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Fishes of the Middle Fork of the Kentucky River, Kentucky

FISHES OF THE MIDDLE FORK OF THE KENTUCKY RIVER, KENTUCKY¹

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Abstract

Distributional data are provided for 91 fish species from the Middle Fork of the Kentucky River (27 collecting sites).

Introduction

This contribution is a continuation of the work on Kentucky River drainage fishes (Branson and Batch 1983), and includes the results of fish inventories at 27 sites distributed from first-order streams to the confluence of the Middle Fork with the main Kentucky River. New distributional data for representatives of nine families, 27 genera, 64 species, and one hybrid combination (*Notropis rubellus* x *N. chrysocephalus*) are presented.

The Middle Fork of the Kentucky River is the smallest of the three headwater branches, having a drainage area only slightly in excess of 877 km². There are fewer large tributaries in this drainage than in the other two forks, many of which are very short and of relatively low water volume throughout much of the year. Like the South Fork, however, the Middle Fork has been severely impacted by strip-mine, farm, and urban pollution.

The records listed here for *Phoxinus erythrogaster* and *Etheostoma tippecanoe* are the first from the Middle Fork system.

Collecting Stations

The 27 numbered collecting stations and dates of sampling are listed below. In the annotated list that follows, species and specimens are referred to appropriate stations according to number. The species are numbered and arranged in the same sequence as they appear in the 1980 AFS checklist (Robins et al 1980). Species numbers followed by "A" either denote species for which published reports of occurrence from the Middle Fork system probably are in error, or (in the case of *Notropis rubellus* x *N. chrysocephalus*) a hybrid combination. The following abbreviations are used for the various collecting sites: SR=state road, US=U.S. highway, CR=county road, and KR=Kentucky state highway.

1. Sturgeon Creek, at CR 1071, Jackson-Owsley Co. line; 20 December 1971. Riffles and pools, 6.1-9.0 m wide, 20 cm-1.5 m deep; bottom of large rocks, gravel, sand. Species: 12,14,25,27,31-32,34-35,39,59,62,65,68,73-74,76,78,87.

2. Little Sturgeon Creek, just off SR 30, Travelers Rest, Owsley Co.; 22 January 1972. Riffles and pools, 7.6 m wide, 31 cm-0.9 m deep; bottom of bedrock, gravel, small rubble. Species: 12,14,20,25,35-36,39,43-44,49,63-64,72,76,78.

3. Sturgeon Creek at SR 587, Lee Co.; 29 April 1972. Riffles and pools, 0.0-12 m wide, 15 cm-1.2 m deep; bottom of gravel and small to medium-sized cobbles. Species: 12,14,25-27,31-32,35,39,44-45,55,64,66,72-74,76,78,81-83,85.

4. Sturgeon Creek, at SR 399, Lee Co.; 29 April 1972. Riffles and pools, 9.2-15 m wide, 15 cm-1.5 m deep; bottom of gravel and rock rubble. Species: 12,26-28,32,35,39,44,60,65,68,72,74,76,78,82-84.

5. Middle Fork of Kentucky River, at SR 708, Lee Co.; 24 June 1972. Riffles and pools, 24-31 m wide, 3

cm-1.3 m deep; bottom of gravel, small rubble, mud. Species: 12,14-15,22,25,27,31-32,35,37,39,44,48,59,62,64,69,74,76,78,82,84,86,89.

6. Twin Branch, 4.4 km W Oakdale, Breathitt-Lee co. line; 24 June 1972. Braided channel and pools, 9.2 m wide, 1.1-1.2 m deep; bottom of gravel, rubble and rocks. Species: 12,39,64.

7. Middle Fork of Kentucky River, at US 30, Breathitt Co.; 1 June 1972. Riffles and pools, 18.0-24 m wide, 25 cm-0.9 m deep. Bottom of gravel and rubble. Species: 1,12,14-15,17,19,22,25-27,31-32,35,37,39,43-44,49,64-65,67-68,71,74-76,78,80-84,86,89.

8. Small unnamed tributary of Middle Fork of Kentucky River, just off SR 315 above mouth of Punccheon Camp Creek, Breathitt Co.; 10 February 1973. Riffles and pools, 0.9-1.5 m wide, 15 cm-1.5 m deep; bottom of gravel, silt, organic debris. Species: 25,32,35,44,74.

9. Punccheon Camp Creek, at SR 315, Breathitt Co.; 10 February 1973. Riffles and pools, 1.8-4.6 m wide, 15 cm-1.5 m deep; bottom of gravel, silt, organic debris. Species: 12,14,25,27,31-32,35,39,44,74,78.

10. Turkey Creek, at CR 1114, Breathitt Co.; 3 March 1973. Riffles and pools, 4.6-7.6 m wide, 15 cm-0.9 m deep; bottom of gravel, rubble, silt. Species: 12,24,26-27,27A,28,31-32,34-35,39,43-44,49,67,74,76,78,81.

11. Burton Creek, at SR 38, Breathitt Co.; 3 March 1973. Riffles and pools, 3.0-6.1 m wide, 15.2 cm-1.0 m deep; bottom of gravel, rubble and large rocks. Species: 12,14,19,22,25-27,31-32,35,39,44,64,73-74,76,78,81.

12. Hell For Certain Creek, at SR 257, Leslie Co.; 14 April 1973. Riffles and pools, 6.1-9.0 m wide, 15 cm-1.2 m deep; bottom of gravel and small rubble. Species: 12,14,21,27,29,35,44,52,64,74,83.

13. Middle Fork of Kentucky River, 1.9 km north of Cowan, SR 931, Letcher Co.; 17 May 1979. Species: 12,14,27,35,39,44,73-74,81,87.

