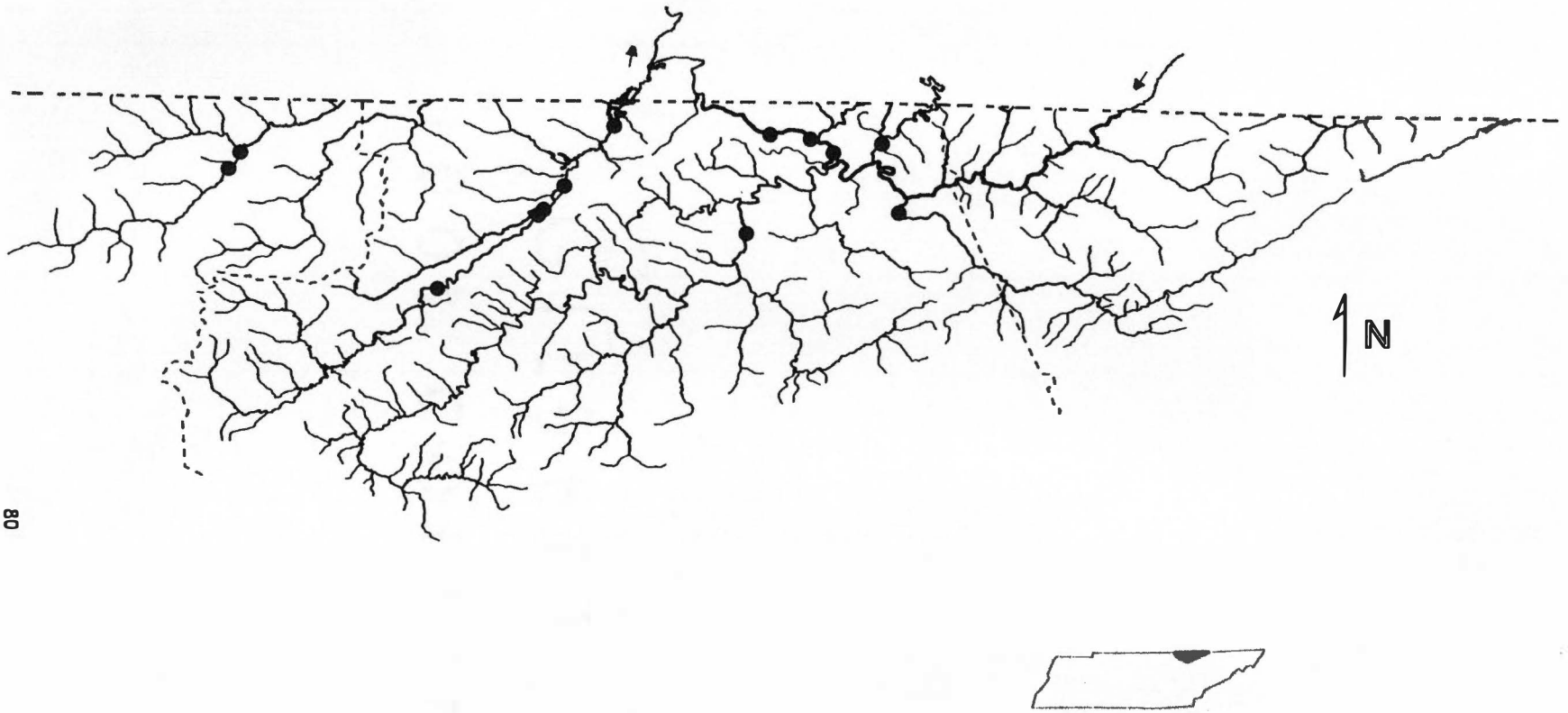


Figure A41. Locality records for *Percina caprodes,* log perch, in the Tennessee portion of the upper Cumberland River drainage.

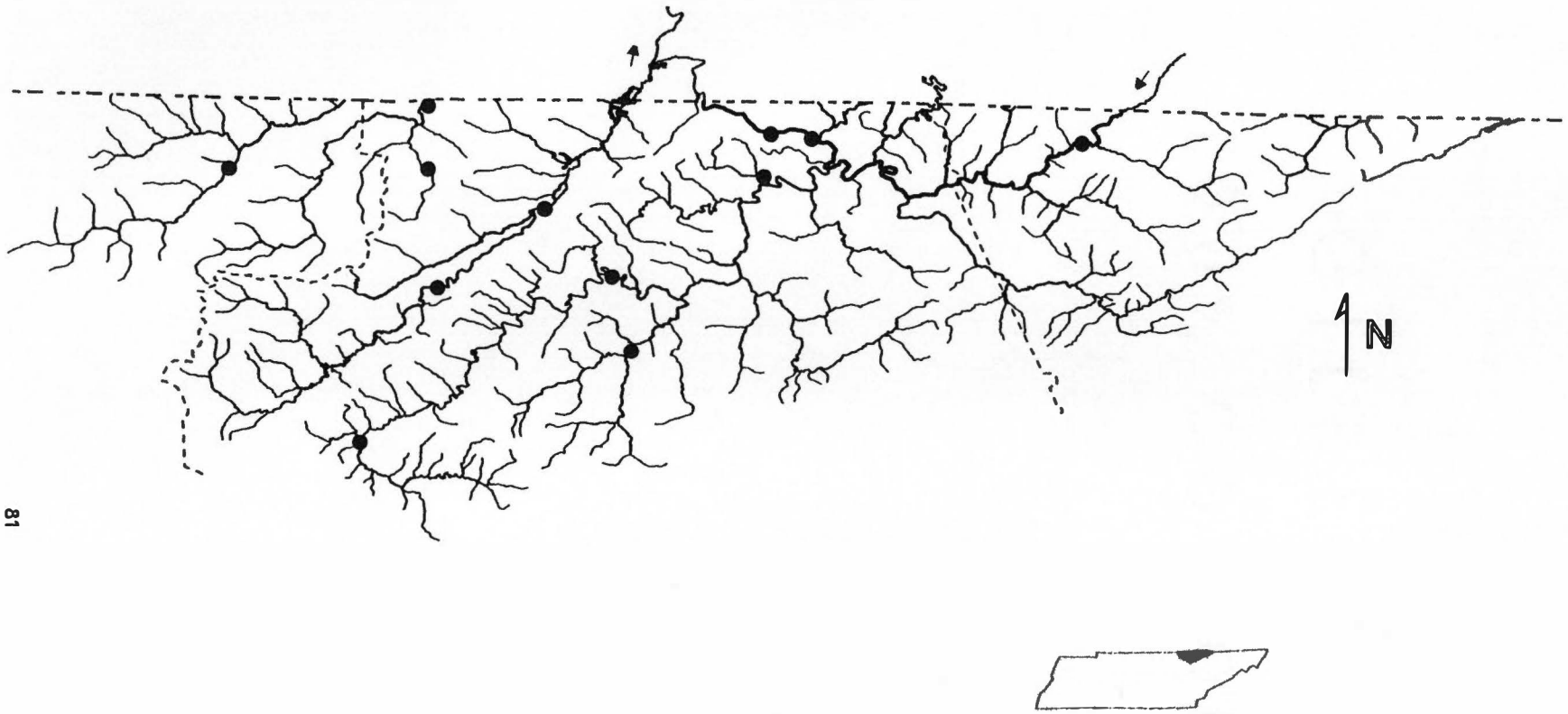


Figure A42. Locality records for *Percina maculata,* blackside darter, in the Tennessee portion of the upper Cumberland River drainage.

