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Fish Survey and Bioassessment of Station Camp Creek and Sturgeon Creek in the Upper Kentucky River Drainage

Fish Survey and Bioassessment of Station Camp Creek and Sturgeon Creek in the Upper Kentucky River Drainage

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ABSTRACT

In 1998 and 1999, 46 collections were made in Station Camp Creek and 24 collections in Sturgeon Creek primarily by seining and backpack electrofishing. Seventy collections yielded 65 species, including five species not previously reported from either stream system. Fifty-five species were collected from Station Camp Creek, including a new record for *Ichthyomyzon fossor*. Fifty-three species were collected from Sturgeon Creek, including new records for *Lampetra appendix*, *Macrhybopsis aestivalis*, *Ammocrypta pellucida*, and *Etheostoma tippecanoe*. *Cottus caroliniae* was listed in 22 historical collections from Station Camp Creek, but all extant voucher specimens were examined and identified as *C. bairdi*. After four other deletions of unsubstantiated records, the known fish fauna of Station Camp Creek is now 65 species, whereas the fish fauna of Sturgeon Creek is 67 species. Index of Biotic Integrity (IBI) values for 26 sites in Station Camp Creek yielded a mean score of 52.4 ("Good" biotic integrity), whereas 11 sites in Sturgeon Creek had a mean score of 55.3 ("Good to Excellent") and six of the 11 Sturgeon Creek sites scored "Excellent" (58-60). Overall, 30% of sites scored "Excellent" and 87% of sites scored "Good" or higher (≥ 48). Streams in the Station Camp Creek and Sturgeon Creek system are among the most undeveloped waterways in Kentucky, and represent intact and dynamic communities that are becoming rare throughout the southeastern United States. Recognition of any section of Station Camp Creek or Sturgeon Creek as a wild and scenic river may insure that these stream systems are not compromised in the future.

INTRODUCTION

Kentucky has a diverse fish fauna with more than 240 species recorded from the waters of the Commonwealth. The Kentucky River drainage, the largest system entirely within Kentucky, contains at least 115 species (Burr and Warren, 1986). Knowledge concerning the distribution of southeastern fishes and fish community composition is dynamic and our understanding of them continues to expand. Current distributions of fishes may be changing rapidly because of environmental alterations, but baseline data from intense surveys is still lacking for many stream systems.

Two tributaries to the upper Kentucky River, Station Camp Creek and Sturgeon Creek systems, were the focus of this study. No comprehensive survey of the ichthyofauna of either stream has been reported and no thorough bioassessment of either watershed has been conducted using any taxonomic group. Therefore, it is currently impossible to assess the environmental health of these systems and the potential negative impacts of continued human-induced changes within the watersheds. A cooperative assessment of Kentucky's rivers by state and federal agencies resulted in sections of the Station Camp Creek and Sturgeon Creek systems being awarded specific resource designations (Kentucky Division of Water [KDOW], 1992). Multiple stream segments were categorized as having outstanding water quality, corridor character, botanical, fish, and wildlife resources. Sections of upper Station Camp Creek, South Fork, and War Fork were included with less than four percent of all Kentucky rivers as undeveloped. These sections were authorized

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as study rivers under the federal Wild and Scenic Rivers Act (KDOW, 1992), but have not yet been formally recognized. In addition, the KDOW (1997a) designated Station Camp Creek, South Fork, and Sturgeon Creek as waters supporting full uses for swimming, eating of fishes, and aquatic life.

The objectives of this study were: to complete a comprehensive fish survey of the Station Camp Creek and Sturgeon Creek systems from the headwaters to the mouth; to provide baseline distribution data for future assessments; to document the fish community characteristics of both streams; and to determine the biotic integrity of the streams using fishes as bioindicators.

Area Description

Station Camp Creek and Sturgeon Creek systems are fifth-order tributaries to the upper Kentucky River and drain portions of Estill, Jackson, Lee, Madison, and Owsley counties (Fig. 1). These streams lie within the Western Allegheny ecoregion, an area characterized by Pennsylvanian and Mississippian rock strata, rugged topography, and mixed mesophytic forests. The major land uses in this ecoregion are agriculture, silviculture, and natural resource extraction (KDOW, 1997b).

Station Camp Creek drains 340 km² and originates in Jackson County within the Appalachian Plateau physiographic region before flowing into the Knobs physiographic region in Estill and Madison counties. The Appalachian Plateau consists of narrow ridges and steep-sided valleys. The Knobs, a narrow region separating the Bluegrass and Appalachian plateaus, is characterized by unique conical and flat-topped hills, and valleys with wide fertile floodplains (KDOW, 1997a). Station Camp Creek proper forms in northeastern Jackson County at the confluence of War Fork (22 km length) and South Fork Station Camp Creek (42 km). The stream flows north for 36 km and enters the Kentucky River near Irvine at river km 351. Approximately half of the Station Camp Creek watershed is forested with the balance used primarily for rural residential, logging, agriculture, and roadway purposes (KDOW, 1997b). Upper portions of the drainage in Jackson County are less developed, especially along the stream corridor. In the transition to the Knobs physiographic region, the valleys widen noticeably and have extensive agricultural development (KDOW, 1997a). Bottomland is used primarily for grazing, corn, and tobacco with forested riparian zones limited or absent. As a result, increased stream bank erosion has removed natural habitats of alternating riffle-pool sequences and in-stream shelter, and are thought to support a more limited fish community (Burr and Warren, 1986). Carter (1970) noted that Red Lick Creek and Station Camp Creek below the mouth of Red Lick Creek had severe siltation from agriculture activity, and the mainstem was frequently turbid. In addition, the stream is incised and the gradient of lower Station Camp Creek (0.5 m/km) is such that

river km 0-6 are essentially backwaters of the Kentucky River, which is characterized by a series of locks and dams (Kornman, 1985; personal observation).

The Sturgeon Creek watershed drains 179 km² and is situated entirely within the Appalachian Plateau physiographic region. The Sturgeon Creek system forms in eastern Jackson County and flows NNE through Owsley County and into Lee County where it enters the Kentucky River just below lock and dam 14 at Heidelberg. Sturgeon Creek proper is 54 km in length and is a fifth-order stream at its confluence with Little Sturgeon Creek. The upper portions of Sturgeon and Little Sturgeon Creeks drain valleys with the most intensive agriculture activity in the watershed. Below the mouth of Little Sturgeon Creek, the valleys along Sturgeon Creek narrow and the riparian corridor is more densely forested. Agricultural activity is present but does not dominate the landscape. Overall, 40% of the watershed is forested, with the balance used primarily for agricultural, rural residential, logging, and mining purposes (KDOW, 1997b).

Sections of Station Camp and Sturgeon Creeks are within the Daniel Boone National Forest (DBNF). South Fork Station Camp Creek (South Fork) and War Fork are almost completely within the DBNF and portions of these streams are relatively inaccessible with limestone and sandstone bluffs over 50 meters on both sides. Narrow valleys limit agriculture along the stream banks, and the riparian zone is densely forested. Karst topography, a complex underground system of caves, sinkholes, resurgence streams, and subterranean stream segments of several hundred meters predominates in sections of War Fork and South Fork (Carter, 1970; USDA, 1994).

Unfortunately, continued human-induced changes to these watersheds may be having a negative impact on the biological integrity of these streams. Agriculture (corn, tobacco, and rangeland), natural resource extraction (logging and coal mining), and rural residential development are the primary land uses. Off-road vehicles, which enter the streams at low water crossings and have created rutted trails along streams in both watersheds, have the potential to become a major cause of non-point source pollution (USDA, 1994). In addition, a dam and reservoir project is currently being considered in Jackson County (Mangi Environmental Group, 1999). The project's purpose is to provide adequate water supplies for the Jackson County Water Authority and its customers for the next 50 years and to provide water-based recreation opportunities for the people in Jackson County. One proposed site in the Station Camp Creek system (impounding War Fork and Steer Fork) and one site in upper Sturgeon Creek proper are considered reasonable alternatives worth more detailed study (Mangi Environmental Group, 1999).