14. Bull Creek, at SR 257, Leslie Co.; 14 April 1973. Riffles and pools, 4.6-7.6 m wide, 15 cm-0.8 m deep; bottom of sand and gravel. Species: 14,27,31-32,35,49,74,83.

15. Cutshin Creek, at SR 699, Leslie Co.; 30 June 1973. Riffles and pools, 31 cm-0.9 m deep; bottom of sand, gravel, silt. Species: 12,14,20,25-29,35,39,43-44,48,72-74,78,81-83.

16. Raccoon Creek, at SR 80, Leslie Co.; 30 June 1973. Riffles and pools, 4.6-7.6 m wide, 15 cm-0.8 m deep; bottom of bedrock, organic litter, rubble, rocks. Species: 12,14,20,25-29,31-32,34-35,39,44,48,56,62,65,67,72-74,76,78-79,82,84,87.

17. Middle Fork of Kentucky River, at SR 80, Leslie Co.; 22 September 1973. Riffles and pools, 0.9 m-30 m wide, 15 cm-2.4 m deep; bottom of rubble and small rocks. Species: 12,16-17,19,25-27,27A,28-29,31-32,35,44,48-49,59-60,62,65,67-68,70,72-74,76,78,81-83,87,89-90.

18. Meadow Creek at Booneville, Owsley Co.; 25 October 1969. Species: 16,25,27,39,72-74,82-83.

19. Greasy Creek, at confluence with Middle Fork of Kentucky River, Leslie Co.; 17 November 1973. Riffles and pools, 6.0-10.7 m wide, 15 cm-1.3 m deep; bottom of gravel, sand, rubble. Species: 12,14,16,19,25,27-29,44,49,62,65,72-76,78,81-83.

20. Greasy Creek, at CR 2009, Leslie Co.; 23 October 1976. Riffles and pools, 15-21 m wide, 15-46 cm deep; bottom of gravel and small rocks. Species: 12,14,19,25,27,31-32,35,39,44,72-74,76,81-83.

21. Greasy Creek, 2.4 km E Chappell on Greasy Creek Road, Leslie Co.; 23 October 1976. Riffles and pools, 3.0-18 m wide, 15 cm-1.5 m deep; bottom of gravel, sand, rubble. Species: 2,12,14,25-30,35,44,47,62,65,67,73-76,78,81-82,87.

22. Laurel Fork of Greasy Creek, at Big Laurel, Harlan Co.; 23 October 1976. Riffles and pools, 3.0-4.6 m wide, 20-41 cm deep; bottom of large rocks, rubble, gravel. Species: 14,17,19,25-27,39,44,74,76,91.

23. Middle Fork of Kentucky River, just south of

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Stinnett via US 421, Leslie Co.; 1 April 1978. Riffles and pools, 11-13.7 m wide, 15-76 cm deep; bottom of sandstone, sand, gravel and large rock slabs. Species: 12,14,16,19,25-29,35,44,48,67,72-74,76,78,81-82,87.

24. Beech Fork of Middle Fork of Kentucky River, S of Mozell via US 421, Leslie Co.; 1 April 1978. Riffles and pools, 3.0-6.1 m wide, 15-77 cm deep; bottom of sandstone rubble. Species: 12,14,19,27,35, 38-39,44,47,67,72,74,76.

25. Beech Fork of Middle Fork of Kentucky River, at junction of US 421 and SR 221, Harlan Co.; 1 April 1978. Riffles and pools, 1.8-3.6 m wide, 15-61 cm deep; bottom of sandstone rubble. Species: 39.

26. Middle Fork of Kentucky River, at CR 1780, Leslie Co.; 2 April 1978. Riffles and pools, 6.1-11.0 m wide, 15 cm-1.1 m deep; bottom of sandstone rubble and gravel. Species: 12,14,19,25,27,31,35,39,44,48,55-56,60,62,65,68,72-74,76,81-82,87.

27. Buck Fork, at confluence with Sturgeon Creek, Lee Co.; 22 Feb. 1972. Riffles and pools, 4.6 m wide, 30-61 cm deep; bottom of rubble and gravel. Species: 12,19,22,25-27,31-32,35,44,48,55-56,59-60,62,65,67-68, 73,76,81-83.

Annotated List of Fishes

Collection localities are indicated by numbers, and in some cases these are followed (in parentheses) by numbers of specimens. The common and scientific names and numerical arrangement of species employed herein follow Robins et al (1980). Including the species reported here, 91 species of fishes are known from the Middle Fork of the Kentucky River, a fairly extensive list considering that Jones (1973) only reported 99 species from the entire Kentucky River drainage. Those species that are introduced or which were classified by Branson et al (1981) as endangered, threatened, status undetermined, etc. in Kentucky are so indicated following the species name.

Family Petromyzontidae (lampreys)

1. Ichthyomyzon bdellium (Jordan)--Ohio lamprey. Collections: 7(1). Previous records: Rohde and Lanteigne-Courchene in Lee et al (1980) - three localities mapped in Middle Fork system. Rare in Kentucky River drainage.

2. Ichthyomyzon fossor Reighard and Cummins - northern brook lamprey. Threatened.

Collections: 21(5). Previous records: Bauer and Branson (1979) - this collection: Rohde and Lanteigne-Courchene in Lee et al (1980) - one locality mapped in Middle Fork system.

3. Ichthyomyzon greeleyi Hubbs and Trautman - mountain brook lamprey. Status undetermined.

Collections: none. Previous records: Turner (1967) - Greasy Cr., Leslie Co.; Clay (1975) - below Buckhorn Reservoir Dam, Perry Co., and Buckhorn Reservoir, Leslie Co.