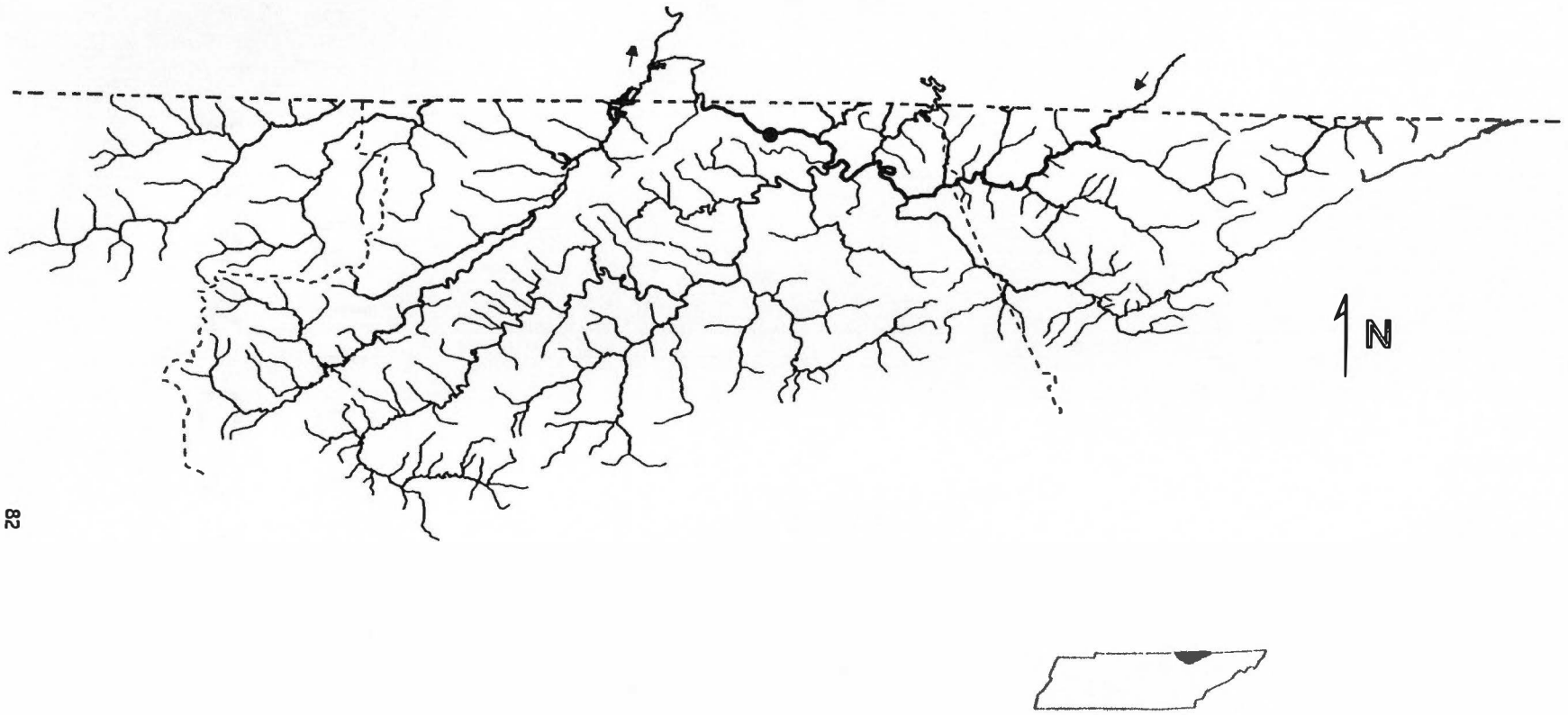


Figure A43. Locality records for *Stizostedion vitreum,* walleye, in the Tennessee portion of the upper Cumberland River drainage.

APPENDIX B

COLLECTION DATA

Collection Data

Collection localities are numbered consecutively, moving from west to east within the drainage. First is Jellico Creek and its tributaries, followed by Elk Fork and its tributaries, and finally streams directly entering the Clear Fork in Tennessee. Collection sites study are numbered consecutively within each stream, beginning at the point where each of the three main streams crosses the Tennessee/Kentucky state line and proceeding upstream within each stream group. The highly dendritic nature of streams in the area makes such a numbering scheme necessary. Collection sites are described from the nearest town, road crossing, intersection or prominent landmark.

A species list is provided with localities present and number of specimens collected at each locality listed. When there are multiple collections from one locality species numbers are listed in chronological order. Asterisks indicate qualitative samples for which there is no numerical data. These collections simply record the presence of the species at this locality.

Collection localities are listed following the species list. The following data are listed for each locality where available: site number, name of stream, stream location, county, width, date of collection, collection number, and species list.

Species List

1. *Lampetra aepyptera*: 38(1), 56(1).

4. *Campostoma anomalum*: 4(*), 5(2), 7(11), 8(*), 13(5)14(*), 15(47), 16(3), 18(38), 21(49), 24(5), 26(1), 27(63,33), 28(11), 29(9), 32(19,12), 33(*), 34(43,40), 36(31), 37(5), 38(25), 40(4), 41(2), 46(17,27,26), 47(15,165), 48(31), 49(331), 50(102), 51(1,21), 53(9), 54(5), 55(28), 56(20), 60(97), 61(23), 62(*), 67(29), 68(214,157), 69(17), 73(1), 76(1,17,131), 78(180,27), 86(10), 88(34), 89(35), 90(*), 91(45,62), 92(82), 93(1,2), 94(85), 95(3),96(63), 97(38), 98(96), 99(178), 100(96,166), 101(3), 102(39,2), 103(10), 107(3),

6. *Cyprinella galactura*: 27(2), 38(20), 39(1), 40(3), 46(2,5), 47(16,37), 48(28), 49(8), 50(14), 51(12), 52(7), 53(11), 54(54), 56(1), 60(5), 61(2), 66(1), 67(1), 76(4,8,2,79), 78(43,24), 89(5), 91(2),

7. *Cyprinella spiloptera*: 18(1), 24(29), 26(5), 27(1,1), 38(24), 39(1), 68(1),

8. *Cyprinella whipplei*: 19(19), 38(13,3).

10. *Ericymba buccata*: 89(1), 91(4), 96(10), 97(8).

12. *Luxilus chrysocephalus*: 18(4), 24(7), 26(3,5), 27(5), 29(14), 32(51,3), 33(*), 38(29), 40(2), 46(9,3,2), 47(19,12), 48(3), 50(4), 60(1), 66(*), 67(8), 68(12,11), 76(1,9,24), 78(22,10), 85(1), 89(49), 90(*), 91(5,4,11), 96(9), 97(17), 103(9),

13 *Lythrurus fasciolaris*: 26(12), 27(1), 32(4), 34(8), 36(25), 48(1), 49(2), 51(1,21), 52(8), 53(4), 54(240), 56(31), 82(1).

16. *Notropis rubellus rubellus*: 1(12), 5(1), 7(177), 17(38), 18(10), 19(*), 27(40,48), 28(2), 32(68), 38(434), 40(25), 42(*), 43(*), 46(114,119,25), 47(134,213), 48(*), 49(49), 50(1), 53(5), 54(1), 60(7), 65(*), 67(91), 68(34,4), 76(1,5,114,94), 78(27,44), 85(17), 89(40), 90(*), 91(28,15), 96(42), 97(85), 99(1), 102(*), 103(4).

17. *Notropis volucellus*: 38(3), 39(5), 40(4), 78(1).

18. *Phoxinus cumberlandensis*: 4(*), 9(*), 10(3), 10(~100), 11(*), 13(1,8), 15(16,7), 16(2), 20(28), 22(*), 33(*), 34(135,23), 35(*), 36(15), 70(*), 71(*), 79(1), 80(5), 88(*), 94(3), 107(30), 108(33).

20. *Pimephales notatus*: 1(13), 4(*), 5(5), 6(*), 7(16), 12(*), 13(3), 14(16), 15(2), 18(11), 24(88), 26(85,6), 27(22,22), 28(2), 29(14), 32(31,13), 33(*), 34(11), 36(5), 37(1), 38(90), 39(many), 40(29), 46(5,5,8), 47(32,10), 48(7), 49(70), 50(32), 51(8), 53(8), 54(115), 56(8), 60(3), 61(1), 66(15), 67(37), 68(109,2), 69(6), 73(1), 76(18,5,84), 78(35,11), 85(37), 86(1), 89(17), 91(5,13), 92(7), 94(15), 95(1), 96(21), 97(37), 98(3), 99(6), 100(1), 103(4), 105(*).

21. *Pimephales promelas*: 25(1), 46(1), 94(1).

22. *Rhinichthys atratulus* : 21(22), 23(7), 25(1), 30(*), 33(*), 34(*), 37(46), 41(19), 46(5,5,4), 49(10), 50(54), 55(14), 56(10), 60(27), 62(*), 63(23), 66(2), 67(1), 68(38,5), 69(3), 70(*), 73(1,1), 76(5), 77(*), 86(57), 87(98), 88(*), 91(6,4), 92(74), 93(6,1), 95(42), 96(23), 97(3), 98(63), 99(211), 100(40,166), 101(21,77), 102(75,77), 103(7), 104(29), 107(43), 108(4).