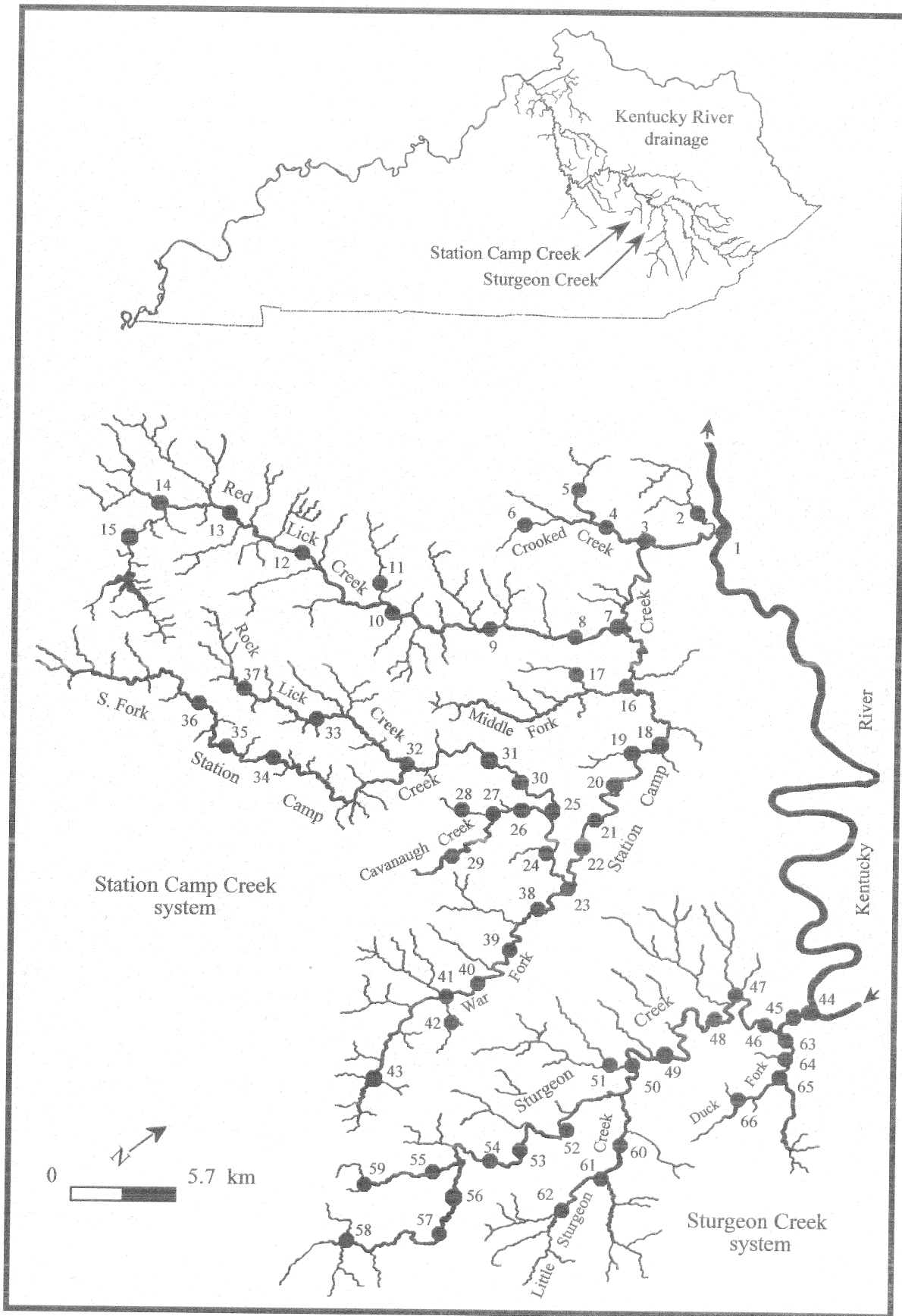


Figure 1. Distribution of 66 collection stations in the Station Camp Creek and Sturgeon Creek systems 1998-1999. Numbers correspond to stations listed in Appendix A.

Historic Collections

The Sturgeon Creek system was sampled by C.H. Gilbert near Travelers Rest, Owsley County in 1884 (Gilbert, 1887; Woolman, 1892) where the Kentucky River endemic *Etheostoma sagitta spilatum* (12 individuals) was first collected, but fewer than five collections were documented prior to the late 1960's. From the late 1960's to the late 1990's, personnel from various state agencies and universities conducted sampling within each stream. Published records for Station Camp Creek include Carter (1970), Branson and Batch (1983), Kornman (1985), and KDOW (1997b), and for Sturgeon Creek include Jones (1973), Harker et al. (1979), Branson and Batch (1984), Kornman (1985), and KDOW (1997b). The most informative sampling was conducted by Kornman (1985), who documented 44 species in 10 collections from Station Camp Creek and 46 species in five collections from Sturgeon Creek while boat electrofishing for *Esox masquinongy*. Currently, KDOW and Kentucky State Nature Preserves Commission (KSNPC) monitor fixed reference sites and rare species, respectively, in these streams.

An analysis of the published reports and unpublished data sheets from Eastern Kentucky University (EKU), Illinois Natural History Survey (INHS), Kentucky Department of Fish and Wildlife Resources (KDFWR), KDOW, KSNPC, and Southern Illinois University at Carbondale (SIUC) provide the following historical data. For Station Camp Creek, 63 species are documented from 79 collections at 43 sites, and for Sturgeon Creek 63 species are documented from 45 collections at 22 sites. Despite the apparent abundance of collections, previous sampling was primarily conducted at fixed reference sites or targeted towards species such as *Percina stictogaster*. Therefore, we conducted a comprehensive survey to document fish communities, determine the biotic integrity, and provide baseline distribution data for future assessments of these two streams.

METHODS

Site Selection

Site selection (Fig. 1) was based on accessibility, proximity to other sites, and field reconnaissance. Sampling localities were distributed throughout each system from the headwaters to the mouth. Many potential sampling sites in small tributaries were found to be void of water (e.g., nearly every east-flowing tributary of War Fork was dry). Forty-six collections were made at 43 localities in Station Camp Creek and 24 collections were made at 23 localities in Sturgeon Creek (Appendix A). Localities were measured in tenths of kilometers from the Kentucky County Maps (1997) and cross-referenced with the Kentucky Atlas & Gazetteer (1997). All known historical localities were resampled or reconnoitered.

Sampling Procedures

Collections were made from 26 February 1998 to 30 April 1999 using appropriate sampling methods which typically included common minnow seines (0.23 cm mesh, 3.05 m x 1.22 m or 6.10 m x 1.52m) and a backpack electrofisher (Smith-Root 12-B). Station 1 (mouth of Station Camp Creek) was sampled with a boat electrofisher, stations 16 and 18 were sampled with a barge electrofisher, and station 44 (mouth of Sturgeon Creek) was sampled with two gill nets. Sites were sampled for approximately one hour or until no new species were found and all habitat types were thoroughly searched. Voucher specimens were preserved in 10% formalin in approximate proportion to their abundance. In the laboratory, fishes were allowed to fix in formalin for 7-10 days, rinsed in tap water for 72 hours, and then transferred to 70% ethanol for permanent storage. Individuals were identified to species, and all specimens and data sheets were deposited in the permanent research collection at the Branson Museum of Zoology at ECU.

Data Analysis

Data Analysis was divided into two main components: species presence data and Index of Biotic Integrity (IBI) data. Distribution maps were generated for each species found in this study and compared with species maps developed from the combined data of historical collections. New records, notable records, erroneous historical records, species not collected, and fish community trends are noted and explained in the Results and Discussion.

To help analyze fish community composition and provide an indication of aquatic ecosystem health, the Index of Biotic Integrity (IBI), developed by Karr (1981) and modified for use in Kentucky's streams (KDOW, 1997b), was utilized. Only the 37 collections that strictly followed sampling protocols described in Kentucky Division of Water Reference Reach Community Fish Report (KDOW, 1997b) and Karr et al. (1986) were included in the IBI analyses. Metrics developed for the Western Allegheny Ecoregion (KDOW, 1997b) were used; an overall score of 12-60 was calculated for each site. In-depth statistical comparisons between the present study and historical collections were not made due to the possible discrepancies in collecting efforts.

RESULTS AND DISCUSSION

Sixty-five species in 35 genera and 13 families were identified from 70 collections (Fig. 1; Appendix B). This study documented eight more species from both Station Camp and Sturgeon Creeks than any previous sampling effort. Fifty-five species were identified from 46 collections (43 localities) in Station Camp Creek, and 53 species were identified from 24 collections (23 localities) in Sturgeon Creek. This represents 86% of the species

historically reported from Station Camp Creek and 78% of the species historically reported from Sturgeon Creek. The known fish fauna of Station Camp Creek is now 65 species, whereas that of Sturgeon Creek is 67 species. The five most frequently encountered species were *Etheostoma flabellare* (58 of 70 collections), *Campostoma anomalum* (57), *Pimephales notatus* (50), *Etheostoma caeruleum* (50), and *Luxilus chrysocephalus* (47).

