BIOTIC COMMUNITY

Stream Fish Distribution and Abundance

The stream fish fauna of the Spring River Tributaries Watershed in Missouri is dominated by species characteristic of the Ozark Faunal Region which make up approximately 67 % of the total species in the watershed (Table Bc01) (MDC 1998a). Based on the faunal region classification of species as developed by Pflieger (1989) as well as distribution data presented by Pflieger (1997), percentages of species within the watershed which are characteristic of other faunal regions include 9% Ozark-Prairie, 4% Ozark-lowland, 2% prairie, and 11% widely distributed.

Since 1963, forty six fish species representing 13 families have been observed in the Spring River Tributaries Watershed in Missouri (Table Bc01 and Figure Bc01)(MDC 1998a and Pflieger 1997). This includes two species which are currently listed as "species of conservation concern": the blue sucker (Cycleptus elongatus) and the southern cavefish (Typhlichthys subterraneus) (MDC 1999a and MDC 1999b).

In 1997, fish were collected at four locations throughout the watershed as part of the watershed assessment and inventory (WAI) effort. These collections yielded 35 species of 12 families. 4 species had not been observed in previous collections from the watershed in Missouri cataloged in the Missouri Department of Conservation (MDC) Fish Collection Database. These species included brown trout (Salmo trutta), largemouth bass (Micropterus salmoides), rainbow trout (Oncorhynchus mykiss), as well as a single larval lamprey (family Petromyzontidae). All new species except for largemouth bass were collected on the main stem of the Warm Fork of the Spring River, a stream which, prior to 1986, had no MDC Fish Community Collection Data. Only 3 MDC fish community collections had been performed on the Warm Fork prior to the watershed assessment and inventory collections. These included collections in 1986, 1992, and one collection in 1996. Largemouth bass were collected at one site on the South Fork of the Spring River at White Ranch Conservation Area; an area which had not been previously sampled (MDC 1998a).

The western mosquito fish (Gambusia affinis) was found in the Warm Fork of the Spring River, a stream in which it had not been previously sampled. Its new found presence in the Warm Fork should be of no surprise in light of how this species has spread so quickly throughout the state. A survey in the 1940s indicated that its distribution in Missouri included the "Lowland Faunal Region and northward along the Mississippi River to Ramsey Creek in Pike County"(Pflieger 1997). Today the mosquito fish can be found in all of the faunal regions of the state.

Ten species which had been observed in the watershed prior to 1997 were absent in the WAI collections. These included the blue sucker (Cycleptus elongatus), Ozark chub (Erimystax harryi), creek chubsucker (Erimyzon oblongus), White River saddle darter (Etheostoma e. euzonum), banded darter (Etheostoma zonale), bigeye chub (Notropis amblops), Ohio logperch (Percina c. caprodes), fathead minnow (Pimephales promelas), creek chub (Semotilus atromaculatus) and southern cavefish (Typhlichthys subterraneus). For all species except bigeye chub, only a few individuals were observed in earlier MDC collections. One bigeye chub was observed in a 1963 collection from a single site on Myatt Creek. A combined 19 were observed in two 1992 collections. One collection was from the previous 1963 site on Myatt Creek, while the other site was located on the Warm Fork of the Spring River. Sites with habitat

typical of that inhabited by the southern cavefish as described by Pflieger (1997) were not sampled; thus nearly eliminating the possibility of an observation. Due to the small numbers of these 10 species found in earlier fish collections, and a shortage of historical data, it is difficult to determine the significance of the absence of these species in these latter collections. In order to gain a better understanding of the status of these species in the watershed, future fish community sampling will be necessary.

Sport Fish

Little data is available regarding sport fish populations within the Spring River Tributaries Watershed within Missouri. Much of this fishery consists of small, wadeable, creeks and small rivers. Because much of the land ownership within the watershed is private, stream fishing access is limited.

Most of the fishable streams within the Spring River Tributaries Watershed in Missouri can be considered warm water/cool water fisheries due to the somewhat sporadic spring influence within the watershed. Sunfish dominate these sport fisheries. Sport fish species (as defined as game fish in MDC 1999a) include shadow bass, and smallmouth bass. Largemouth bass, while prevalent in ponds and small lakes throughout the watershed, seem to play a lesser role in the stream sport fishery. Chain pickerel, brown trout, and rainbow trout have also been observed in the Warm Fork of the Spring River. Along with the previously mentioned sport fish species, bluegill, green sunfish, longear sunfish, northern hogsucker and black redhorse occur in the streams throughout the watershed.

Approximately 3.1 miles of the Warm Fork of the Spring River is designated as a "coldwater sport fishery" within the Rules of Department of Natural Resources Division 20-Clean Water Commission (1996). As previously mentioned three individuals of two species of salmonids (brown trout and rainbow trout) have been observed in fish collections in the watershed. Incidentally only one of the individuals was observed in the designated area. Despite these observations this is not considered to be a significant salmonid fishery.

Due to its limited size, the fishery of the Spring River Tributaries Watershed could be susceptible to over-exploitation. However, the large amount of land in private ownership and thus limited access probably helps lessen this risk.