23. *Semotilus atromaculatus*: 1(7), 2(10), 3(3), 4(*), (*), 7(12), 8(*), 10(~100), 11(*), 12(*), 13(*), 13(1), 13(44), 14(*), 14(96), 15(31), 16(27), 17(38), 18(3), 20(126), 21(22), 23(78), 24(22), 25(99), 26(2), 27(2,7), 28(4), 29(25), 31(*), 32(19,3), 33(*), 34(44,18), 36(90), 37(69), 41(27), 46(16,20,5), 47(5), 48(3,1), 49(1), 50(21), 51(5,38), 52(38), 54(110), 55(45), 56(80), 57(*), 58(79), 59(185), 60(41), 61(142), 62(*), 63(420), 64(*), 66(6), 67(2), 68(93,6), 69(132), 70(*), 73(92,5), 76(2,16,95), 77(*), 78(3,2), 79(56), 80(191), 85(2), 86(56), 87(152), 88(*), 89(11), 90(*), 91(1,23,16), 92(144), 93(15,21), 94(297), 95(40), 96(27), 98(32), 99(22), 100(1,59), 101(2,18), 102(26,18), 103(57), 104(32), 105(*), 107(151), 108(174).

24. *Catostomus commersoni*: 4(*), 6(*), 10(11), 12(*), 13(1), 13(4), 14(4),15(8), 16(3), 23(19), 25(9), 28(2), 29(1), 31(*), 33(*), 34(2,3), 36(5), 40(1), 47(1), 54(3), 55(1), 56(5), 61(2), 63(27), 69(26), 72(6), 87(3), 89(1), 91(1), 92(15), 94(1), 96(2), 97(6), 98(*), 99(1), 100(1), 102(3), 103(3), 104(1), 107(11), 108(10).

25. *Hypentilium nigricans*: 1(2), 5(4), 7(9), 8(*), 10(3), 12(*), 14(3), 15(11), 16(3), 18(28), 21(5), 24(3), 26(3,2), 27(13,16), 28(5), 29(3), 32(21,10), 33(*), 34(1,1), 36(7), 38(18), 40(9), 46(7,2,6), 47(8,29), 48(15), 49(15), 50(7), 51(1), 52(1), 54(21), 56(9), 60(6), 61(2), 62(*), 63(1), 67(51), 69(19), 76(3,7,38), 78(39,2), 87(23), 89(11), 90(*), 91(10,1), 96(6), 97(17), 98(8), 99(4), 100(1), 101(2,1), 102(4), 103(4).

27. *Moxostoma erythrurum*: 5(1), 18(13), 27(11), 32(4,1), 38(19), 39(2), 40(34), 43(*), 46(2,1), 47(29,59), 48(8), 49(16), 50(20), 52(1), 61(12), 76(5), 78(7,2), 89(6), 96(1), 97(2), 102(1).

29 *Ameiurus natalis*: 33(*), 52(2), 78(3).

30. *Ictalurus punctatus*: 38(34), 40(5), 47(8).

31. *Noturus miurus*: 45(1).

32. *Pylodictus olivaris*: 40(9).

33. *Oncyrhynchus mykiss*: 50(1), 56(1), 76(1).

36. *Labidesthes sicculus*: 38(1).

38 *Ambloplites rupestris*: 1(1), 2(38), 3(1), 5(6), 7(4), 10(7), 15(1), 26(2,1), 27(2,3), 32(4,3), 38(12), 40(6), 46(1,2,1), 47(24), 48(6), 49(8), 50(1), 51(1,16), 52(2), 53(1), 54(2), 56(15), 61(9), 62(*), 66(*), 67(13), 68(1,2), 69(7), 76(1,7), 78(13), 85(1), 89(4).

39. *Lepomis auritus*: 1(10), 2(15), 3(7), 5(9), 7(19), 13(3), 15(5), 18(39), 23(4), 25(24), 27(11,25), 28(21), 29(5), 32(2,11), 34(20), 38(6), 40(6), 46(4,3), 47(15), 48(5), 49(7), 50(3), 51(19), 52(1), 53(27), 54(12), 56(65), 60(7), 61(14), 62(*),67(7), 68(4), 76(4), 86(2), 97(1).

40. *Lepomis cyanellus*: 6(*), 18(13), 25(33), 27(1), 28(1), 29(4), 32(1), 38(3), 40(2), 46(1), 49(3), 60(11), 61(1), 76(3), 78(3,8), 80(10), 87(4), 89(15), 90(*), 91(3,3), 92(10), 93(5,1), 95(7), 96(11), 99(1), 100(1), 102(8), 103(4).

41. *Lepomis gulosus* : 25(1), 26(1), 28(1), 38(9).

42. *Lepomis macrochirus*: 1(4), 3(1), 5(1), 6(*), 18(3), 21(1), 23(10), 25(5), 27(1), 28(2), 29(2), 32(4), 34(1), 38(24), 40(2), 46(1,4,17), 47(2,11), 48(1), 49(10), 51(1), 52(10), 56(14), 60(5), 61(5), 63(1), 69(1), 74(30,1), 76(1,9), 78(5,4), 85(1), 89(4), 91(2,1), 96(2), 97(9), 98(1), 103(1), 107(4).

43. *Lepomis megalotis*: 1(3), 3(1), 5(1), 6(*), 7(11), 8(*), 14(*), 18(14), 24(3), 26(3,5), 27(3,5), 28(14), 29(3), 32(30,5), 33(*), 36(1), 38(74), 39(many), 40(11), 46(1), 47(1,67), 49(6), 51(22), 52(11), 54(15), 56(8), 67(1), 69(1), 76(1,1), 78(5,3), 89(11), 92(2).

45. *Micropterus dolomieu*: 27(5), 32(1,2), 38(9), 40(5), 47(2,9), 48(2), 48(10), 49(11), 50(1), 51(5), 52(1), 61(1), 62(*), 66(*), 67(24), 68(3,9), 69(1), 76(2,11), 78(18,1), 87(1), 89(2), 90(*), 91(2), 97(5), 103(1).

46. *Micropterus punctulatus*: 1(11), 2(2), 3(1), 5(1), 6(*), 7(7), 10(3), 18(4), 23(1), 26(2), 27(1,2), 28(3), 32(1,1), 38(21), 39(2), 40(7), 46(3,1), 47(2,32), 48(7), 49(19), 52(5), 60(21), 67(3), 77(7,1), 76(3,1), 78(2,2), 89(3), 90(*), 91(1,3,1), 97(3).

47. *Micropterus salmoides: 3(1), 24(1),* 25(3), 32(1), 40(1), 47(1), 48(1), 54(1), 56(1), 60(1), 76(1), 91(*).

48. *Pomoxis annularis*: 38(1).

49. *Etheostoma baileyi*: 7(3), 10(2), 15(15), 18(5), 24(1), 26(1,2), 27(1), 32(8,3), 36(4), 38(10), 40(6), 46(20,7,100+), 47(9,18), 48(3), 49(8), 50(3), 53(1), 60(7), 67(7), 68(15,5), 76(1,7,20,15), 78(11,2), 85(1), 87(1), 89(14), 91(1,6), 96(10), 97(5), 98(5), 99(1).

50. *Etheostoma blennioides*: 12(*), 14(*), 18(1), 24(1), 26(1), 27(4,1), 32(3,4), 38(6), 40(26), 46(1,1), 47(2), 51(1,5), 53(1), 76(3,1,1,13).

51. *Etheostoma caeruleum*: 18(47), 21(87), 23(18), 25(10), 26(1), 27(8,52), 28(41), *29(4),* 32(56,42), 34(11,3), 36(32), 37(3), 38(290), 40(1), 46(10,100+), 47(1), 76(10,1), 77(*), 78(2,4), 86(3), 91(4),

52. *Etheostoma kennicotti*: 1(4), 2(1), 4(*), 5(2), 6(*), 7(20), 8(*), 10(18), 13(2), 13(58), 14(8), 15(39), 16(9), 18(2), 24(67), 26(5,105), 27(43,5), 28(14), 29(4), 32(16,5), 33(*), 34(24,2), 36(67), 37(1), 38(7), 40(7), 41(7), 46(35,8,17), 47(5,17), 48(20), 49(20), 50(19), 51(29,6), 52(3), 53(8), 54(7), 55(12), 56(29), 57(*), 58(9), 59(4), 60(40), 61(20), 62(*),63(37), 64(*), 67(6), 68(32,5), 69(47), 70(*), 76(40,25,35,4), 77(*), 78(35), 79(22), 80(11), 85(4), 86(11), 87(36), 88(*), 89(4), 91(6), 92(7), 93(3), 94(40), 95(7), 96(5), 97(1), 98(5), 99(1), 107(16), 108(27).

53. *Etheostoma nigrum susanae:* 1(*), 5(5), 7(*).