The most species-rich families in Station Camp Creek were Cyprinidae (18 species), Percidae (12), Centrarchidae (8), Catostomidae (7), and Ictaluridae (2). The Station Camp Creek system had a mean of 15.3 species per collection, with a maximum of 27 species in one collection (station 16). Forty-one species have been recorded in 12 collections from station 21. A total of 47 species were found in Station Camp Creek proper with a mean of 21 species per collection. Based on collections from all studies, 30 species may be considered generally distributed, 19 occasional, and 16 sporadic.

The most species-rich families in Sturgeon Creek were Cyprinidae (17 species), Percidae (15), Catostomidae (7), Centrarchidae (7), and Ictaluridae (2). Sturgeon Creek had a mean of 16.6 species per collection, with a maximum of 29 species in one collection (station 47). Thirty-nine species have been recorded in 12 collections from this station. A total of 49 species were found in the fifth-order portion of Sturgeon Creek with a mean of 21 species per collection. Based on collections from all studies, 26 species may be considered generally distributed, 12 occasional, and 29 sporadic.

Notable Records

Five species were collected in this study that had not been previously reported from either stream system. In Station Camp Creek, *Ichthyomyzon fossor*, a threatened species in Kentucky (KSNPC, 2000) was collected from two stations in the upper half of Station Camp Creek proper and from one station in lower South Fork. In Sturgeon Creek, *Lampetra appendix*, *Macrhybopsis aestivalis*, *Ammocrypta pellucida*, and *Etheostoma tippecanoe* were each recorded from at least one station. *Lampetra appendix* is threatened in Kentucky (KSNPC, 2000).

A number of species with limited distributions that have experienced a reduction in range or abundance in Kentucky (Burr and Warren, 1986) were found in Station Camp Creek and/or Sturgeon Creek. *Nocomis micropogon* was generally distributed in South Fork, upper Station Camp Creek proper, and the lower 25 km of Sturgeon Creek. *Erimystax dissimilis*, *Macrhybopsis aestivalis*, *Ammocrypta pellucida*, *Etheostoma tippecanoe*, and *Percina copelandi* were found only in the lower 3 km of Sturgeon Creek. *Etheostoma sagitta* was collected from the middle reaches of Sturgeon Creek.

Species Not Collected and Erroneous Records

Five species not collected during this study (*Lepisosteus osseus*, *Hiodon tergisus*, *Anguilla rostrata*, *Ictiobus bubalus*, and *Ictalurus punctatus*) were almost exclusively collected by Kornman (1985) while boat electrofishing. These species were not recorded at Station 1 (the mouth of Station Camp Creek), the only site where this technique was used in the present study. These species are generally considered inhabitants of rivers and can be difficult to capture without boat electrofishing gear. Their presence in the Station Camp Creek and Sturgeon Creek systems is likely limited to the lower reaches of each stream, and they are best categorized as "occasional" members of the fish fauna. Four other species not documented in this study, *Pimephales promelas*, *Ameiurus melas*, *Lepomis microlophus*, and *Pomoxis annularis* were each found in fewer than five previous collections.

Five species reported by previous collectors are regarded as questionable and are not included in the species list for these streams. No voucher specimens exist for *Rhinichthys atratulus* (Branson and Batch, 1983), *Lepomis humilis* and *Etheostoma spectabile* (Jones, 1973), and *Etheostoma stigmaeum* (Carter, 1970). *Cottus carolinae* was listed in 22 collections from Station Camp Creek by various investigators, but all extant voucher specimens were identified as *C. bairdi*. All specimens had 13-16 pectoral fin rays and incomplete lateral lines (< 24 pores). Station Camp Creek is apparently not a stream where *Cottus bairdi* and *C. carolinae* are found sympatrically (Burr and Warren, 1986). Branson and Batch (1983) listed *Rhinichthys atratulus* in collection data from War Fork, but no corresponding specimens were located in the ECU fish collection. *Rhinichthys atratulus* might be present in extreme headwater portions of War Fork (B.A. Branson, pers. comm.). *Lepomis humilis* was listed in collection data from Sturgeon Creek (Jones, 1973), but no voucher specimen exists. These specimens may have been misidentified juveniles of *L. megalotis*, which are common in the system. Burr and Warren (1986) did not report *L. humilis* from the Kentucky River. *Etheostoma spectabile*, reported from Sturgeon Creek (Jones, 1973), was likely a misidentification of the superficially similar *E. caeruleum*. Verified records of the *E. spectabile* complex in the Kentucky River system are downstream of the study area (PAC, pers. obs.). *Etheostoma stigmaeum* (Carter, 1970) was possibly a misidentification of *E. baileyi* or *E. nigrum*, both of which are generally distributed in upper Station Camp Creek. Burr and Warren (1986) did not report *E. stigmaeum* from the Kentucky River system.

Annotated List of Species

The following list of fishes includes 74 species that have been reported at least once from the Station Camp Creek or Sturgeon Creek systems. Accounts of two hybrids follow the species descriptions. The species accounts contain a description of how common each species is within the study area. Distributions are frequently described using specific tributaries (Fig. 1). Terminology follows Smith (1965) as used by Burr and Warren (1986), and Powers and Ceas (2000). "Generally distributed" implies that suitable habitat should be expected to yield specimens with a reasonably thorough search. "Occasional" implies that suitable habitat may or may not yield specimens even after a prolonged search. "Sporadic" implies that encountering specimens of a given taxon cannot be predicted. Station numbers are included in the descriptions for the 65 species found in this study. Previous collections often represent the same locality sampled repeatedly and are listed for all 74 species. Species distributions from previous collections are congruent with this study unless noted in the species account.

Petromyzontidae

Ichthyomyzon fossor. Northern brook lamprey. Sporadic in lower South Fork and upper Station Camp Creek. A state threatened species (KSNPC, 2000). Stations: 19, 20, 24. Previous collections (previous): None.

Lampetra appendix. American brook lamprey. Sporadic in upper Sturgeon Creek. A state threatened species (KSNPC, 2000). Kornman (1985) reported a lamprey ammocoete from lower Sturgeon Creek, but no lamprey species had been documented from either stream system. Stations: 54. Previous: None.

Lepisosteidae

Lepisosteus osseus. Longnose gar. Occasional in the mainstem of both streams, collected primarily by boat electrofishing. Reported by anglers from South Fork. Stations: None. Previous: 12.

Hiodontidae

Hiodon tergisus. Mooneye. Occasional to sporadic in the lower mainstem of both streams. Stations: None. Previous: 5.

Anguillidae

Anguilla rostrata. American eel. Kornman (1985) listed all records for this species in both Station Camp Creek (5) and Sturgeon Creek (1). Stations: None. Previous: 6.

Clupeidae

Dorosoma cepedianum. Gizzard shad. Occasional primarily near the mouths of Station Camp and Sturgeon creeks. Stations: 1, 3, 16, 44. Previous: 9.

Cyprinidae

Campostoma anomalum. Central stoneroller. Generally distributed and abundant throughout both drainages. Found in 83% of collections in this study. Stations: 3-9, 11-21, 23-27, 31-43, 45-56, 58-66. Previous: 86.

Cyprinella spiloptera. Spotfin shiner. Generally distributed in Red Lick Creek, lower Station Camp Creek, and lower Sturgeon Creek. Not collected from South Fork and War Fork. Stations: 3-4, 7, 9-14, 16, 18, 45, 47-48, 64. Previous: 31.

Cyprinella whipplei. Steelcolor shiner. Generally distributed in Red Lick Creek, Station Camp Creek proper, and the lower two-thirds of Sturgeon Creek. Not collected from South Fork or War Fork. Outnumbered *C. spiloptera* at 70% of sites when found sympatrically. Stations: 2-5, 7, 9-10, 13, 16, 19-22, 45-50, 54, 63. Previous: 33.

Cyprinus carpio. Common carp. Occasional or sporadic. All collections made at or near the mouth of both streams. Stations: 1. Previous: 6.

Ericymba buccata. Silverjaw minnow. Generally distributed in Red Lick Creek, upper South Fork, and throughout the Sturgeon Creek system. Absent in collections from Station Camp Creek proper. Stations: 4-7, 11-16, 33-37, 47, 51, 55-56, 58-62, 65. Previous: 32.