4. Lampetra (Okkelbergia) aepyptera (Abbott) - least brook lamprey.

Collections: none. Previous records: Clay (1975), Rohde and Lanteigne-Courchene in Lee et al (1980) (mapped). Rare in Kentucky River drainage (Walsh and Burr 1981).

5. Lampetra appendix (DeKay) - American brook lamprey. Special Concern.

Collections: none. Previous records: Turner (1967), Clay (1975), Rohde in Lee et al (1980) (mapped) - Greasy Cr., Leslie Co. This is the same species to which the specific name lamottei (or lamottenii) was formerly applied.

Family Lepisosteidae (Gars)

6. Lepisosteus osseus (Linnaeus) - longnose gar. Collections: none. Previous records: Turner (1959) - Middle Fk. near mouth of Bull Cr. and Cutshin Cr., Leslie Co.; Middle Fk., 3.2 km above Buckhorn Reservoir Dam, Perry Co.; Turner (1967), Charles (1967) - mouth of Greasy Cr., Leslie Co., and Buckhorn

Reservoir, Perry Co.; Jones (1973) - Middle Fk., Perry and Lee cos. The longnose gar is the only lepisosteid known from the Kentucky River drainage, where it is relatively uncommon.

Family Clupeidae (Herrings and Shads)

Two clupeids have been stocked in various reservoirs in the Middle Fork system (Charles 1967). Neither species is very common.

7. Dorosoma cepedianum (Lesueur) - gizzard shad. Collections: none. Previous records: Turner (1967) - Buckhorn Reservoir; Jones (1973) - Middle Fk., Perry and Lee cos.

8. Dorosoma petenense (Gunther) - threadfin shad. Collections: none. Previous records: Charles (1967), Turner (1967) - Buckhorn Reservoir. Adversely affected by cold winters.

Family Hiodontidae (Mooneyes)

Although mooneyes (Hiodon tergisus) were collected from the South Fork (Branson and Batch 1983), no hiodontids were taken from the Middle Fork.

9. Hiodon alosoides (Rafinesque) - goldeye. Collections: none. Previous records: none. Clay (1975) indicated species as "common in lower portion of Middle Fork."

Family Salmonidae (Trouts)

10. Salmo gairdneri Richardson - rainbow trout. Introduced.

Collections: none. Previous records: Jones (1973) - introduced in several Middle Fork tributaries, including Laurel Fk., Harlan and Leslie cos.

Family Esocidae (Pikes)

As in the South Fork (Branson and Batch 1983), there is only one esocid known from the Middle Fork system.

11. Esox masquinongy (Mitchill) - muskellunge. Special Concern.

Collections: none. Previous records: Crossman, in Lee et al (1980) - mapped from all three forks of the Kentucky River.

Family Cyprinidae (Carps and Minnows)

12. Camptostoma anomalum (Rafinesque) - central stoneroller.

Collections: 1-7, 9-13, 15-17, 19-21, 23-24, 26-27. Previous records: Woolman (1892), Turner (1967), Jones (1973), Harker et al (1979) - numerous localities.

13. Cyprinus carpio Linnaeus - carp. Introduced. Collections: none. Previous records: Harker et al (1979) - mouth of Squabble Cr. (Buckhorn Reservoir).

14. Ericymba buccata Cope - silverjaw minnow. Collections: 1-3, 5, 7, 9, 11-16, 19-24, 26. Previous records: Woolman (1892); Turner (1967); Jones (1973); Harker et al (1979); Burr, Retzer and Mayden (1980); Gilbert in Lee et al (1980) - numerous localities.

15. Hybopsis aestivalis (Girard) - speckled chub. Collections: 5(13), 7(6). Previous records: Wallace in Lee et al (1980) indicated above are only records for Middle Fork system. Not known from South Fork system (Branson and Batch 1983). Not presently included on Kentucky list of endangered or threatened biota, but probably should be listed as threatened, or even endangered, in the state.

16. Hybopsis amblops (Rafinesque) - bigeye chub. Collections 17(1), 18(1), 19(80), 23(1). Previous records: Woolman (1892) - Cutshin Cr. and Middle Fk., near Hyden; Turner (1967) - Greasy Cr. and Middle Fk., Leslie Co.; Jones (1973) - Middle Fk., Leslie Co., Harker et al (1979) - Greasy Cr., Leslie Co. Rare in most of upper Kentucky River drainage.

17. Hybopsis dissimilis (Kirtland) - streamline chub.

Collections: 7(3), 17(1), 22(1). Previous records: Turner (1967) - Greasy Cr., Leslie Co., and Middle Fk., Leslie, Perry and Breathitt cos.; Clay (1975) - Greasy Cr. and Middle Fk.; Harris in Lee et al (1980) (mapped) - Middle Fk. Records for this species are scarce and spotty throughout Kentucky.

18. Hybopsis storeriana (Kirtland) - silver chub.

Collections: none. Although known from the South Fk. (Branson and Batch 1983) and North Fk. (Gilbert in Lee et al 1980), there are no records of this species from the Middle Fk., although it probably occurs in the main stream.

19. Nocomis micropogon (Cope) - river chub.

Collections: 7, 11, 17, 19-20, 22-24, 26-27. Previous records: Woolman (1892), Lachner and Jenkins (1967), Turner (1967), Jones (1973), Harker et al (1979) - numerous records.

20. Notropis ardens Cope - rosefin shiner.

Collections: 2(abundant), 15(1), 16(abundant). Previous records: Jones (1973) - Cutshin Cr., Leslie Co.; Harker et al (1979) - Laurel Fk., Knott Co. Considering its abundance in the South Fork system (Branson and Batch 1983), this species is surprisingly scarce in the Middle Fork.