54. *Etheostoma sagitta sagitta:* 1(1), 1(10), 4(*), 7(21), 10(8), 13(2), 13(10), 14(8), 15(7), 16(2), 24(3), 27(15), 29(1), 32(6), 34(2,2), 36(6), 41(1), 46(7,2,13), 47(4,6), 48(1,6), 49(2), 51(5,11), 52(1), 53(1), 54(5), 55(10), 56(7,18), 58(7), 60(40), 61(7), 62(*), 63(3), 66(1), 68(11,6), 69(5), 70(*), 73(8), 76(1,7,7), 78(1), 86(3), 91(4,3), 92(4), 94(17), 95(1), 96(3), 97(1), 98(2), 99(7), 103(1), 107(7), 108(7).

56. *Percina caprodes:* 1(1), 5(*), 18(3), 24(1), 26(2,5), 27(4,1), 32(1,2), 38(8), 40(4), 42(*), 47(3), 78(2).

57. *Percina maculata*: 5(*), 7(3), 13(1), 15(1), 26(1,2), 32(1), 38(2), 40(3), 49(1), 56(1), 61(2), 78(*), 96(1).

58. *Stizostediom vitreum*: 38(1).

Collection Localities

1. Jellico Creek 1/4 mile upstream from intersection with Jellico Creek Rd., Scott Co., TN. JTBaxter, RBEvans, CJPaxton. 8 September 1995. 16(12), 20(13), 23(7), 25(2), 38(1), 39(10), 42(4), 43(3), 46(5), 52(11), 54(1), 56(1).

Jellico Creek at junction of Jellico Creek Road and Gum Creek Road, Scott Co., TN. 18 February, 1968. Wilson, Stiles, Etnier. DAE 68-28TN. 52(4), 54(10).

2. Gum Fork from mouth upstream 100 m, Scott Co., TN. 5 May 1996. JTBaxter, DAEtnier, RBEvans, CJPaxton. 23(10), 38(2), 39(15), 46(2), 52(1).

3. Gum Fork ca. 0.6 road miles below lowest bridge on Gum Fork Rd., Scott Co., TN. 5 May 1996. JTBaxter, DAEtnier, RBEvans, CJPaxton. 23(3), 38(1), 39(7), 42(1), 43(1), 46(1), 47(1).

4. Gum Fork at mouth of Childers Creek, Scott Co., TN. (O'Bara, 1985). 4(*), 18(*), 19(*), 20(*), 23(*), 24(*), 52(*), 54(*).

5. Jellico Creek 300 m reach from 100 m below mouth of Gum Fork to 200 m above mouth, Scott Co., TN. 5 May 1996. JTBaxter, DAEtnier, RBEvans, CJPaxton. 4(2), 16(1), 20(5), 25(4), 27(1), 38(6), 39(9), 42(1), 43(1), 46(1), 52(2), 53(5), 56(*), 57(*).

6. Jellico Creek at mouth of Long Fork, Scott Co., TN. (O'Bara, 1985). 20(*), 23(*), 24(*), 40(*), 42(*), 43(*), 46(*), 52(*).

7. Capuchin Creek downstream of confluence with Trammel Branch, approximately 0.2 miles S of TN/KY state line, Campbell Co., TN. 22 June 1994. TWRA. 4(11), 16(177), 20(16), 23(12), 25(9), 38(4), 39(19), 43(11), 46(7), 49(3), 52(20), 54(21), 57(3).

8. Hatfield Creek at mouth of Trammel Creek, Campbell Co., TN. (O'Bara, 1985). 4(*), 23(*), 25(*), 43(*), 52(*).

9. Unnamed tributary to Capuchin Creek, unnumbered gravel road crossing, first tributary north of Lawson Branch, ca. 8.0 air miles W of Jellico, Campbell Co., TN. 20 March 1979. BMBauer, WDickerson, Harris. 18(*).

10. Capuchin Creek at Scott/Campbell Co. line, Scott Co., TN. 24 June 1994. TWRA. 18(3).

Capuchin Creek 1/4 mile W of Scott/Campbell Co. line, Scott Co., TN. 8 September 1995. JTBaxter, RBEvans, CJPaxton. 18(~100), 23(~100), 24(11), 25(3), 38(7), 46(3), 49(2), 52(18), 54(~80).

11. Lawson Branch, entire length. Scott Co., TN. (O'Bara, 1985). 18(*), 23(*).

12. Capuchin Creek at mouth of Trammel Branch, Scott Co., TN. (O'Bara, 1985). 20(*), 23(*), 24(*), 25(*), 50(*), 52(*), 54(*).

13. Trammel Branch, entire length. Scott Co., TN. (O'Bara, 1985). 23(*), 54(*).
Trammel Branch, tributary to Hatfield Creek, at county road 5.0 miles W of Jellico, Campbell Co., TN. 16 April 1977. 18(1), 23(1), 24(1), 52(2), 54(2).

Trammel Branch, tributary to Capuchin Creek, 5.8 air miles W of Jellico, at unnumbered road crossing (first left off county road 2345 after Newcomb), Campbell Co., TN. 24 September 1978. BHBauer, RTBryant, JLHarris. DAE 78-52TN. BHB 78-60, JLH 78-17. 4(5), 18(8), 20(3), 23(44), 24(4), 39(3), 52(58), 54(10), 57(1).

14. Trammel Creek (=Trammel Branch), entire length, Campbell Co., TN. (O'Bara, 1985). 4(*), 23(*), 24(*), 43(*), 50(*), 52(*), 54(*).
Trammel Branch at Capuchin Creek Road crossing, Campbell Co., TN. 23 June 1994. TWRA. 18(16), 23(96), 24(4), 52(8), 54(8).

15. Hatfield Creek approximately 0.3 road miles downstream of Hatfield-Baird Creek confluence, Campbell Co., TN. 24 June 1994. TWRA. 4(47), 16(38), 18(7), 20(2), 23(31), 24(8), 25(11), 38(1), 39(5), 49(15), 52(39), 54(7), 57(1).

Hatfield Creek at mouth of Baird's Creek, Campbell Co., TN. (O'Bara, 1985). 4(*), 18(*), 20(*), 23(*), 25(*), 52(*), 54(*).

Baird's Creek at mouth, Campbell Co., TN. (O'Bara, 1985). 4(*), 20(*), 22(*), 23(*), 52(*).

Baird Creek and Hatfield Creek, Campbell Co., TN. 7 March 1981. WAPORA, Inc., Project 524. 18(*), 23(*), 24(*), 52(*).

16. Baird Creek approximately 400 m upstream from confluence with Hatfield Creek, Campbell Co., TN. 23 June 1994. TWRA. 4(3), 18(2), 23(27), 24(3), 25(3), 52(9), 54(2).

17. Hatfield Creek at Jellico Creek Rd., Campbell Co., TN. 8 September 1995. JTBaxter, RBEvans, CJPaxton. 23(38).

18. Elk Fork upstream and downstream of bridge on entrance road to Indian Mountain State Park, Jellico, Campbell Co., TN. 17 July 1991. TWRA. 4(38), 7(1), 12(4), 16(10), 20(11), 23(3), 25(28), 27(13), 39(39), 40(13), 42(3), 43(14), 46(4), 49(5), 50(1), 51(47), 52(2), 56(3).

19. Elk Fork Creek, mile 1.4 (near KY line), Campbell Co., TN. 15 March 1983. DMelgaard, JWojtowicz, ADMcKinney. 16(*).

Elk Creek on road between Jellico and Pioneer, Campbell Co., TN. 30 November 1968. DAE 68-138TN. 4(1), 12(138), 20(18), 49(1), 50(2), 52(18), 54(3), 56(2), 57(5).

20. Fall Branch tributary to Elk Fork Creek, 50 ft upstream of Wooldridge Rd. crossing, Campbell Co., TN. 14 July 1994. TWRA. 18(28), 23(126).

21. Crooked Creek from 500 ft. below first Wooldridge Rd. crossing to road crossing, Campbell Co., TN. 14 July 1994. TWRA. 4(49), 22(22), 23(22), 25(3), 42(1), 51(87).

22. Left Fork of Crooked Creek, Campbell Co., TN. 14 July 1994. TWRA. 18(*)

23. Burnt Pone Creek at third road crossing and upstream 500 ft, Campbell Co., TN. 27 July 1994. TWRA. 22(7), 23(78), 24(19), 39(4), 42(10), 46(1), 51(18).

24. Elk Fork Creek 3.2 air miles S of Kentucky border at 84 10' W, Campbell Co., TN. 11 June 1969. Stile Bouchard, Etnier. 4(5), 7(29), 12(7), 20(88), 23(22), 25(3), 43(2), 47(1), 49(1), 50(1), 52(67), 54(3), 56(1).