Erimystax dissimilis. Streamline chub. Sporadic in the lower 3 km of Sturgeon Creek. Stations: 45. Previous: 1.

Hybopsis amblops. Bigeye chub. Occasional in South Fork and upper Station Camp Creek. Stations: 31-35. Previous: 3.

Luxilus chrysocephalus. Striped shiner. Generally distributed and abundant throughout Station Camp and Sturgeon creeks. Stations: 3-7, 9-14, 16, 18-27, 30-36, 38-39, 45, 47-52, 54, 56-58, 60-62, 64-65. Previous: 99.

Lythrurus fasciolaris. Scarlet shiner. Generally distributed in Red Lick Creek, South Fork, and upper Sturgeon Creek. Stations: 4-5, 8-15, 21, 23-27, 31-35, 38, 51, 54, 56-58, 60-62. Previous: 57.

Macrhybopsis aestivalis. Speckled chub. A new record for the study area. One individual was found approximately 2 km above the mouth of Sturgeon Creek. Stations: 45. Previous: None.

Macrhybopsis storeriana. Silver chub. Sporadic, collected only from Station Camp Creek in this study. Reported from lower Sturgeon Creek (Jones, 1973). Stations: 3, 7. Previous: 4.

Nocomis micropogon. River chub. Generally distributed in South Fork, the upper half of Station Camp Creek, and throughout Sturgeon Creek. Stations: 16, 18-22, 25-26, 30-34, 45-50, 52, 54, 60-61, 63-65. Previous: 51.

Notropis atherinoides. Emerald shiner. Generally distributed in Station Camp Creek proper, Red Lick Creek, and all but the headwaters of the Sturgeon Creek system. Rare in South Fork and absent from War Fork. Stations: 2-4, 7, 9-10, 16, 18, 20, 45-50, 63-64. Previous: 21.

Notropis ludibundus. Sand shiner. Occasional in Red

Lick Creek and sporadic in Sturgeon Creek. Stations: 9-10, 12-13, 47, 64. Previous: 6.

Notropis photogenis. Silver shiner. Occasional except in upper Station Camp Creek proper where it is generally distributed. Found more often by earlier investigators in Sturgeon Creek. Stations: 9, 16, 20-24, 27, 32, 54. Previous: 39.

Notropis rubellus. Rosyface shiner. Generally distributed at upstream sites in both systems. More abundant than *N. atherinoides* when found sympatrically at downstream sites in Sturgeon Creek. Stations: 7, 9, 14, 16, 18-19, 21-26, 31-33, 45-52, 54, 56, 60, 63-64. Previous: 61.

Notropis volucellus. Mimic shiner. Occasional in Station Camp Creek proper, lower Sturgeon Creek, and Duck Fork. Stations: 2, 16, 21-22, 24, 45-47, 50, 63-64. Previous collections: 17.

Phoxinus erythrogaster. Southern redbelly dace.

Sporadic in Sturgeon Creek; generally distributed in Station Camp Creek. Stations: 5-6, 8, 11, 17, 28-29, 36-37, 39-43, 59, 66. Previous: 21.

Pimephales notatus. Bluntnose minnow. Generally distributed throughout both stream systems. Stations: 1-7, 9, 11-16, 18-27, 31-36, 38-39, 45, 47-50, 52, 54-65. Previous collections: 96.

Pimephales promelas. Fathead minnow. Reported only by Branson and Batch (1983) in Station Camp Creek and present in the ECU fish collection. Also reported from Sturgeon Creek (Branson and Batch, 1984), but no voucher specimen was found. Stations: None. Previous: 1.

Semotilus atromaculatus. Creek chub. Generally distributed. Stations: 4-8, 10-17, 26-29, 32-43, 47, 49-53, 55-59, 61-62, 65-66. Previous: 69.

Catostomidae

Catostomus commersoni. White sucker. Occasional in the upper reaches of both streams. Absent from collections in Station Camp Creek proper and lower Sturgeon Creek. Stations: 4, 7, 29, 34, 36, 39, 43, 55-59, 62, 66. Previous: 15.

Hypentelium nigricans. Northern hog sucker. Generally distributed in both stream systems. Stations: 3-5, 7, 9-10, 12-14, 16, 18-22, 26-27, 31, 33-35, 37-38, 43, 45-52, 54-58, 60-63, 65. Previous: 64.

Ictiobus bubalus. Smallmouth buffalo. Sporadic.

Kornman (1985) lists two localities in Station Camp Creek for this species. Stations: None. Previous: 2.

Minytrema melanops. Spotted sucker. Occasional near the mouth of Station Camp Creek. Four immature individuals were found 16 km from the mouth of Sturgeon Creek (Branson and Batch, 1984). Stations: 1. Previous: 11.

Moxostoma anisurum. Silver redhorse. Sporadic. Only collected from the near the mouths of both streams. Rare in the upper Kentucky River drainage (Branson and Batch, 1983). Stations: 44. Previous: 4.

Moxostoma carinatum. River redhorse. Sporadic. Found

only near the mouths of both streams. Recent sampling has shown this species to be more generally distributed in the upper Kentucky River than previously thought (PAC, pers. obs.; Burr and Warren, 1986). Stations: 16, 44. Previous: 4.

Moxostoma duquesnei. Black redhorse. Generally distributed in Station Camp Creek and sporadic in Sturgeon Creek. Stations: 9-10, 13, 16, 18, 21, 25, 27, 32-34, 38, 47-50, 59, 65. Previous: 14.

Moxostoma erythrurum. Golden redhorse. Generally distributed. Stations: 1, 3, 7, 9-10, 12, 16, 18, 24, 32, 45, 47, 49-50, 54, 56-57, 63. Previous: 38.

Moxostoma macrolepidotum. Shorthead redhorse. Sporadic near the mouths of both streams. Stations: 1, 45. Previous: 9.

Ictaluridae

Ameiurus melas. Black bullhead. Sporadic. Stations: None. Previous: 3.

Ameiurus natalis. Yellow bullhead. Sporadic. In Sturgeon Creek, only collected from station 47 by KDOW. Stations: 4, 9, 13, 20. Previous: 2.

Ictalurus punctatus. Channel catfish. Sporadic. Reported from each stream system. Stations: None. Previous: 4.

Noturus flavus. Stonecat. Occasional. Collected only from middle and lower Sturgeon Creek. Not known from Station Camp Creek. Stations: 45-46, 48-50, 52, 54. Previous: 8.

Noturus miurus. Brindled madtom. Occasional in Station Camp Creek proper and Red Lick Creek. Reported once from Sturgeon Creek (Jones, 1973). Stations: 7, 9, 13, 18, 20. Previous: 8.

Pylodictis olivaris. Flathead catfish. Sporadic, with one large individual caught in Little Sturgeon Creek. Stations: 61. Previous: 2.

Esocidae

Esox masquinongy. Muskellunge. Occasional from Station Camp Creek proper and the lower 10 km of Sturgeon Creek. Reported by anglers from lower South Fork. Stations: 1, 16, 44. Previous: 9.

Salmonidae

Oncorhynchus mykiss. Rainbow trout. Occasional, but only collected below the mouth of Resurgence Cave (War Fork) in this study. Stocked annually by KDFWR in both stream systems (L.E. Kornman, pers. comm.). Stations: 39. Previous: 8.

Poeciliidae

Gambusia affinis. Western mosquitofish. Sporadic; introduced into Owsley Fork Reservoir (Red Lick Creek). Not known from Sturgeon Creek. Stations: 13. Previous: 1.

Atherinidae

Labidesthes sicculus. Brook silverside. Occasional in Station Camp Creek and sporadic lower Sturgeon Creek. Stations: 1, 9-10, 12, 16, 20-21, 25, 45. Previous: 21.

Cottidae

Cottus bairdi. Mottled sculpin. Generally distributed in Station Camp Creek. No *Cottus* species have been recorded from Sturgeon Creek. All specimens collected had 13-16 pectoral fin rays and incomplete lateral lines (less than 24 lateral line pores). Stations: 16, 18-36, 38-43. Previous: 15.

Centrarchidae

Ambloplites rupestris. Rock bass. Generally distributed in most stream sections, but not collected from War Fork or lower Station Camp Creek. Stations: 9, 16, 18-23, 26-27, 30-32, 34-35, 47-50, 54, 56-57, 63-64. Previous: 45.

Lepomis cyanellus. Green sunfish. Generally distributed, but usually outnumbered by other *Lepomis* species when found sympatrically. Stations: 2-5, 7, 9, 13, 15, 18, 20, 27, 30, 34, 43, 46-47, 50, 52, 54-56, 58, 60-66. Previous: 39.