21. Notropis ariommus (Cope) - popeye shiner.

Collections: 12(1). Previous records: Woolman (1892) - Middle Fk. near Hyden; Turner (1967) - Greasy Cr., Leslie Co. and Middle Fork, Leslie, Perry and Breathitt cos.; Gilbert (1969), Clay (1975), Greasy Cr. and Middle Fk.; Harker et al (1979), Greasy Cr., Leslie Co.; Gilbert in Lee et al (1980) (mapped) - Middle Fork. Status presently undetermined, but probably should be listed as endangered in Kentucky.

22. Notropis atherinoides Rafinesque - emerald shiner.

Collections: 5, 7, 11, 27. Previous records: Charles (1967) - Buckhorn Reservoir; Turner (1967) - Greasy Cr. and Laurel Fk., Leslie Co., and Middle Fk., Leslie, Perry and Breathitt cos.; Jones (1973) - Greasy Cr.; Harker et al (1979) - Sturgeon Cr., Lee Co., and Squabble Cr., Perry Co.; Gilbert and Burgess in Lee et al (1980) (mapped) Middle Fk.

22A. Notropis blennioides (Girard) - river shiner.

Collections: none. The only records for this big-river fish from the upper Kentucky River drainage are those of Woolman (1892) from Bull and Cutshin creeks and the Middle Fork near Hyden. These records are almost certainly based on either Notropis stramineus or N. volucellus (or both), the species to which the name blennioides long was jointly and erroneously applied. The true N. blennioides does not occur in the upper Kentucky River drainage (Gilbert in Lee et al 1980), and almost certainly should be deleted from the present list.

23. Notropis boops Gilbert - bigeye shiner.

Collections: none. Previous records: Gilbert in Lee et al (1980) (mapped) - Middle Fk., but this record needs verification. We (Branson and Batch 1983) reported the bigeye chub as rare in the South Fork, and did not collect it at all from the Middle Fork.

24. Notropis burchanani Meek - ghost shiner.

Collections: none. Previous records: The only basis for inclusion of this species in the Middle Fork fauna is Clay's (1975) distributional statement. Since the ghost shiner is primarily a big-river minnow, its presence in the upper Kentucky River drainage is problematic.

25. Notropis chrysocephalus chrysocephalus (Rafinesque) - striped shiner.

Collections: 1-3, 5, 7-11, 15-23, 26-27. Previous records: Woolman (1892); Turner (1967); Resh, Hoyt and Neff (1971); Jones (1973); Harker et al (1979); Gilbert in Lee et al (1980) (mapped) - numerous localities. Earlier literature references refer to this species either as Notropis megalops or Notropis cornutus.

26. Notropis photogenis (Cope) - silver shiner.

Collections: 3-4, 7, 11, 15-17, 21-23, 27. Previous records: Turner (1967); Jones (1973), Harker et al (1979), Gilbert in Lee et al (1980) - numerous localities.

27. Notropis rubellus (Agassiz) - rosyface shiner.

Collections: 1, 3-5, 7, 9-24, 26-27. Previous records: Turner (1967), Jones (1973), Harker et al (1979), Gilbert and Burgess in Lee et al (1980) - numerous localities.

27A. Notropis rubellus x Notropis chrysocephalus.

Collections: 10(1), 17(2). Previous records: Harker et al (1979) reported this hybrid combination from Squabble Cr., at Buckhorn Reservoir, Perry Co.

28. Notropis spilopterus (Cope) - spotfin shiner.

Collections: 4, 10, 15-17, 19, 21, 23. Previous records: Turner (1967) - Greasy Cr., Leslie Co., and Middle Fk., Leslie, Perry and Breathitt cos.; Jones (1973) - Middle Fk., Perry, Lee and Leslie cos., Cutshin and Greasy creeks, and Laurel Fk., Harlan and Leslie cos.; Harker et al (1979) - Greasy Cr., Leslie Co.; Gilbert and Burgess in Lee et al (1980) (mapped) - Middle Fk. Based on our records, this species is only locally abundant in the Middle Fork.

29. Notropis stramineus (Cope) - sand shiner.

Collections: 12, 15-17, 19, 21, 23. Previous records: Turner (1967) - Greasy Cr., Leslie Co., and Middle Fk., Leslie and Perry cos.; Jones (1973), Middle Fk., Leslie Co., and Cutshin Cr.; Harker et al (1979), Greasy Cr., Leslie Co., and Squabble Cr., Perry Co.

30. Notropis telescopus (Cope) - telescope shiner.

Introduced. Collections: 21(1). Previous records: none. So far as we can discern, this is the only verified record of the telescope shiner from the Middle Fork system. The species is very common in the adjacent Cumberland River drainage.

31. Notropis volucellus (Cope) - mimic shiner.

Collections: 1, 3, 5-7, 9-11, 14, 16-17, 20, 26-27. Previous records: Turner (1967), Harker et al (1979), Gilbert and Burgess in Lee et al (1980) - numerous localities.

32. Notropis whipplei (Girard) - steelcolor shiner.

Collections: 1, 3-4, 7-11, 14, 16-17, 20, 27. Previous records: Woolman (1892), Charles (1967), Turner (1967), Harker et al (1979), Gilbert and Burgess in Lee et al (1980) - numerous localities. Woolman's (1892) records may apply entirely or in part to the closely related N. spilopterus, which at that time was not distinguished from N. whipplei.

33. Phenacobius mirabilis (Girard) - suckermouth minnow.

Collections: none. Previous records: Turner (1967) - Buckhorn Reservoir area (prior to impoundment), Leslie Co.; this record is in need of verification.