25. Whistle Creek approximately 125 ft. downstream of Capuchin Rd. crossing, Campbell Co., TN. 12 July 1994. TWRA. 21(1), 22(1), 23(99), 24(9), 39(24), 40(33), 41(1), 42(5), 47(3), 51(10).

26. Elk Fork Creek just below junction with Little Elk Fork Creek, Campbell Co., TN. 11 June 1969. Bouchard, Stiles, Etnier. 4(1), 7(5), 12(5), 13(12), 20(6, reported as *Pimephales vigilax*), 23(2), 25(2), 38(1), 43(1), 49(2), 50(1), 52(105), 54(7), 56(5), 57(2).

Elk Fork Creek 1/4 mile below junction with Little Elk Fork Creek, Campbell Co., TN. 28 March 1974, WCStarnes et al. 12(3), 20(85), 25(3), 38(2), 41(1), 43(3), 46(2), 49(1), 51(1), 52(8), 56(2), 57(1).

27. Elk Fork below mouth of Little Elk Fork at Webb Lane bridge, Campbell Co., TN. 18 July 1996. JTBaxter, RBEvans, SLHammons, BDHart, CJPaxton, BTarbert. 4(33), 6(2), 7(1), 12(5), 16(48), 20(22), 23(7), 25(16), 27(11), 38(3), 39(25), 43(5), 45(5), 46(2), 50(1), 51(52), 52(5), 56(1).

Elk Fork Creek above and below confluence with Little Elk Fork Creek, Campbell Co., TN. 13 July 1994. TWRA. 4(63), 7(1), 13(1), 16(40), 20(22), 23(2), 25(13), 38(2), 39(11), 40(1), 42(1), 43(3), 46(1), 49(1), 50(4), 51(8), 52(43), 54(15), 56(4).

28. Little Elk Creek 200 ft. upstream from confluence with Elk Fork Creek, Campbell Co., TN. 13 July 1994. TWRA. 4(11), 16(2), 20(2), 23(4), 24(2), 25(6), 39(21), 40(1), 41(1), 42(1), 43(14), 46(3), 51(41), 52(14).

29. Little Elk Fork at Little Elk Fork Rd., near Baird Cemetery, Campbell Co., TN. 18 July 1996. JTBaxter, RBEvans, SLHammons, BDHart, CJPaxton BTarbert. 4(9), 12(14), 20(14), 23(25), 24(1), 25(3), 39(5), 40(4), 42(2), 43(2), 51(4), 52(4), 54(1), *Lepomis* sp.(*cyanellus* x *auritus*??)

30. Barley Creek (=Barley Branch) at mouth, Campbell Co., TN. (O'Bara, 1985). 22(*).

31. Little Elk Fork Creek headwaters, Campbell Co., TN. (O'Bara, 1985). 23(*), 24(*).

29. Elk Fork at Wilkens Rd. crossing, Campbell Co., TN. 18 July 1996. JTBaxter, RBEvans, SLHammons, BDHart, CJPaxton, BTarbert. 4(12), 12(3), 13(4), 20(13), 23(3), 25(10), 27(1), 38(3), 39(11), 43(5), 45(2), 46(1), 49(3), 50(4), 51(42), 52(5), 56(2).

Elk Fork along Hwy 297, just downstream of William Manis Bridge on Lone Road, near stream mile 9.4, Campbell Co., TN. 1 November 1991. TWRA. 4(19), 12(51), 16(68), 20(31), 23(19), 25(21), 27(4), 38(4), 39(2), 40(1), 42(4), 43(30), 45(1), 46(1), 47(1), 49(8), 50(3), 51(56), 52(16), 54(6), 56(1), 57(1).

33. Elk Creek (=Elk Fork) at Elk Valley, Campbell Co., TN. (O'Bara, 1985). 4(*), 12(*), 18(*), 19(*), 20(*), 22(*), 23(*), 24(*), 25(*), 29(*), 43(*), 52(*).

34. Lick Fork at bridge crossing on John Baird Rd., Campbell Co., TN. 20 July 1994. TWRA. 4(43), 13(8), 18(135), 20(11), 23(44), 24(2), 25(1), 39(20), 42(1), 51(11), 52(24), 54(2).

Lick Fork at John Baird Rd., Campbell Co., TN. 18 July 1996. JTBaxter, RBEvans, SLHammons, BDHart, CJPaxton, BTarbert. 4(40), 18(23), 23(47), 24(3), 25(1), 51(3), 52(2), 54(2).

Lick Creek (=Lick Fork) at mouth, Campbell Co., TN. (O'Bara, 1985). 22(*), 23(*).

35. Coontail Branch above Hwy. 2967 crossing, Campbell Co., TN. 1 July 1994. TWRA. 18(*).

36. Terry Creek from just downstream of Hwy. 297 crossing to bridge crossing on Terry Creek Road, Campbell Co., TN. 1 July 1994. TWRA. 4(31), 13(25), 18(15), 20(5), 23(90), 24(5), 25(7), 43(1), 49(4), 51(32), 52(67), 54(6).

37. Crouches Creek approximately 0.75 miles upstream from mouth, Campbell Co., TN. 28 July 1994. TWRA. 4(5), 20(1), 22,(46) 23(69), 51(3), 52(1).

38. Clear Fork near water pumping station for Jellico Stone Co. near Highcliff, Campbell Co., TN. 27 October 1994. TWRA. JTB 94-01. 1(1), 4(25), 6(20), 7(24), 12(29), 16(434), 17(3), 20(90), 25(18), 27(19), 30(34), 38(12), 39(6), 40(3), 41(9), 42(24), 43(74), 45(9), 46(21), 48(1), 49(10), 50(6), 51(290), 52(7), 56(8), 57(2), 58(1).

39. Clear Fork, 2.3 road miles N of Hwy 90 on US 25W, Campbell Co., TN. 23 April 1989. DAEtnier, MAEtnier, WEve, SEMcClain. 6(1), 7(1), 17(5), 20(many), 27(2), 43(many), 46(2).

40. Clear Fork at mouth of Primroy Creek, Campbell Co., TN. 9 August 1990. TWRA. 4(4), 6(3), 12(2), 16(25), 17(4), 20(29), 24(1), 25(9), 27(34), 30(5), 32(9), 38(6), 39(6), 40(2), 42(2), 43(11), 45(5), 46(7), 47(1), 49(6), 50(26), 51(1), 52(7), 56(4), 57(3).

41. Primroy Creek at mouth and approximately 200 ft. upstream, Campbell Co., TN. 9 August 1990. TWRA. 4(2), 22(19), 23(27), 52(7), 54(1).

42. Clear Fork at turnoff on US 25W 0.2 rd. mi. S of old VFW Post, Campbell Co., TN. 4(*), 6(*), 16(*), 20(*), 42(*), 45(*), 46(*), 49(14), 56(1 YOY).

43. Clear Fork at Hwy 90 bridge, Campbell Co., Tn. 5 August 1997. JTBaxter, RBEvans, CJPaxton. 4(15), 6(118), 16(296), 17(2), 20(99), 23(2), 25(6), 27(2), 38(1), 40(5), 43(8), 45(3), 46(3), 49(2), 51(2), 52(2).

44. Hickory Creek at mouth of White Oak Creek, Campbell Co., TN. 30 May 1997. JTB, RBE, CJP. 6(*), 16(*), 17(1), 20(*).

45. No Business Creek, tributary to Hickory Creek, at US 25W, Campbell Co., TN. 20 July 1995. JTBaxter, CESkelton. 4(2), 20(10), 22(3), 23(100), 49(5), 52(5), 54(2).

No Business Creek at US 25W, Campbell Co., TN. 28 March 1974. WCStarnes et al. 6(1), 22(15), 23(40), 50(1), 52(10), 54(23), 57(2).

Lowe & Wolfe. 29 April 1975. 54(13)

LStarnes, TVA. 2 November 1977. 31(1)

No Business Creek at US 25W. 14 October 1981 and 30 June 1982. 22(1), 23(27), 24(7), 25(1), 52(15), 54(204).

No Business Creek at mouth, Campbell Co., TN. (O'Bara, 1985). 22(*), 23(*), 24(*), 52(*), 54(*).

No Business Branch approximately 400 yards upstream from the mouth. Campbell Co., TN. 27 July 1994. TWRA. 22(9), 23(102), 52(16), 54(3).

No Business Creek at US 25W, Campbell Co., TN. 17 November 1974. Starnes, Boronow, Gregory. DAE 74-14TN. 22(1), 54(14).