Lepomis gulosus. Warmouth. Occasional in Station Camp Creek and sporadic in Sturgeon Creek, found in the lower portions of both streams. Stations: 1. Previous: 6.

Lepomis macrochirus. Bluegill. Generally distributed. Stations: 1-2, 4-6, 9-10, 13-16, 18, 20, 36, 43, 49-50, 52-54, 56-57, 59, 61-66. Previous: 44.

Lepomis megalotis. Longear sunfish. The most frequently encountered centrarchid. Widespread and generally distributed in both streams. Stations: 1-5, 7, 9-10, 12-16, 18-24, 26, 30-32, 34-35, 45, 47, 49-50, 52, 54, 56-57, 63. Previous: 67.

Lepomis microlophus. Redear sunfish. Sporadic. Known only from Sturgeon Creek. Stations: None. Previous: 4.

Micropterus dolomieu. Smallmouth bass. Generally distributed throughout both drainages except absent from lower Station Camp Creek. Stations: 9, 14, 16, 18-22, 26-27, 30-35, 37, 45-50, 54, 61-62, 65. Previous: 38.

Micropterus punctulatus. Spotted bass. Generally distributed, except rare in War Fork and South Fork. Found in 46% of collections with *M. dolomieu*. Stations: 1, 3-4, 7, 9-10, 13, 15-16, 18-20, 27, 45-47, 49, 53-54, 56-57, 59, 61-64. Previous: 45.

Micropterus salmoides. Largemouth bass. Sporadic in this study, but occasional in previous studies. Stations: 15, 59. Previous: 22.

Pomoxis annularis. White crappie. Sporadic. Stations: None. Previous: 4.

Percidae

Ammocrypta pellucida. Eastern sand darter. The first record of this species in Sturgeon Creek. Three individuals were found approximately 1 km from the mouth of Sturgeon Creek. Stations: 45. Previous: None.

Etheostoma baileyi. Emerald darter. Generally distributed and abundant in upper Station Camp Creek and the middle reaches of Sturgeon Creek. Occasional in Red Lick Creek. Stations: 7, 9-10, 12-13, 16, 18-27, 30-34, 37-38, 45-52, 54, 56, 60-64. Previous collections: 52.

Etheostoma blennioides. Greenside darter. Generally distributed throughout the middle portions of both streams. Stations: 9-13, 16, 18-27, 30-35, 37-39, 45-52, 54-57, 60-61. Previous: 69.

Etheostoma caeruleum. Rainbow darter. Generally distributed and often the most abundant darter, except at headwater sites, where it was outnumbered by *E. flabellare*. Stations: 4-6, 9-16, 18-27, 29-39, 41, 43, 45-52, 54, 56, 60-65. Previous: 89.

Etheostoma camurum. Bluebreast darter. Occasional. Found only in collections with seven or more darter species. Stations: 21, 24-25, 45-46. Previous: 8.

Etheostoma flabellare. Fantail darter. Generally distributed, found in 84% of the collections in this study; the most commonly encountered *Etheostoma* species. Stations: 4-7, 9-26, 28-39, 41-43, 45-52, 54-66. Previous: 74.

Etheostoma nigrum. Johnny darter. Generally distributed. Stations: 3, 5-7, 9-16, 18-25, 32-35, 37-39, 43, 45, 47-52, 54-59, 61-65. Previous: 58.

Etheostoma sagitta. Arrow darter. Occasional and restricted to the middle reaches of Sturgeon Creek. Stations: 47, 51-52. Previous: 11.

Etheostoma tippecanoe. Tippecanoe darter. A new record for Sturgeon Creek, found in the lower 3 km of the stream. Stations: 45-46. Previous: None.

Etheostoma variatum. Varigate darter. Generally distributed. Stations: 18-19, 21-25, 31, 45-52, 54, 56, 63. Previous: 33.

Etheostoma zonale. Banded darter. Generally distributed and found with *Etheostoma variatum* in 87% of collections. Stations: 7, 16, 18-19, 21-22, 24-25, 31, 45-50. Previous collections: 35.

Percina caprodes. Logperch. Generally distributed in the mainstem of both streams. Stations: 4, 7, 9-10, 18-22, 30-31, 38, 45-50, 52, 54, 56-57. Previous: 46.

Percina copelandi. Channel darter. Sporadic, known only from the lower 3 km of Sturgeon Creek. Stations: 45. Previous: 2.

Percina maculata. Blackside darter. Occasional. Stations: 7, 9-10, 16, 23, 50, 52, 54, 56-57. Previous: 37.

Percina sciera. Dusky darter. Sporadic in the lower 18 km of Station Camp Creek proper. Not reported from Sturgeon Creek. Stations: 1, 3, 16. Previous: 2.

Percina stictogaster. Frecklebelly darter. Generally distributed in upper Station Camp Creek proper, lower South Fork, and the fifth-order section of Sturgeon Creek. Stations: 19-22, 26, 49-50. Previous: 29.

Sciaenidae

Aplodinotus grunniens. Freshwater drum. Sporadic. Stations: 1, 3, 50. Previous: 6.

Hybrids

Probable *Luxilus chrysocephalus* x *Notropis rubellus* minnow hybrid. Found in South Fork and upper Sturgeon Creek. Stations: 24, 33-34, 54. Previous: 2. Probable *Lepomis cyanellus* x *L. megalotis* sunfish hybrid. Collected exclusively from Sturgeon Creek in this study. Stations: 56, 65. Previous: 4.

Index of Biotic Integrity

The Index of Biotic Integrity (IBI), with metrics developed for the Western Allegheny ecoregion, was used in the analysis of the fish communities at 37 sites that strictly followed IBI protocols. Overall, 30% of sites scored "Excellent" (58-60) and 87% of stations scored "Good" (≥ 48) or higher (Fig. 2). The IBI scores for all 26 sites in Station Camp Creek yielded a mean score of 52.4 ("Good") and ranged from 42-60. Sites in the Knobs physiographic region (Red Lick and Crooked creeks) had a mean score of 50.4 ("Good"), ranged from 44-58, and had more tolerant species and fewer darter species than other sites in the Station Camp Creek system. Eleven sites in Sturgeon Creek had a mean score of 55.3 ("Good to Excellent") and ranged from 46 to 60. Six of the 11 Sturgeon Creek sites scored "Excellent" (58-60). In general, main stem sites on Station Camp and Sturgeon Creeks (draining 90-240 km²) produced the highest IBI scores.

Wadeable sites (draining >36 km²) in both streams had a mean IBI score of 55.1 ("Good to Excellent") and ranged from 44-60. Metrics for wadeable sites that lowered scores most frequently were high percentage of omnivores, low diversity of suckers, and low diversity of top carnivores. Metrics that always strongly approximated the expected values were high species diversity, high darter diversity, and low numbers of intolerant species. Sites analyzed using metrics for headwater sites (draining ≤ 36 km²) in both streams ranged from 42 to 56 with a mean of 48.9 ("Good"). Metrics that consistently scored poorly were low diversity of headwater species and low numbers of intolerant species. Headwater sites (stations 4-6, 29, 35, 36, 39, 43, and 62-64) always had good species diversity and high percentages of insectivores.

The IBI was a relatively effective tool for screening wadeable sites in these watersheds, but does not appear to be extremely sensitive to perturbations in these streams. Although most sites in the Knobs physiographic region were noticeably impacted by poor land use practices, mean IBI scores did not differ by more than four points from other sites, the minimum variability necessary to suggest differences in site quality (Karr et al., 1986). The IBI metrics may overestimate the biotic integrity in these streams, or the fish community may have not responded to some relatively limited disturbances. Regardless, due to the overall high biotic integrity of the fish communities, differences in IBI

scores were best understood by comparing similar sites within individual tributaries and identifying disturbances to the fish communities. Sites with higher IBI scores always had more well-developed riparian corridors and limited stream bank erosion, even if upstream disturbances were present. For example, within the Sturgeon Creek system, the two sites in Little Sturgeon Creek had relatively lower IBI scores of 46 and 48 while the remainder of the system scored 52-60. As described earlier, Little Sturgeon Creek is impacted by agricultural lands.

The headwater metrics developed by KDOW were apparently less suitable for the evaluation of fish communities in Station Camp and Sturgeon Creeks, and scored a mean of six points lower than wadeable sites, despite comparable quality watershed conditions. Metrics such as headwater species diversity, number of intolerant species, and number of pioneer species scored poorly more frequently than equivalent metrics developed for wadeable sites. Adjustments are being made to the IBI metrics (M.C. Compton, KDOW, pers. comm.), but other taxa, such as macroinvertebrates, might be more suitable for evaluating the biotic integrity of these and similar headwater sites.