34. Phoxinus (Chrosomus) erythrogaster (Rafinesque) - southern redbelly dace.

Collections: 1(1), 10(4), 16(2). The collections reported here are the only ones from the Middle Fork system.

35. Pimephales notatus (Rafinesque) - bluntnose minnow.

Collections: 1-5, 7-17, 20-21, 23-24, 26-27. Previous records: Woolman (1892), Charles (1967), Jones (1973), Harker et al (1979), Lee and Shute in Lee et al (1980) - numerous localities.

36. Pimephales promelas (Rafinesque) - fathead minnow.

Collections: 2(2). Previous records: Charles (1967) - Buckhorn Reservoir; Jones (1973) - Middle Fk., Leslie Co.; Harker et al (1979) - Canoe Cr., Breathitt Co.; Lee and Shute in Lee et al (1980) (mapped) - Middle Fk.

37. Pimephales vigilax Baird and Girard - bullhead minnow.

Collections: 5(17), 7(22). Previous records: Turner (1967) - Greasy Cr., Leslie Co., and Buckhorn Reservoir area (before impoundment). Nowhere abundant in Kentucky River drainage.

38. Rhinichthys atratulus meleagris (Hermann) - blacknose dace.

Collection: 24(1). Previous records: Jones (1973) - Cutshin Cr., Leslie Co. Very rare in upper Kentucky River drainage.

39. Semotilus atromaculatus (Mitchill) - creek chub.

Collections: 1-7, 9-11, 13, 15-16, 18, 20, 22,

24-26. Previous records: Turner (1967), Jones (1973), Harker et al (1979), Lee and Platania in Lee et al (1980) - numerous localities.

Family Catostomidae (Suckers)

40. Carpiodes carpio (Rafinesque) - river carpsucker.

Collections: none. Although there are no published records of this species from the Middle Fork of the Kentucky River, the species probably occurs in the lower parts of the system.

41. Carpiodes cyprinus (Lesueur) - quillback.

Collections: none. Previous records: Charles (1967) - Buckhorn Reservoir; Turner (1967) - Greasy Cr., Leslie Co.; Jones (1973) - Middle Fk., Leslie and Perry cos.; Plantania and Jenkins in Lee et al (1980) - mapped in Middle Fork.

42. Carpiodes velifer (Rafinesque) - highfin carpsucker.

Collections: none. Previous records: Woolman (1892) - near Hyden; Turner (1967) - Greasy Cr., Leslie Co., and Middle Fk., Breathitt, Leslie and Perry cos. Because of difficulty of separating young of this species from those of C. carpio, the above records are tentative pending examination of specimens.

43. Catostomus commersoni (Lacepede) - white sucker.

Collections: 2, 7, 10, 15. Previous records: Woolman (1892), Jones (1973), Harker et al (1979), Lee and Kucas in Lee et al (1980) - numerous localities. Although relatively common in large headwater creeks, the white sucker is uncommon in larger streams.

44. Hypentelium nigricans (Lesueur) - northern hog sucker.

Collections: 2-5, 7-13, 15-17, 19-24, 26-27. Previous records: Woolman (1892), Turner (1959), Carter (1966), Charles (1967), Jones (1973), Harker et al (1979) - numerous localities. The most widespread and abundant sucker in the Middle Fork system.

45. Minytrema melanops (Rafinesque) - spotted sucker.

Collections: 3(4 immature). This appears to be the only published record for this species from the Middle Fork system.

46. Moxostoma anisurum (Rafinesque) - silver redbhorse.

Collections: none. Previous records: Charles (1967) - Buckhorn Reservoir; Turner (1967) - Buckhorn Reservoir area (prior to impoundment). These records need verification, particularly since Jenkins in Lee et al (1980) did not show localities from the Middle Fork system.

47. Moxostoma duquesnei (Lesueur) - black redbhorse.

Collections: 21(1), 24(1). Previous records: Turner (1967), Charles (1967) - Greasy Cr., Leslie Co., and Buckhorn Reservoir, Leslie and Perry cos.; Harker et al (1979) - Canoe Cr., Breathitt Co., and Greasy Cr., Leslie Co.; Jenkins in Lee et al (1980) - mapped in Middle Fork.

48. Moxostoma erythrurum (Rafinesque) - golden redbhorse.

Collections: 5, 15-17, 23, 26-27. Previous records: Turner (1967), Charles (1967), Jones (1973), Harker et al (1979), Jenkins in Lee et al (1980) - numerous localities.

49. Moxostoma macrolepidotum breviceps (Cope) - shorthead redbhorse.

Collections: 2, 7, 10, 14, 17, 19. Previous records: Woolman (1892) - Middle Fk. near Hyden; Turner (1967) - Greasy Cr., Leslie Co., and Middle Fk., Leslie and Perry cos.; Jenkins in Lee et al (1980) - mapped in Middle Fork.

Family Ictaluridae (bullhead catfishes)

50. Ictalurus furcatus (Lesueur) - blue catfish.

Collections: none. Previous records: The only basis for inclusion of this species is Clay's (1975) general statement regarding presence "from the lower Middle Fork."

51. Ictalurus melas (Rafinesque) - black bullhead.

Collections: none. Previous records: none.

Included here on the basis of scattered records from the uplands of Kentucky, including numerous records from the South Fork system (Branson and Batch 1983).

52. Ictalurus natalis (Lesueur) - yellow bullhead.

Collections: 12(1). Previous records: Turner (1967) - main stream in Leslie and Perry cos.; Charles (1967) - Buckhorn Reservoir; Jones (1973) - Cutshin Cr., Leslie Co.