No Business Creek at US 25W, 1.6 mi. S of intersection with Hwy. 90(TN), Campbell Co., TN. 30 June 1982. PWS 820630-3. JR & PWShute, DEasson, WPennington, JA & CELouton, WCDickinson. 22(11), 23(54), 52(13), 54(2).

46. Laurel Fork at mouth, Campbell Co., TN. (O'Bara, 1985). 20(*), 22(*), 23(*), 25(*), 52(*), 54(*).

Laurel Fork approximately 400 ft upstream from mouth, Campbell Co., TN. 28 July 1994. TWRA. 4(17), 6(2), 12(9), 16(114), 20(5), 22(5), 23(16), 25(7), 38(1), 39(4), 42(1), 43(1), 45(2), 46(3), 49(20), 50(1), 51(10), 52(35),54(7).

Laurel Fork, tributary to Hickory Creek, at US 25W, Campbell Co., TN. 20 July 1995. JTBaxter, CESkelton. 4(27), 12(3), 16(119), 20(5), 22(5), 23(20), 25(2), 27(2), 38(2), 42(4), 49(7), 50(9), 52(8), 54(2).

Laurel Fork, tributary to Hickory Creek, at US 25W crossing, Campbell Co., TN. 7 August 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(26), 6(5), 12(2), 16(25),

20(8), 22(4), 23(5), 25(6), 27(1), 38(1), 39(3), 40(1), 42(17), 45(3), 46(1), 49(100+), 50(1), 51(100+), 52(17), 54(3), *Etheostoma caeruleum* X *E.sagitta* hybrid .

47. Hickory Creek, 4.1 road miles S of junction of Hwy 90 and US 25W. Campbell Co., TN. 15 May 1991. DAE 91-11. DAEtnier, et al. 4(15), 6(16), 12(19), 16(134), 20(32), 23(5), 24(1), 25(8), 27(29), 42(2), 43(1), 45(2), 46(2), 49(9), 52(5), 54(4).

Hickory Creek at Chaska. Approximately 250 m reach upstream from Chaska Rd. bridge. Campbell Co., TN. 25 October 1994. TWRA. JTB 94-02. RDBivens, CWilliams, BCarter, SJFraley, JTBaxter. 4(165), 6(37), 12(12), 16(213), 20(10), 25(29), 27(59), 30(8), 38(24), 39(15), 42(11), 43(67), 45(9), 46(32), 47(1), 49(18), 50(2), 51(1), 52(17), 54(6), 56(3).

48. Hickory Creek from Rock Creek Rd. bridge to confluence of Hickory and Stinking Creeks, Campbell Co., TN. 18 October 1994. TWRA. 4(31), 6(28), 12(3), 20(7), 23(1), 25(15), 27(8), 38(6), 39(5), 42(1), 43(2), 45(10), 46(7), 47(1), 49(3), 52(20), 54(6).

Hickory Creek at southerly bridge on US 25W, Campbell Co., TN. 13 October 1970. DAEtnier and UT Ecology Class. DAE 70-14TN. 23(3), 54(1).

Hickory Creek at intersection of US 25W and Stinking Creek Rd., Campbell Co., TN. 6 August 1997. JTBaxter, RBEvans, CJPaxton, CESkelton. 4(17), 6(47), 16(345), 15(1), 25(1), 45(8), 50(1).

49. Stinking Creek at secondary road bridge, just upstream of Stinking Creek School, Campbell Co., TN. 2 August 1990. TWRA. 4(331), 6(8), 13(2), 16(49), 20(70), 22(10), 23(8), 25(66), 27(16), 38(8), 39(7), 40(3), 42(10), 43(6), 45(11), 46(19), 49(8), 52(20), 54(2), 57(1).

50. Laurel Branch at Old Stinking Creek Rd., behind Stinking Creek Baptist Church, 100 m reach upstream from bridge. 18 May 1996. JTBaxter, SJFraley. 4(102), 6(14), 12(4), 16(1), 20(32), 22(54), 23(21), 25(7), 27(20), 33(1), 38(1), 39(3), 45(1), 49(3), 52(19).

51. Stinking Creek, 0.9 miles W of New Liberty Baptist Church on Stinking Creek Rd., Campbell Co., TN. 23 October 1973. WMSeawell. 4(1), 13(1), 23(5), 38(1), **50(1)**, 52(29), 54(5).

Stinking Creek upstream of wooden bridge at New Liberty Church, Campbell Co., TN. 3 August 1990. TWRA. 4(21), 6(12), 13(21), 16(1), 20(1), 23(22), **25(1)**, 38(16), 39(19), 42(1), 43(22), 45(5), 50(5), 52(6), 54(11).

52. Stinking Creek downstream from Owen Branch, Campbell Co., TN. 10 September 1995. JTBaxter, RBEvans, JCHill, CJPaxton. 6(7), 13(8), 20(8), 23(38), 25(1), 27(1), 29(2), 38(2), 39(1), 42(10), 43(11), 45(1), 46(5), 52(3), 54(1).

53. Stinking Creek 1.0 road miles upstream of Adams Hollow Rd., Campbell Co., TN. 20 July 1995. JTBaxter, CESkelton. 4(9), 6(11), 13(4), 16(5), 20(8), 38(1), 39(27), 49(1), 50(1), 52(8), 54(1).

54. Stinking Creek off of Stinking Creek Rd., ca. 2.5 road miles E of I-75, 150 m reach, Campbell Co., TN. 10 September 1995. JTBaxter, RBEvans, JCHill, CJPaxton. 4(5), 6(54), 13(240), 16(1), 20(115), 23(110), 24(3), 25(21), 38(2), 39(12), 43(15), 46(1), 47(1), 52(7) 54(5)

55. Big Branch, 50 m reach upstream from bridge crossing, Campbell Co., TN. 18 May 1996. 4(28), 22(14), 23(45), 24(1), 33(1), 52(12), 54(10).

56. Stinking Creek at confluence with Big Branch, Ron Baird property, 300 m reach upstream from Big Branch, Campbell Co., TN. 18 May 1996. JTBaxter, SJFraley. 4(20), 6(1), 13(31), 20(8), 22(10), 23(80), 24(5), 25(9), 33(1), 38(15), 39(65), 42(14), 43(8), 47(1), 52(29), 54(18), 57(1).

Stinking Creek, off I-75 north of Cove Lake at Stinking Creek Road exit, one mile on Stinking Creek road, take first road to right 500 yards to a small wooden bridge, Campbell Co., TN. 15 March 1975. JELowe and KSLowe. 54(7).

Stinking Creek at ford about one mile above Big Branch Campbell Co., TN. 11 April 1985. CFSaylor, RWallus, GHickman. 1(1).

57. Stinking Creek headwaters, Campbell Co., TN. (O'Bara, 1985). 23(*), 52(*).

58. Jennings Creek, Campbell Co., TN. 30 April 1989. DAE et al. 23(79), 52(9), 54(7).

59. Jennings Creek and Lower Broyles Branch, Campbell Co., TN. 2 May 1992. DAE et al. 23(184), 52(4).

60. Rock Creek approximately 100 ft upstream from confluence with Hickory Creek, Campbell Co., TN. 17 October 1994. TWRA. 4(97), 6(5), 12(1), 16(7), 20(3), 22(27), 23(41), 25(6), 39(7), 40(11), 42(5), 46(21), 47(1), 49(7), 52(40), 54(40).

61. Hickory Creek from bridge at L.C. Johnson property to confluence with Louse Creek, Campbell Co., TN. 20 May 1996. JTBaxter, BDHart. 4(23), 6(2), 20(1), 23(142), 24(2), 25(2), 27(12), 38(9), 39(14), 40(1), 42(5), 45(1), 52(20), 54(7), 57(2).

62. Louse Creek upstream from confluence with Hickory Creek, 100 m reach, Campbell Co., TN. 20 May 1996. JTBaxter, BDHart. 4(*), 22(*), 23(*), 25(*), 38(*), 39(*), 45(*), 52(*), 54(*).

63. Louse Creek between Jim Branch and Bruce Hollow, Campbell Co., TN. 39 November 1992. DAEtnier, DJEisenhour, MHHughes, PAMyer, JANegus. 22(23), 23(420), 24(27), 25(1), 42(1), 52(37), 54(3).

64. Louse Creek headwaters, Campbell Co., TN. (O'Bara, 1985). 23(*), 52(*).

65. Hickory Creek above Hatmaker Branch, Campbell Co., TN. 6 August 1997. JTBaxter, RBEvans, CJPaxton, CESkelton. 6(35), 16(128), 20(25), 23(28), 27(3), 40(8), 42(3), 46(2).