Although War Fork had only "Fair" to "Good" IBI scores, this stream appeared to have few human-made disturbances and an intact fish fauna. The karst topography of the stream reduces the upstream-downstream connectivity, which is vital to supporting a diverse assemblage of fishes (Allan, 1995). In addition, the effects of seasonally stocking *Oncorhynchus mykiss* might be to the detriment of the native species (Etnier and Starnes, 1993).

Summary and Justification of Special Status Designation for both Streams

Streams in the Station Camp Creek and Sturgeon Creek system are among the most undeveloped waterways in Kentucky, have above average fish community composition, and harbor species with limited distributions such as *Etheostoma sagitta*. Overall, fish communities at sites in Station Camp Creek proper, lower South Fork, and Sturgeon Creek can be categorized as "Good to Excellent" with high species diversity, especially with regard to darters, and many intolerant species. Fish communities at sites in Red Lick Creek, War Fork, and Little Sturgeon Creek can be categorized as "Good" with moderate to high species diversity and low percentages of tolerant species.

The designations assigned by the Kentucky Rivers Assessment (KDOW, 1992) to portions of both streams are valid and promote appreciation and limited protection for these ecosystems. Recognition of any section of Station Camp Creek or Sturgeon Creek as a wild and scenic river might help to insure that these stream systems are not compromised in the future. The most out-

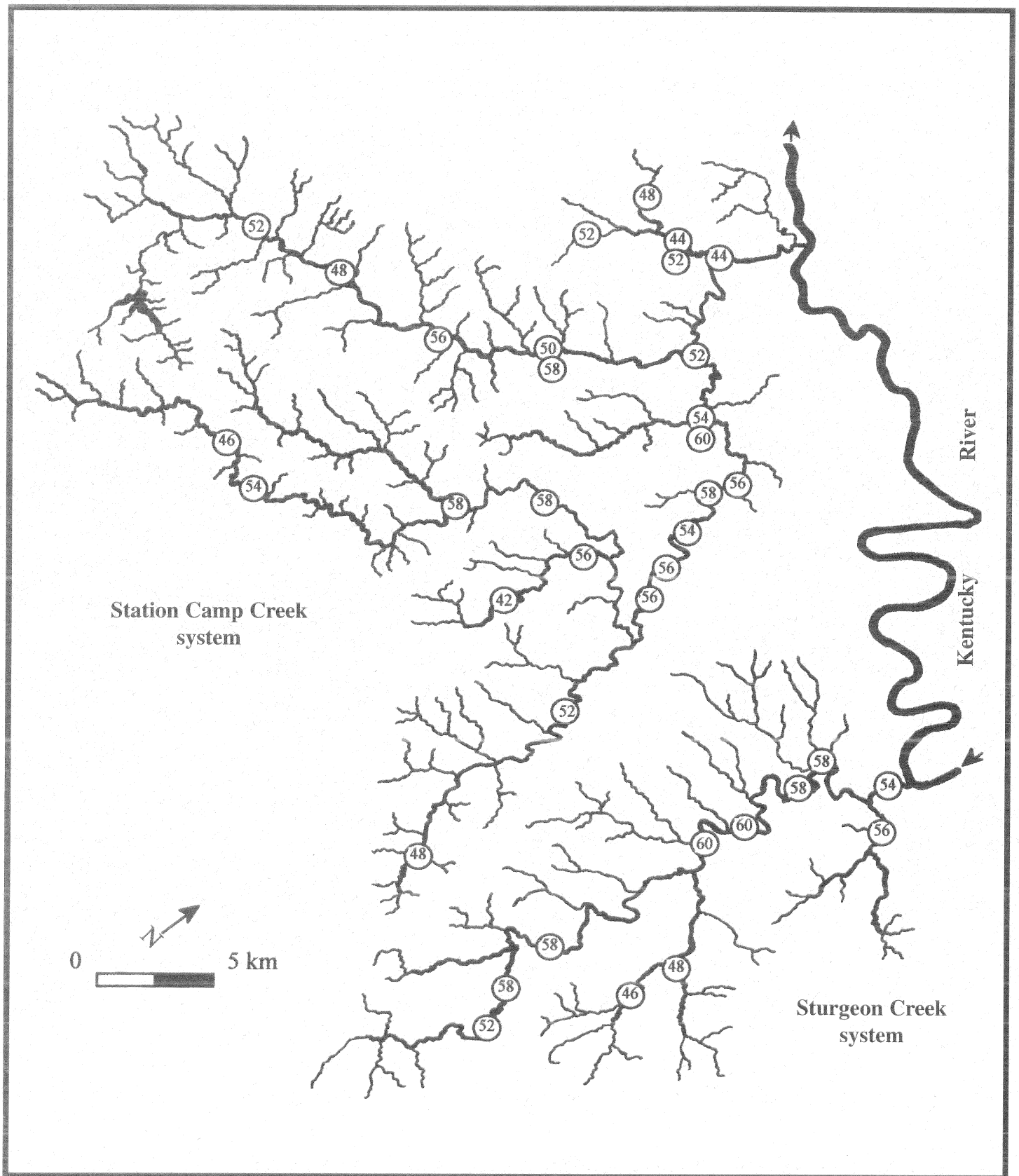


Figure 2. Index of Biotic Integrity (IBI) scores for 37 collections in the Station Camp Creek and Sturgeon Creek systems 1998-1999.

standing sections with regard to biotic integrity and overall aesthetic value that merit the strongest consideration for wild and scenic river status are the lower 10 km of South Fork Station Camp Creek, the lower 10 km of War Fork, the upper 5 km of Station Camp Creek proper, and river km 16 to 25 of Sturgeon Creek. The absence of unique geological or hydrological features might deter recognition of these streams as wild and scenic, but these streams represent intact and dynamic communities that are becoming ever more rare throughout the southeastern United States.

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LITERATURE CITED

- Allan, J.D. 1995. Stream ecology, structure and function of running waters. Chapman & Hall, London.
- Branson, B.A. and D.L. Batch. 1983. Fishes of the South Fork of the Kentucky River, with notes and records from other parts of the drainage. Southeastern Fishes Council Proc. 4(2)1-15.
- Branson, B.A., and D.L. Batch. 1984. Fishes of the Middle Fork of the Kentucky River, Kentucky. Southeastern Fishes Council Proc. 4(4)4-9.
- Burr, B.M., and M.L. Warren. 1986. A distributional atlas of Kentucky fishes. Kentucky Nat. Preserves Comm. Sci. and Tech. Ser. 4. Frankfort, KY.
- Carter, J.P. 1970. Survey and classification of six Kentucky streams. Kentucky Dept. Fish Wildl. Res., Proj. F-35-2:33-39.
- Etnier, D.A., and W.C. Starnes. 1993. The fishes of Tennessee. Univ. Tennessee Press, Knoxville, TN.
- Gilbert, C.H. 1887. Descriptions of new and little known theostomids. Proc. U.S. Natl. Mus. 10:47-64.
- Harker, D.F., Jr., S.M. Call, M.L. Warren Jr., K.E. Camburn, and P. Wigley. 1979. Aquatic biota and water quality survey of the Appalachian Province, eastern Kentucky. Kentucky State Nat. Preserves Comm. Vol. I.
- Jones, A.R. 1973. Inventory and classification of streams in the Kentucky River drainage. Kentucky Dept. Fish Wildl. Res., Fish. Bull. 58:41-64.
- Karr, J.R., 1981. Assessment of biotic integrity using fish communities. Fish. 6:21-27.
- Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. Assessing biological integrity in running waters: a method and its rationale. Illinois Nat. Hist. Surv. Spec. Publ. 5. Champaign, IL.
- Kentucky County Maps. 1997. Thomas Publ., Lyndon Station, WI.
- Kentucky Atlas & Gazetteer. 1997. DeLorme Publ., Yarmouth, ME.
- [KDOW] Kentucky Division of Water. 1997a. Kentucky River basin status report. Kentucky Div. of Water, Frankfort, KY.
- [KDOW] Kentucky Division of Water. 1997b. Reference reach fish community report. Kentucky Ecol. Support Section, Div. of Water, Frankfort, KY.
- [KDOW] Kentucky Division of Water. 1992. Kentucky Rivers Assessment. Gen. Serv. Admin., Atlanta, GA.
- [KSNPC] Kentucky State Nature Preserves Commission. 2000. Rare and extirpated biota of Kentucky. Trans. Kentucky Acad. Sci. 61:115-132.
- Kornman, L.E. 1985. Muskellunge streams investigation in Red River, Station Camp Creek, and Sturgeon Creek. Kentucky Dept. Fish Wildl. Res., Fish. Bull. 77:1-32.
- Mangi Environmental Group. 1999. Jackson County lake project final alternatives analysis. Jackson County, Kentucky Empowerment Zone.
- Powers, S. L., and P. A. Ceas. 2000. Ichthyofauna and biogeography of Russell Fork (Big Sandy - Ohio River). Southeastern Fishes Council Proc. 41:1-12.
- Smith, P.W. 1965. A preliminary annotated list of the lampreys and fishes of Illinois. Illinois Nat. Hist. Surv. Biol. Notes 54:1-12.
- [USDA] United States Department of Agriculture. 1994. War Fork water resource inventory. U.S. Forest Service, Daniel Boone Nat. Forest.
- Woolman, A.J. 1892. Report of an examination of the rivers of Kentucky, with lists of the fishes obtained. U.S. Fish Comm., Bull. U.S. Fish Comm. 10:249-288.