53. Ictalurus punctatus (Rafinesque) - channel catfish.

Collections: none. Previous records: Turner (1959) - Greasy Cr., Leslie Co., Middle Fk., Perry and Leslie cos.; Charles (1967) - Greasy Cr., Leslie Co., Middle Fk., Breathitt, Leslie and Perry cos.; Jones (1973) - Middle Fk., Lee and Perry cos.

54. Noturus eleutherus Jordan - mountain madtom.

Collections: none. Previous records: Turner (1967) - Middle Fork system in Perry Co.; subsequently cited by Taylor (1969), Clay (1975), and Rohde in Lee et al (1980). This record requires verification.

55. Noturus flavus Rafinesque - stonecat.

Collections: 3(1), 26(1), 27(1). Previous records: Taylor (1969) - Middle Fk.; Harker et al (1979) - Sturgeon Cr., Lee Co.

56. Noturus miurus Jordan - brindled madtom.

Collections: 16, 26-27. Previous records: Woolman (1892) - Middle Fk. near Hyden; Turner (1967), Taylor (1969) - Middle Fk., Breathitt and Leslie cos. The brindled madtom does not appear to be as common in the Middle Fork as in the South Fork (Branson and Batch 1983).

57. Noturus nocturnus Jordan and Gilbert - freckled madtom.

Collections: none. Previous records: Turner (1967) - Middle Fk., in Buckhorn Reservoir area, Breathitt, Leslie and Perry cos.; record subsequently cited by Clay (1975) and Rohde in Lee et al (1980). Records needs verification.

58. Noturus stigmosus Taylor - northern madtom. Threatened.

Collections: none. Previous records: Clay (1975) - Middle Fk., Leslie Co.; mapped by Rhode in Lee et al (1980). Specimens said to be in University of Louisville fish collection (UL-11,868), but could not be located by us. This records needs verification.

59. Pylodictis olivaris (Rafinesque) - flathead catfish.

Collections: 1, 5, 17, 27. Previous records: Charles (1967) - Buckhorn Reservoir; Turner (1967) - Middle Fk., at confluence with Laurel Fork, Leslie Co., and Middle Fk., Leslie and Perry cos.; Jones (1973) - Middle Fk., Leslie and Perry cos.; Harker et al (1979) - Greasy Cr., 2.5 km above Chappell, Leslie Co. Although considered rare in the upper Kentucky River drainage, young are often collected from deep riffles over large rocks in the main stream.

Family Cyprinodontidae (Killifishes)

Family Poeciliidae (livebearers)

Although both Fundulus notatus (Cyprinodontidae) and Gambusia affinis (Poeciliidae) were collected in the South Fork system (Branson and Batch 1983), neither these nor any other members of the two families were collected during our work in the Middle Fork. No previous records are known for these groups from the system.

Family Atherinidae (Siversides)

60. Labidesthes sicculus sicculus (Cope) - brook silverside.

Collections: 4, 17, 26-27. Previous records: Turner (1959, 1967), Charles (1967), Lee in Lee et al (1980) - numerous localities.

Family Percichthyidae (Temperate basses)

61. Morone chrysops (Rafinesque) - white bass.

Collections: none. Previous records: Carter (1966), Charles (1967), Turner (1967) - Buckhorn Reservoir.

Family Centrarchidae (Sunfishes and Black basses)

62. Ambloplites rupestris (Rafinesque) - rockbass
Collections: 1, 5, 16-17, 19, 21, 26-27. Previous records: Woolman (1892), Turner (1959, 1967), Charles (1967), Jones (1973), Harker et al (1979) - numerous localities. Although there are a number of records of this species from the Middle Fork system, the species nevertheless appears to be less common here than for the upper Kentucky River drainage in general.

63. Lepomis cyanellus Rafinesque - green sunfish.
Collections: 2(2). Previous records: Turner (1959, 1967), Charles (1967), Lee in Lee et al (1980) (mapped) - Buckhorn Reservoir and vicinity. Since this is primarily a lowland fish, the paucity of records from upper areas of the Middle Fork system is not particularly surprising.

64. Lepomis macrochirus Rafinesque - bluegill.
Collections: 2-3, 5-7, 11-12. Previous records: Charles (1967), Turner (1967), Jones (1973), Harker et al (1979), Lee in Lee et al (1980) (mapped) - numerous localities. We took relatively few bluegills from small creeks, most of our specimens coming from large, relatively deep pools.

65. Lepomis megalotis (Rafinesque) - longear sunfish.
Collections: 1, 4, 7, 16-17, 19, 21, 26-27. Previous records: Woolman (1892), Turner (1959, 1967), Charles (1967), Jones (1973), Harker et al (1979), Baner in Lee et al (1980) (mapped) - numerous localities.

66. Lepomis microlophus (Günther) - redear sunfish. Introduced.
Collections: 3(1). This is the only published record for the redear sunfish from the Middle Fork system.

67. Micropterus dolomieu (Lacepede) - smallmouth bass.
Collections: 7, 10, 16-17, 21, 23-24, 27. Previous records: Woolman (1892), Turner (1959, 1967), Jones (1973), Harker et al (1979), Lee in Lee et al (1980) (mapped) - numerous localities.

68. Micropterus punctulatus (Rafinesque) - spotted bass.

Collections: 1, 4, 7, 17, 26-27. Previous records: Turner (1959, 1967), Charles (1967), Jones (1973), Harker et al (1979), Gilbert in Lee et al (1980) (mapped) - numerous localities.