66. Hickory Creek (=Davis Creek) at Habersham, along US 25W, Campbell Co., Tn. 13 March 1974. AEBogan, JFletcher, DAEtnier. DAE 74-55TN. 6(1), 20(15), 22(2), 23(6), 54(1).

Davis Creek at Habersham. (UTMISC 2-95) 12(*), 20(*), 22(*), 23(*), 25(*), 38(*), 45(*).

67. Lick Creek at mouth, Campbell Co., TN. (O'Bara, 1985). 23(*), 52(*).
Lick Creek, tributary to Hickory Creek, 400 ft upstream of mouth, Campbell Co., TN. 19 August 1994. TWRA. 4(29), 6(1), 12(18), 16(91), 20(37), 22(1), 23(2), 25(51), 38(13), 39(7), 43(1), 45(24), 46(3), 49(7), 52(6).

68. Davis Creek, tributary to Lick Creek, approximately 0.6 road miles downstream of Hog Camp Branch-Davis Creek confluence, Campbell Co., TN. 26 October 1994. TWRA. 4(157), 12(11), 16(4), 20(2), 22(5), 23(6), 25(38), 38(2), 39(4), 45(9), 49(5), 52(5), 54(6).

Lower Davis Creek, Campbell Co., TN. 30 November 1988. DAEtnier et. al. 4(214), 7(1), 12(12), 16(34), 20(109), 22(38), 25(93), 38(1), 45(3), 49(15), 52(32), 54(11).

69. Davis Creek ca. 1.5 road miles above 1st bridge on Davis Creek Rd., Campbell Co., TN. 11 July 1996. JTBaxter, RBEvans, BDHart, CJPaxton, DWSmith. 4(17), 20(6), 22(3), 23(132), 24(26), 25(19), 38(7), 42(1), 43(1), 45(1), 52(47), 54(5).

70. Davis Creek headwaters, Campbell Co., TN. (O'Bara, 1985). 18(*), 22(*), 23(*), 24(*), 54(*).

71. Sandlick Creek (=Sandlick Branch) at mouth, Campbell Co., TN. (O'Bara, 1985). 18(*), 22(*), 23(*), 52(*), 54(*).

72. Lower White Oak Creek from private road and most downstream bridge to approximately 600 ft. above mouth, Campbell Co., TN. 30 May 1997. JTB, RBE, CJP. 4(45), 6(20), 12(3), 16(17), 20(7), 22(1), 23(6), 25(6), 27(5), 39(1), 40(1), 42(1), 45(2), 46(3), 51(49), 52(2).

73. White Creek off Hwy 90, 1/2 mile from White Oak, Campbell Co., TN. 25 September 1975. JELowe, KSLowe. 54(8).

74. White Oak Creek above and below bridge crossing at Little White Oak Rd.,Campbell Co., TN. 26 July 1994. TWRA. 4(1), 20(1), 22(1), 23(92), 24(6), 42(30), 46(7).

White Oak Creek, 300 m reach below Little White Oak Rd., Campbell Co., TN. 30 May 1997. JTB, RBE, CJP. 22(1), 23(5), 42(1), 46(1).

75. White Oak, from Sugartree Branch to Sled Tree Rd., Campbell Co., TN. 30 May 1997. JTB, RBE, CJP. 4(*), 20(*), 22(*), 23(*), 24(*), 42(*), 46(*), 47(*).

76. Cumberland-Laurel Fork Creek, 2.7 miles NW of Rose Creek and TN 90, 8 miles NE of US 25W, Campbell Co., TN. 16 November 1975. WCStarnes, LBetson. DAE 75-22. 4(1), 6(8), 7(2), 12(1), 16(5), 20(18), 23(2), 25(3), 49(7), 50(1), 52(25).

Laurel Fork, S of Kentucky, Claiborne Co., TN. 14 July 1975. TN Game & Fish. (UTMISC 829). 6(4), 16(1), 49(1), 50(3), 52(40), 54(1).

Laurel Fork, tributary to Clear Fork at bridge crossing ca. 1.0 miles upstream of mouth, Campbell Co., TN. 1 August 1990. TWRA. 4(17), 6(2), 12(9), 16(114), 20(5), 22(5), 23(16), 25(7), 38(1), 39(4), 42(1), 43(1), 45(2), 46(3), 49(20), 50(1), 51(10), 52(35), 54(7).

Laurel Fork at Primroy Rd. bridge, Campbell Co., TN. 11 July 1996. JTBaxter, RBEvans, BDHart, CJPaxton, DWSmith. 4(131), 6(79), 12(24), 16(94), 20(84), 23(95), 25(38), 27(5), 33(1), 38(7), 40(3), 42(9), 43(1), 45(11), 46(1), 47(1), 49(15), 50(13), 51(1), 52(4), 54(1).

77. Unnamed tributary to Laurel Fork above Primroy Rd. bridge, Campbell Co., TN. 11 July 1996. JTBaxter, RBEvans, BDHart, CJPaxton, DWSmith. 22(*), 23(*), 51(*), 52(*).

Unknown tributary to Laurel Fork, Claiborne Co., TN. (O'Bara, 1985). 23(*), 33(*).

78. Tackett Creek off Hwy 90 near Ewing School, Campbell Co., TN. 25 September 1975. JELowe, KSLowe. 54(6).

Tackett Creek 0.6 road miles upstream of Hwy 90 at old ford site, Campbell Co., TN. 26 October 1990. TWRA. 4(180), 6(43), 12(22), 16(27), 20(35), 23(3), 25(39), 27(7), 29(3), 38(13), 40(3), 42(5), 43(5), 45(18), 46(2), 49(11), 51(2), 52(35), 54(35), 54(1), 56(2).

Tackett Creek at US 90 bridge, 300 m reach upstream from bridge, Campbell Co., TN. 10 September 1995. JTBaxter, RBEvans, JCHill, CJPaxton. 4(27), 6(24), 12(10), 16(44), 20(11), 23(2), 25(2), 27(2), 40(8), 42(4), 43(3), 45(1), 46(2), 49(2), 51(4).

Tackett Creek, Campbell Co., TN. 22 April 1988. TWRA Ellingron Ag Ctr. TVA-Robert Wallus (MISC 2-96) 4(*), 6(*), 16(*), 40(*), 49(*), 52(*), 56(*), 57(*).

79. Little Tackett Creek just above railroad crossing approximately 500 yds upstream from mouth, Claiborne Co., TN. 30 June 1994. TWRA. 18(1), 23(56), 52(22).

80. Little Tackett Creek, from ca. 2000 feet downstream of lowermost settling ponds to mouth. 18 November 1995. JTBaxter, DAEtnier, RBEvans, SJFraley, CHHeacock, CJPaxton. 18(5), 23(191), 40(10), 52(11).

81. Unnamed tributary to Little Tackett Creek approximately 300 ft downstream of Jeep Rd. crossing, Claiborne Co., TN. 4 November 1994. No species collected.

82. Cumberland-Anthras Creek (=Clear Fork at Anthras) at TN 90, 6.4 miles NE of US 25W (Morley), Campbell Co., TN. 16 November 1975. WCStarnes, LBetson. DAE 75-21. 12(1), 16(17), 20(37), 23(2), 38(1), 42(1), 49(1), 52(4).

84. Buffalo Creek at Buffalo Cr. Rd. crossing, Claiborne Co., TN. 5 August 1997. JTBaxter, RBEvans, CJPaxton. 4(66), 22(10), 23(109), 24(1), 25(4), 40(87), 46(1), 52(29).

86. Rose Creek off Hwy 90, Eagan, Claiborne Co., TN. 25 September 1975. JELowe, KSLowe. 54(*).

Rose Creek at Hwy 90 crossing, Campbell Co., TN. 15 June 1994. TWRA. 4(10), 20(1), 22(57), 23(56), 39(2), 51(3), 52(11), 54(3).

87. Buffalo Creek just upstream of bridge at Hwy 90, Claiborne Co., TN. 10 August 1990. TWRA. 4(34), 22(98), 23(152), 24(3), 25(23), 40(4), 45(1), 46(1), 49(1), 52(36).

88. Buffalo Creek headwaters, Claiborne Co., TN. (O'Bara, 1985). 18(*), 22(*), 23(*), 52(*).

89. Clear Fork above mouth of Buffalo Creek, Claiborne Co., TN. 11 July 1996. JTBaxter, RBEvans, BDHart, CJPaxton, DWSmith. 4(35), 6(5), 10(1), 12(49), 16(40), 20(17), 23(11), 24(1), 25(11), 27(6), 38(4), 40(15), 42(4), 43(11), 45(2), 46(3), 49(14), 52(4).