Appendix A. Stream name, locality, and sampling date for 66 stations in the Station Camp Creek and Sturgeon Creek systems 1998-1999.

1. Station Camp Creek, Irvine, at mouth to 1.0 river km upstream, Estill County (Co.), 9 Oct 1998.
2. Clear Creek, 1.4 km SW Irvine at Route (Rt.) 499, Estill Co., 11 Apr 1999.
3. Station Camp Creek, 0.8 km SE Wisemantown at Crooked Creek, Estill Co., 19 Oct 1998.
4. Crooked Creek, 1.6 km NW Station Camp at Rt. 594, Estill Co., 16 Jun 1998 and 11 Apr 1998.
5. Hoys Fork, 3.2 km NE Blackburn at Rt. 499, Estill Co., 16 Jun 1998.
6. Crooked Creek, 0.4 km E Noland at Rt. 1139, Estill Co., 16 Jun 1998.
7. Red Lick Creek, 1.6 km S Station Camp at Wagersville-Red Lick Road (Rd.), Estill Co., 16 Sep 1998.
8. Tributary to Red Lick Creek, 0.4 km S Station Camp at Rt. 594, Estill Co., 16 Jun 1998.
9. Red Lick Creek, 0.3 km S Jinks at Sang Branch Rd., Madison Co., 8 Oct 1998 and 11 Apr 1999.
10. Red Lick Creek, 0.8 km N Locust Branch at Locust Branch Rd., Estill Co., 8 Oct 1998.
11. Locust Branch, 0.8 km NW Locust Branch at Locust Branch Rd., Estill Co., 26 February 1998.
12. Red Lick Creek, 1.6 km W Estill Co. line at Long Branch Rd., Madison Co., 8 Oct 1998.
13. Red Lick Creek, 1.6 km E Duluth at Rt. 594, Madison Co., 8 Oct 1998.
14. Owsley Fork, 1.6 km W Duluth at Rt. 594, Madison Co., 18 Oct 1998.
15. Owsley Fork, 2.4 km E Bighill at Rt. 21, Madison Co., 27 Oct 1998.
16. Station Camp Creek, 0.8 km SW Wagersville at Rt. 89, Estill Co., 16 Sep 1998 and 5 Oct 1998.
17. Edwards Branch, 0.5 km W Estilco at Middle Fork Station Camp Creek, Estill Co., 16 Jun 1998.
18. Station Camp Creek, 0.8 km NE Alumbaugh at Searcy Branch, Estill Co., 5 Oct 1998.
19. Station Camp Creek, Alumbaugh at low water ford, Estill Co., 19 Oct 1998.
20. Station Camp Creek, 2.4 km S Alumbaugh along Rt. 1209, Jackson Co., 25 Oct 1998.
21. Station Camp Creek, 4.0 km S Alumbaugh, Jackson Co. line along Rt. 1209, Estill Co., 19 Oct 1998.
22. Station Camp Creek, 2.4 km NW Old Orchard off Rt. 1209, Jackson Co., 18 Apr 1999.
23. Station Camp Creek, 1.6 km NW Old Orchard at mouth of War Fork, Jackson Co., 25 Apr 1999.
24. South Fork Station Camp Creek, 2.6 km N Wind Cave, 1.0 river km above mouth at tributary, Jackson Co., 25 Apr 1999.
25. South Fork Station Camp Creek, 3.6 km SE Drip Rock at mouth of Cavanaugh Creek, Jackson Co., 24 Apr 1999.
26. Cavanaugh Creek, 5.2 km NE Sand Springs, Jackson Co., 22 Aug 1998.
27. Cavanaugh Creek, 3.8 km NE Sand Springs, 0.5 river km below Hopper Cave Branch, Jackson Co., 22 Aug 1998.
28. Hopper Cave Branch, 3.4 km NE Sand Springs, 0.5 river km above mouth, Jackson Co., 22 Aug 1998.
29. Cavanaugh Creek, 3.4 km E Sand Springs at King Rd., Jackson Co., 22 Aug 1998.
30. South Fork Station Camp Creek, 2.4 km SE Drip Rock along East Fox Rd., Jackson Co., 24 Apr 1999.
31. South Fork Station Camp Creek, 4.8 km NE Sand Springs at Rt. 89, Jackson Co., 12 Aug 1998.
32. South Fork Station Camp Creek, 2.0 km NW Sand Springs at mouth of Rock Lick Creek, Jackson Co., 30 Apr 1999.
33. Rock Lick Creek, 1.8 km N Brazil at Chestnut Flat School Rd., Jackson Co., 29 Oct 1998.

Appendix A (continued).

34. South Fork Station Camp Creek, 1.8 km SW Brazil at Wilson Rd., Jackson Co., 25 Oct 1998.
35. South Fork Station Camp Creek, 0.8 km N Sandgap at Big Rock Rd., Jackson Co., 18 Jun 1998.
36. South Fork Station Camp Creek, 1.5 km SE Kerby Knob at Rt. 2004, Jackson Co., 25 Oct 1998.
37. Rock Lick Creek, 2.0 km NE Kerby Knob off Bronson Rd. at tributary, Jackson Co., 30 Apr 1999.
38. War Fork, 2.1 km NE Wind Cave, 0.6 river km above mouth, Jackson Co., 11 Apr 1999.
39. War Fork, 2.4 km N Turkey Foot at Resurgence Cave, Jackson Co., 18 Apr 1999.
40. War Fork, 0.4 km N Turkey Foot along Elsam Fork Rd., Jackson Co., 11 Nov 1998.
41. War Fork, Turkey Foot Recreation Area at Turkey Foot Rd., Jackson Co., 18 Jun 1998.
42. Hughes Fork, 0.8 km SE Turkey Foot at Turkey Foot Rd., Jackson Co., 18 Jun 1998.
43. War Fork, 3.0 km N Privett at War Fork Rd., Jackson Co., 21 Oct 1998.
44. Sturgeon Creek, Heidelberg, at mouth, Lee Co., 16 Dec 1998.
45. Sturgeon Creek, 1.6 km S Heidelberg, 1.2 river km above mouth, Lee Co., 12 and 18 Sep 1998.
46. Sturgeon Creek, 2.1 km S Heidelberg at Rt. 399, Lee Co., 19 Nov 1998.
47. Sturgeon Creek, 1.5 km NW Cressmont at Lower Sinking Creek, Lee Co., 14 Oct 1998.
48. Sturgeon Creek, 1.8 km SW Cressmont along Sturgeon Creek Rd., Lee Co., 14 Oct 1998.
49. Sturgeon Creek, 1.7 km W Delvinta at Rt. 587, Lee Co., 14 Oct 1998.
50. Sturgeon Creek, Wild Dog at Sturgeon Creek Rd., Owsley Co., 16 Oct 1998.
51. Wild Dog Creek, 0.2 km SW Wild Dog, 0.2 km above Sturgeon Creek, Owsley Co., 12 Sep 1998.
52. Sturgeon Creek, 3.7 km SW Travelers Rest along Rt. 30 and Sturgeon Creek Rd., Owsley Co., 11 Nov 1998.
53. Tributary to Sturgeon Creek, 4.5 km W Sturgeon off Rt. 1071, Jackson Co., 19 Nov 1998.
54. Sturgeon Creek, 4.8 km W Sturgeon at Rt. 1071, Owsley Co., 23 Oct 1998.
55. Sturgeon Creek, 4.0 km E Mummie at Rt. 30, Jackson Co., 16 Oct 1998.
56. Sturgeon Creek, 1.5 km S Elias at Herd-Elias Rd., Jackson Co., 21 Oct 1998.
57. Sturgeon Creek, 2.9 km E Zekes Point at Maulden Branch, Jackson Co., 25 Apr 1998.
58. Blackwater Creek, 1.0 km NE Mummie along Rt. 30, Jackson Co., 23 Oct 1998.
59. Blackwater Creek, 1.6 km SW Mummie at Rt. 30, Jackson Co., 21 Oct 1998.
60. Little Sturgeon Creek, 1.4 km N Travelers Rest, 0.4 river km below Hartsock Branch, Owsley Co., 15 Dec 1998.
61. Little Sturgeon Creek, Travelers Rest at Rt. 30, Owsley Co., 16 Oct 1998.
62. Little Sturgeon Creek, 0.4 km S Sturgeon at Rt. 30 and 846, Owsley Co., 23 Oct 1998.
63. Duck Fork, 2.2 km S Heidelberg at mouth, Lee Co., 19 Nov 1998.
64. Duck Fork, 1.0 km N Ida May along Rt. 399, Lee Co., 23 Oct 1998.
65. Duck Fork, 0.2 km N Ida May at Rt. 399, Lee Co., 16 Oct 1998.
- Duck Fork, 1.5 km S Ida May along Rt. 399, Lee Co., 23 Oct 1998.