69. Micropterus salmoides salmoides (Lacepede) - northern largemouth bass.
Collections: 5. Previous records: Charles (1967) - Buckhorn Reservoir; Jones (1973) - Middle Fk., Perry and Lee cos.; Cutshin Cr., Leslie Co.; Laurel Fk., Harlan and Leslie cos. Although the record from Buckhorn Reservoir likely is valid, specimens on which the other records are based should be reexamined (if available) in order to confirm that they were not based on the superficially similar spotted bass.

70. Pomoxis annularis Rafinesque - white crappie.
Collections: 17. Previous records: Turner (1959, 1967) - Buckhorn Reservoir; Jones (1973) - Middle Fk., Perry and Lee cos.

Family Percidae (Perches and Darters)

71. Ammocrypta pellucida (Agassiz) - eastern sand darter. Threatened.
Collections: 7(12). Previous records: Turner (1967) - Greasy Cr., Leslie Co.; Middle Fk., Perry and Leslie cos.; Clay (1975) - Little Goose Cr., Clay Co.; Warren (1981) - Greasy Cr. and Middle Fk., Leslie Co. There are few records for this species from the Kentucky River drainage, most of which are old. Although listed in the Threatened category by Branson et al (1981), this and other species of the genus Ammocrypta probably should be reassigned to Endangered status in Kentucky.

72. Etheostoma baileyi Page and Burr - emerald darter.
Collections: 3(4), 4(1), 15(1), 16(6), 17(4), 18(2), 19(4), 20(7), 23(6), 24(1), 26(2) (last two specimens now in University of Tennessee collection

[UT91.1610]). Page and Burr's (1982) recent description of this species did not include records from the Middle Fork of the Kentucky River. Although seasonally abundant and widespread in the Kentucky River drainage, there are few previously published distributional records for the Middle Fork. Previous records: Turner (1967) - Greasy Cr., Leslie Co.; Harker et al (1979) - Sturgeon Cr., Lee Co., Greasy and Cutshin creeks, Leslie Co., and Squabble Cr., Perry Co.

73. Etheostoma blennioides blennioides Rafinesque - greenside darter.

Collections: 1, 3, 11, 13, 15-21, 23, 26-27. Always captured along margins of riffles and chutes with well-developed stands of water willow. Previous records: Woolman (1892), Charles (1967), Turner (1967), Jones (1973), Harker et al (1979), Denoncourt in Lee et al (1980) (mapped) - numerous localities.

74. Etheostoma caeruleum Storer - rainbow darter.
Collections: 1, 3-5, 7-24, 26. As in the South Fork (Branson and Batch 1982), the rainbow and fantail darters are the dominant percids in the Middle Fork. Previous records: Woolman (1892), Jones (1973), Harker et al (1979), Stauffer and Hocutt in Lee et al (1980) (mapped) - numerous localities.

75. Etheostoma camurum (Cope) - bluebreast darter.
Collections: 7(3), 19(2), 21(3). Etheostoma camurum has a very discontinuous distribution in the upper Kentucky River drainage. There are few records from the Middle Fork. Previous records: Turner's (1967) records for E. maculatum from Greasy Creek, Leslie Co., and the Middle Fork, Leslie and Perry cos., are probably the result of misidentified E. camurum; Zorach (1972) - Middle Fk.; Jones (1973) - Cutshin Cr., Leslie Co.; Harker et al (1979) - Greasy Cr., Leslie Co.; Stauffer in Lee et al (1980) (mapped) - Middle Fork system.

76. Etheostoma flabellare flabellare Rafinesque - fantail darter.

Collections: 1-5, 7, 10-11, 16-17, 19-24, 26-27. Previous records: Turner (1967), Jones (1973), Harker et al (1979), Lee in Lee et al (1980) (mapped) - numerous localities.

77. Etheostoma maculatum Kirtland - spotted darter.
Collections: none. The only record of the spotted darter from the upper Kentucky River drainage emanates from Turner (1967) (repeated by Clay [1975]) from Greasy Creek and the Middle Fork, Leslie Co. Since E. camurum is not rare in that vicinity, there is good circumstantial evidence for misidentification.

78. Etheostoma nigrum nigrum Rafinesque - johnny darter.

Collections: 1-5, 7, 9-11, 15-17, 19, 21, 23. This species is widespread and common where clean sand is encountered through the Kentucky River drainage. Previous records: Woolman (1892), Turner (1967), Jones (1973), Harker et al (1979), Bruner in Lee et al (1980) (mapped) - numerous localities.

79. Etheostoma sagitta spilotum (Gilbert) - arrow darter. Threatened.

Collections: 16(1). This species is becoming scarce throughout its range, and population sizes are often small at any given locality. The type locality for this subspecies is Sturgeon Creek, near Travelers Rest, Owsley Co., Kentucky (Gilbert 1887), although we were unable to find specimens at that site. Previous records: Woolman (1892) - Cutshin Cr. and Middle Fk. near Hyden; Kuehne and Bailey (1961), Clay (1975), Harker et al (1979) - Sturgeon Cr., near its confluence, Lee Co.; Gilbert and Burgess in Lee et al (1980) (mapped) - Middle Fork system.

80. Etheostoma tippecanoe Jordan and Evermann - Tippecanoe darter. Threatened.

Collections: 7(10). So far as we can tell, this is the only published record for this attractive little fish from the Middle Fork system. Zorach (1969) did not list any Middle Fork localities. Because of its highly seasonal abundance, a markedly discontinuous distribution, and a habitat at the foot of waist-deep, swift riffles over pea-sized gravel, the biology of the Tippecanoe darter is poorly understood. It is interesting to note that we recently (26 September 1982) collected 11 adult specimens (23.0-36.0 mm SL)

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from the Green River at SR 88, Green Co., Kentucky, in company with 17 other species including Hybopsis dissimilis, Phenacobius uranops, Noturus eleutherus, Etheostoma bellum, Etheostoma rafinesquei, Percina copelandi and Percina evides.