90. Clear Fork from mouth of Straight (Valley?)Creek to bridge at Straight Creek Rd., Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(, 12, 16, 23, 25, 40, 45, 46.

91. Straight Creek, tributary to Tackett Creek(Clear Fork), at Hwy 90, Campbell Co., TN. 21 November 1974. WCStarnes, UT Ichthyology Class. 6(2), 10(4), 12(5), 16(28), 20(5), 23(1), 46(1), 49(1).

Straight Creek at 2nd bridge crossing on Straight Creek Rd., Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(62), 12(11), 16(15), 22(4), 23(16), 25(1), 40(3), 42(1), 45(2), 46(1), 49(6), 51(4), 54(3).

Straight Creek at off road crossing near the powerline crossing upstream of the mouth, Claiborne Co., TN. 10 August 1990. TWRA. 4(45), 12(4), 20(13), 22(6), 23(23), 24(1), 25(10), 40(3), 42(2), 46(3), 52(6), 54(4).

Straight Creek at Clairfield, Claiborne Co., TN. (O'Bara, 1985). 4(*), 12(*), 16(*), 22(*), 23(*), 25(*), 40(*), 47(*), 52(*).

92. Straight Creek at confluence with Rock Creek, 250 m reach upstream from confluence, Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(55), 22(62), 23(114), 24(15), 40(5), 43(2), 52(7), 54(3).

Straight Creek at and below confluence with Rock Creek, Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(27), 20(7), 22(12), 23(30), 40(5), 54(1).

93. Rock Creek approximately 100 ft upstream of confluence with Straight Creek, Claiborne Co., TN. 15 June 1994. TWRA. 4(2), 22(1), 23(21), 40(1), 52(3).

Rock Creek upstream from confluence with Straight Creek, Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(1), 22(6), 23(15), 40(5).

94. Straight Creek, Claiborne Co., TN. 23 April 1989. DAEtnier, et. al. 4(85), 18(3), 20(15), 23(297), 24(1), 52(40), 54(17).

Straight Creek ca. 0.3 rd mi. from upper fork in Straight Creek Rd., Claiborne Co., TN. 12 October 1997. JTBaxter, RBEvans, BAMoody, CJPaxton. 23(503), 21(1).

95. Tracy Branch near confluence with Clear Fork, upstream to Hwy 90 bridge, Claiborne Co., TN. 17 June 1994. TWRA. 4(3), 20(1), 22(42), 23(40), 40(7), 52(7), 54(1).

96. Clear Fork above and below confluence with Tracy Branch, Campbell Co., TN. 17 June 1994. TWRA. 4(63), 10(10), 12(9), 16(42), 20(21), 22(23), 23(27), 24(2), 25(6), 27(1), 40(11), 42(2), 49(10), 52(5), 54(3), 57(1).

97. Clear Fork at mouth of Valley Creek, Claiborne Co., TN. 7 August 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(38), 12(17), 16(85), 20(37), 22(3), 24(6), 25(17), 27(2), 39(1), 42(9), 45(5), 46(3), 49(5), 52(1), 54(1), Lepomis sp. hybrid.

98. Valley Creek on Valley Creek Rd, ca. 0.9 road miles above confluence with Clear Fork, Claiborne Co., TN. 29 May 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(96), 20(3), 22(63), 23(32), 25(8), 42(1), 49(5), 52(5), 54(2).

Valley Creek at mouth, Claiborne Co., TN. (O'Bara, 1985). 4(*), 22(*), 23(*), 24(*), 25(*), 54(*).

99. Valley Creek along gravel road approximately 0.5 miles upstream of Clear Fork and upstream of coal yard, sample length approx. 200 ft., Claiborne Co., TN. 10 August 1990. TWRA. 4(178), 16(1), 20(6), 22(211), 23(22), 24(1), 25(4), 40(1), 49(1), 52(1), 54(7).

Valley Creek ca. 0.2 rd. mi. above mining site near mouth on Valley Creek Rd., just above rip-rap revetement, Claiborne Co., TN. 11 October 1997. JTBaxter, ELEtnier,

RBEvans, CJPaxton, CESkelton. 4(25), 12(6), 22(25), 23(19), 24(19), 25(17), 46(1), 49(7+ many YOY), 52(2).

100. Valley Creek at mouth of Bear Creek, Claiborne Co., TN. DAEtnier, et al. 12 May 1991. DAE 91-4. 4(96), 20(1), 22(40), 23(1), 24(1).

Valley Creek at mouth of Bear Creek, Claiborne Co., TN. JTBaxter, et al. 11 October 1997. 4(40), 22(166), 23(59), 25(1), 40(1).

Bear Creek at Valley Creek Rd. crossing, Claiborne Co., TN. 11 October 1997. CJP, CES. 4(3), 22(77), 23(18), 25(1).

101. Bear Creek, upstream from mouth, Claiborne Co., TN. DAEtnier, et al. 12 May 1991. 22(21), 23(2), 25(2).

Bear Creek, upstream from mouth, Claiborne Co., TN. CJPaxton, CESkelton. 11 October 1997. 4(3), 22(77), 23(18), 25(1).

Valley Creek at mouth of Bear Creek, Claiborne Co., TN. 11 October 1997. JTBaxter, ELEtnier, RBEvans. 4(40), 22(166), 23(59), 25(1), 40(1).

102. Valley Creek at Pigeon Roost Branch, Claiborne Co., TN. 7 August 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(2), 22(54), 23(37), 40(8).

Valley Creek at Pigeon Roost Branch, Claiborne Co., TN. 12 May 1991. DAEtnier, et al. 4(39), 22(75), 23(26), 24(3), 25(4), 27(1), *Lepomis cyanellus* X *L. macrochirus* hybrid.

103. Clear Fork at turnoff on US 25W ca. 0.2 road miles N of Valley Creek Rd., Claiborne Co., TN. 7 August 1996. JTBaxter, RBEvans, BDHart, CJPaxton. 4(10), 12(9), 16(4), 20(4), 22(7), 23(57), 24(3), 25(4), 40(4), 42(1), 45(1), 54(1).

104. Clear Fork just downstream from community of Pruden, Claiborne Co., TN. 17 June 1994. TWRA. 22(29), 23(32), 24(1).

105. Burrell Creek at Fork Ridge, Claiborne Co., TN. (O'Bara, 1985). 20(*), 23(*). Burrell Creek at mouth of Cabin Hollow, Claiborne Co., TN. 10 October 1997. JTBaxter, ELEtnier, CJPaxton, CESkelton. 4(13), 22(122), 23(149), 25(1).

106. Burrell Creek at Valley Cr. Rd. crossing, Claiborne Co., TN. 5 August 1997. JTBaxter, RBEvans, CJPaxton. 22(*), 23(*).

107. Little Yellow Creek near Fern Lake impoundment, Claiborne Co., TN. 8 December 1994. TWRA. 4(3), 18(30), 22(43), 23(151), 24(11), 42(4), 52(16), 54(2).

108. Little Yellow Creek, Claiborne Co., TN. 8 December 1994. TWRA. 18(33), 22(4), 23(174), 24(10), 52(27), 54(7).

Miscellaneous Collections.

Campbell Co., TN. 17 November 1974. Starnes, Boronow, Gregory. DAE 74-13TN. No good locality for this sample, notable for containing *Cyprinella spiloptera* (7) and *Ameiurus natalis*. (29). 4, 7, 12, 20, 23, 25, 29, 51, 52, 54.

Hickory Creek, Between Jellico and Lafollette, north of Lafollette, Campbell Co., TN. 7 June 1936. ARCahn (UTMISC 1084). 4, 8, 10, 12, 13, 20, 23, 43, 45.

VITA

John Tracy Baxter, Jr. (Bo) was born in Oak Ridge, Tennessee on 2 April 1969. He attended public schools in Norris, Tennessee, the Anderson County School System, where he graduated from Anderson County High School in May, 1987. He entered The University of Tennessee at Knoxville during August 1987, where in May, 1993 he received the Bachelor of Sciences in Zoology. He entered the Master's program at The University of Tennessee, Knoxville in August 1994, officially receiving the Master's degree in December, 1997.

He is presently working for Conservation Fisheries, Incorporated of Knoxville, Tennessee and planning to enter the PhD program in Ecology and Evolutionary Biology at The University of Tennessee in August, 1998.