Appendix B. Species presence in Station Camp Creek and Sturgeon Creek based upon this study and previous collections. G=generally distributed; O=occasional; S=sporadic [from Smith (1965)].

Family	STATION CAMP CREEK		STURGEON CREEK	
	Distribution	Collections this study/previous 46 / 79	Distribution	Collections this study/previous 24 / 45
<i>Species</i>				
Petromyzontidae				
<i>Ichthyomyzon fossor</i>	S	3 / 0		–
<i>Lampetra appendix</i>		–	S	1 / 0
Lepisosteidae				
<i>Lepisosteus osseus</i>	O	0 / 9	O	0 / 3
Hiodontidae				
<i>Hiodon tergisus</i>	O	0 / 4	S	0 / 1
Anguillidae				
<i>Anguilla rostrata</i>	O	0 / 5	S	0 / 1
Clupeidae				
<i>Dorosoma cepedianum</i>	O	3 / 7	S	1 / 2
Cyprinidae				
<i>Camptostoma anomalum</i>	G	36 / 53	G	21 / 33
<i>Cyprinella spiloptera</i>	G	11 / 21	G	4 / 10
<i>Cyprinella whipplei</i>	G	13 / 15	G	8 / 18
<i>Cyprinus carpio</i>	O	1 / 5	S	0 / 1
<i>Ericymba buccata</i>	G	14 / 17	G	10 / 15
<i>Erimystax dissimilis</i>		–	S	1 / 1
<i>Hybopsis amblops</i>	O	5 / 2	S	0 / 1
<i>Luxilus chrysocephalus</i>	G	32 / 63	G	15 / 36
<i>Lythrurus fasciolaris</i>	G	22 / 44	G	8 / 13
<i>Macrhybopsis aestivalis</i>		–	S	1 / 0
<i>Macrhybopsis storeriana</i>	S	2 / 3	S	0 / 1
<i>Nocomis micropogon</i>	G	13 / 25	G	13 / 26
<i>Notropis atherinoides</i>	G	9 / 8	G	9 / 13
<i>Notropis ludibundus</i>	O	4 / 5	S	2 / 1
<i>Notropis photogenis</i>	G	9 / 23	O	1 / 16
<i>Notropis rubellus</i>	G	15 / 33	G	13 / 28
<i>Notropis volucellus</i>	O	5 / 3	O	6 / 14
<i>Phoxinus erythrogaster</i>	G	14 / 19	S	2 / 2
<i>Pimephales notatus</i>	G	32 / 61	G	18 / 35
<i>Pimephales promelas</i>	S	0 / 1		–
<i>Semotilus atromaculatus</i>	G	29 / 37	G	15 / 32
Catostomidae				
<i>Catostomus commersoni</i>	O	7 / 11	O	7 / 4
<i>Hypentelium nigricans</i>	G	24 / 38	G	18 / 26
<i>Ictiobus bubalus</i>	S	0 / 2		–
<i>Minytrema melanops</i>	O	1 / 8	S	0 / 3
<i>Moxostoma anisurum</i>	S	0 / 3	S	1 / 1
<i>Moxostoma carinatum</i>	S	1 / 3	S	1 / 1
<i>Moxostoma duquesnei</i>	G	13 / 11	S	6 / 3
<i>Moxostoma erythrurum</i>	G	10 / 22	G	8 / 16
<i>Moxostoma macrolepidotum</i>	S	1 / 7	S	1 / 2
Ictaluridae				
<i>Ameiurus melas</i>	S	0 / 1	S	0 / 2
<i>Ameiurus natalis</i>	S	4 / 1	S	0 / 1
<i>Ictalurus punctatus</i>	S	0 / 1	S	0 / 3
<i>Noturus flavus</i>		–	O	7 / 8
<i>Noturus miurus</i>	O	5 / 7	S	0 / 1
<i>Pylodictus olivaris</i>	S	0 / 1	S	1 / 1

Appendix B (Continued).

Family	STATION CAMP CREEK		STURGEON CREEK	
	Distribution	Collections this study/previous	Distribution	Collections this study/previous
Species		46 / 79		24 / 45
Esocidae				
<i>Esox masquinongy</i>	O	2 / 6	O	1 / 3
Salmonidae				
<i>Oncorhynchus mykiss</i> *	O	1 / 8		–
Poeciliidae				
<i>Gambusia affinis</i>	S	1 / 1		–
Atherinidae				
<i>Labidesthes sicculus</i>	O	9 / 18	S	1 / 3
Cottidae				
<i>Cottus bairdi</i>	G	26 / 22		–
Centrarchidae				
<i>Ambloplites rupestris</i>	G	15 / 27	G	9 / 18
<i>Lepomis cyanellus</i>	G	14 / 15	G	15 / 24
<i>Lepomis gulosus</i>	O	1 / 4	S	0 / 2
<i>Lepomis macrochirus</i>	G	29 / 23	G	44 / 21
<i>Lepomis megalotis</i>	G	26 / 41	G	9 / 26
<i>Lepomis microlophus</i>		–	S	0 / 4
<i>Micropterus dolomieu</i>	G	17 / 20	G	10 / 18
<i>Micropterus punctulatus</i>	G	13 / 23	G	13 / 22
<i>Micropterus salmoides</i>	O	1 / 10	O	1 / 12
<i>Pomoxis annularis</i>	S	0 / 2	S	0 / 2
Percidae				
<i>Ammocrypta pellucida</i>		–	S	1 / 0
<i>Etheostoma baileyi</i>	G	23 / 21	G	15 / 31
<i>Etheostoma blennioides</i>	G	25 / 37	G	14 / 32
<i>Etheostoma caeruleum</i>	G	34 / 54	G	16 / 35
<i>Etheostoma camurum</i>	O	3 / 7	O	2 / 1
<i>Etheostoma flabellare</i>	G	37 / 41	G	21 / 33
<i>Etheostoma nigrum</i>	G	28 / 28	G	18 / 30
<i>Etheostoma sagitta</i>		–	O	3 / 11
<i>Etheostoma tippecanoe</i>		–	S	2 / 0
<i>Etheostoma variatum</i>	O	8 / 10	G	11 / 23
<i>Etheostoma zonale</i>	O	9 / 10	O	6 / 25
<i>Percina caprodes</i>	G	12 / 24	G	10 / 22
<i>Percina copelandi</i>		–	S	1 / 2
<i>Percina maculata</i>	G	5 / 19	G	5 / 18
<i>Percina sciera</i>	S	4 / 2		–
<i>Percina stictogaster</i>	G	5 / 17	O	2 / 12
Sciaenidae				
<i>Aplodinotus grunniens</i>	S	2 / 2	S	1 / 4
Hybrids				
<i>Notropis x Luxilus</i> hybrid	S	3 / 1	S	1 / 1
<i>Lepomis</i> hybrid	S	0 / 2	S	2 / 2
Total species		65		67

– not known from this stream

*stocked by KDFWR