81. Etheostoma variatum Kirtland - variegated darter. Collections: 3, 7, 10-11, 13, 15, 17, 19-21, 23, 26-27. This colorful fish typically lives in deep, swift riffles over a large-rock substrate. Previous records: Woolman (1892), Turner (1967), Jones (1973), Harker et al (1979), Gilbert in Lee et al (1980) (mapped) - numerous localities.

82. Etheostoma zonale (Cope) - banded darter. Collections: 3-5, 15-21, 23, 26-27. Previous records: Woolman (1892), Turner (1967), Jones (1973), Harker et al (1979), Denoncourt in Lee et al (1980) (mapped) - numerous localities.

83. Percina caprodes caprodes (Rafinesque) - central logperch. Collections: 3-4, 7, 12, 14-15, 17, 19-20, 27. Previous records: Charles (1967), Turner (1967), Jones (1973), Thompson in Lee et al (1980) (mapped) - numerous localities.

84. Percina copelandi Jordan - channel darter. Special Concern.

Collections: 4(2), 5(2), 7(11), 16(2), 17(2). There are few records for the channel darter through eastern Kentucky in general and the upper Kentucky River drainage in particular. Previous records: Turner (1967) - Greasy Cr., Leslie Co.; Middle Fk., Leslie-Perry cos. (also see Clay 1975); Gilbert and Burgess in Lee et al (1980) (mapped) - Middle Fork system. Our specimens are currently being studied by Dr. Royal Suttikus, Tulane University.

85. Percina (Odontopholis) n. sp. cf. cymatotaenia (Gilbert and Meek) - bluestripe darter. Special Concern.

Collections: 3(1). The only other record for this species is that of Harker et al (1979) from the mouth of Sturgeon Creek, Lee Co.

86. Percina evides (Jordan and Copeland) - gilt darter. Special Concern.

Collections: 5, 7. The gilt darter is of sporadic occurrence in the upper Kentucky River drainage. The only other published record from the Middle Fork system

is that of Turner (1967), Perry Co. (also see Clay [1975] and Denoncourt in Lee et al [1980]).

87. Percina maculata (Girard) - blackside darter.

Collections: 1, 13, 17, 21, 23, 26. Previous records: Turner (1967), Jones (1973), Harker et al (1979), Beckham in Lee et al (1980) (mapped) - numerous localities.

88. Percina oxyrhyncha (Hubbs and Raney) - sharpnose darter. Status undetermined.

Collections: none. Previous records: Turner (1967) reported Percina phoxocephala from Greasy Cr., Leslie Co., and Middle Fork in Perry and Breathitt cos. However, Bruce Turner, Tulane University, has determined that all material from the upper Kentucky River is the present species. The status listed above probably should be changed to Threatened.

89. Percina sciera (Swain) - dusky darter.

Collections: 5(7), 7(1), 17(2). The only other published records (included by Page in Lee et al [1980]) are those by Turner (1967) from Greasy Creek, Leslie Co., and the Middle Fork, Leslie-Breathitt cos.

Family Sciaenidae (Drums)

90. Aplodinotus grunniens (Rafinesque) - freshwater drum.

Collections: 17(1). This large-stream fish was previously reported from Buckhorn Reservoir (Charles 1967, Turner 1967) and the Middle Fork, Perry and Lee cos. (Jones 1973).

Family Cottidae (Sculpins)

91. Cottus caroliniae (Gill) - banded sculpin.

Collections: 22(3). Although Lee in Lee et al (1980) listed the banded sculpin from the Middle Fork, we were unable to locate any other published references to the species from that system.

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A SURVEY OF FISH COMMUNITIES OF STREAMS IN COAL SURFACE MINING AREAS OF THE CUMBERLAND PLATEAU, TENNESSEE

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Introduction

Coal, the most abundant and economically feasible energy source in the United States, has been labelled the resource to fulfill the energy needs of today's society. Coal production is expected to increase by 65 to 85 percent above the production level of 1975 by the year 1985 (Yancik 1979).

Increased production of coal leads to a greater stress on the aquatic environment due to the influx of acid mine drainage (AMD) and silt. AMD is a product of both surface and underground mining, but is an extremely serious problem in surface mining. It is formed by the oxidation of pyritic material found in the strata surrounding the coal seam and will result in the lowering of the pH, increasing iron concentration and the formation of a sterile ferric hydroxide (FeOH) slime or "yellowboy" on the substrate (Barnes and

Romberger 1969).

Siltation resulting from surface mining also has a serious impact on the lotic environment. Increases in silt have been found to decrease benthic macroinvertebrate communities, thus affecting the ichthyofauna of a stream. Although the influx of AMD and silt are the major degrading factors of coal mining, increased heavy metal concentrations and coal mines also have been found to severely affect the aquatic environment.

Many studies have depicted the detrimental effects of coal mining. Vaughan (1979) found that diatoms and fish species diversities were reduced in streams receiving AMD. Koryak et al (1972) reported that riffle zoobenthos were affected adversely and their community structure was altered radically. Branson and Batch (1972) noted changes in fish communities due to siltation from surface mining, and concluded that fish were eliminated or forced to emigrate because of the loss of a food source or reduction in their reproductive capabilities. Wilson et al (1981) found increased heavy metal concentrations in the livers of rainbow trout (Salmo gairdneri) and brown trout (Salmo trutta) in streams receiving AMD.

The purpose of our study was two-fold: First, to