Fish Stocking

There have been no official fish stocking efforts within the Spring River Tributaries Watershed in Missouri (Mayers, personal communication). There are currently no public fishing lakes within the Spring River Tributaries Watershed. Grass carp (Ctenopharyngodon idella), bluegill, largemouth bass, and channel catfish are routinely stocked in private lakes and ponds throughout the watershed. However it is difficult to estimate the extent of this due to the possibility of stocking by private aquaculture. Potential for these fish to be introduced into streams of the watershed during heavy rain events always exists. Undoubtably, bait bucket releases have also occurred in streams throughout the watershed. Effects of these introductions vary. While the introduction of species already present in the watershed may have minimal to no effect, the introduction of non-native species can often times have disastrous consequences.

Mussels

Little information exists regarding freshwater mussel species within the Spring River Tributaries Watershed in Missouri. As of this writing, no comprehensive mussel collections have been performed in

the watershed. However, Duchrow (1977) does list 3 mussel species identified in benthic invertebrate samples performed on the Warm Fork of the Spring River in 1974. These include the Ozark Pigtoe, (Fusconaia ozarkensis); yellow sand shell (Lampsilis teres teres); and Ozark Brokenray (Lampsilis reeviana brevicula). In addition, Oesch (1995) mentions 3 species which have been identified from the Spring River Tributaries Watershed in Missouri. These are the paper pondshell (Utterbackia imbecillis); Arkansas Brokenray (Lampsilis reeviana reeviana); and the creeper (Strophitus undulatus undulatus). L. reeviana reeviana is listed as a "species of conservation concern" (MDC 1999b). One non-native species, the Asian Clam (Corbicula fluminea), has been observed at two sites on the Warm Fork (MDC 1998d). Of the five species identified from the watershed; one, L. teres teres, has not been observed in adjoining watersheds in Missouri. In addition to the five mussel species found in Missouri, 18 species have been identified from the South Fork of the Spring River in Arkansas (Table Bc02) (Faiman, personal communication). Four of these species are listed as "species of conservation concern" including, the Curtis' Pearlymussel (Epioblasma florentina curtisi) which is a state and federal endangered species, (Bruenderman, personal communication; MDC 1999b).

As stated previously, there appears to be little baseline information available regarding freshwater mussel communities within the Spring River Tributaries Watershed in Missouri. Future sampling will be necessary in order to gain an adequate assessment of the freshwater mussel community and it's distribution within the Spring River Tributaries Watershed in Missouri. Once adequate baseline data is obtained, a schedule for monitoring can be established.

Crayfish

Eight species of crayfish have been collected at 4 sites or reported from the Spring River Tributaries Watershed. (Table Bc03 and Figure Bc02)(MDC 1988, MDC 1998c, and Pflieger 1996). Three of these species are listed as "species of conservation concern". These include the Salem cave crayfish (Cambarus hubrichti); coldwater crayfish (Orconectus eupunctus); and the Mammoth Spring crayfish (Orconectes marchandi) (MDC 1999b).

The Salem cave crayfish (Cambarus hubrichti) has been recorded at two sites within the Watershed (MDC 1988, MDC 1998c, and Pflieger 1996). The Salem cave crayfish has been found only in Missouri and is believed to occur throughout the Eastern Ozarks from Camden to Crawford Counties, southward to Oregon and Ripley Counties (Pflieger 1996). As its name suggests, it is a subterranean species which has been observed in a variety of subterranean habitats such as cave streams over various substrates, subterranean lakes, as well as the outlets of large springs near the limit of daylight (Pflieger 1996). It has also, on occasion, been observed in more terrestrial areas such as the outflow of a small spring, the pool at the bottom of a deep sinkhole, and the ruts left by a truck in a fen.

The coldwater crayfish (Orconectus eupunctus) has been collected from one site within the Spring River Tributaries Watershed. In Missouri, it occurs only within the Spring River Tributaries and Eleven Point Watersheds (MDC 1988, MDC 1998c and Pflieger 1996). As its name suggests the coldwater crayfish seems to prefer streams whose temperature is highly influenced by springs (Pflieger 1996). Within the Eleven Point Watershed, this species only inhabits the Eleven Point River and Greer Spring Branch. It does not ascend the river much above Greer Spring.

The mammoth spring crayfish (Orconectes marchandi) generally occupies riffles over a gravel or rubble substrate. In Missouri it is known only to occur in the Warm Fork of the Spring River (Pflieger 1996).

In addition to the previously mentioned species, 5 other crayfish have been identified from the Spring River Tributaries Watershed. These include the Hubbs' Crayfish (Cambarus hubbsi); Ozark crayfish (Orconectes ozarkae); spothanded crayfish (Orconectus punctimanus); and the northern crayfish (Orconectus virilis) (MDC 1988, MDC 1998c, and Pflieger 1996).

As of this writing (1999), all major subwatersheds within the Spring River Tributaries Watershed have available (within the Missouri Department of Conservation Database) crayfish collection data except for the Myatt Creek Subwatershed. In order to adequately assess and monitor the crayfish community of the watershed including "species of conservation concern", future monitoring on a regular basis will be necessary. Also, it will be necessary to extend sampling efforts to the Myatt Creek Subwatershed in order to develop an adequate baseline of crayfish community data.

Aquatic Insects

Benthic macro-invertebrates were sampled within the Spring River Tributaries Watershed in 1974 (Table Bc04 and Figure Bc03)(Duchrow 1977 and MDC 1998c). A total of 8 collections were made from 2 sites both of which were on the Warm Fork of the Spring River. These collections yielded 7,963 individuals of 74 species, 45 families, and 18 orders. Analysis of collection data indicate that species of the order Ephemeroptera were the most prevalent comprising between 34% and 70% of individuals observed in each collection (Table Bc05).

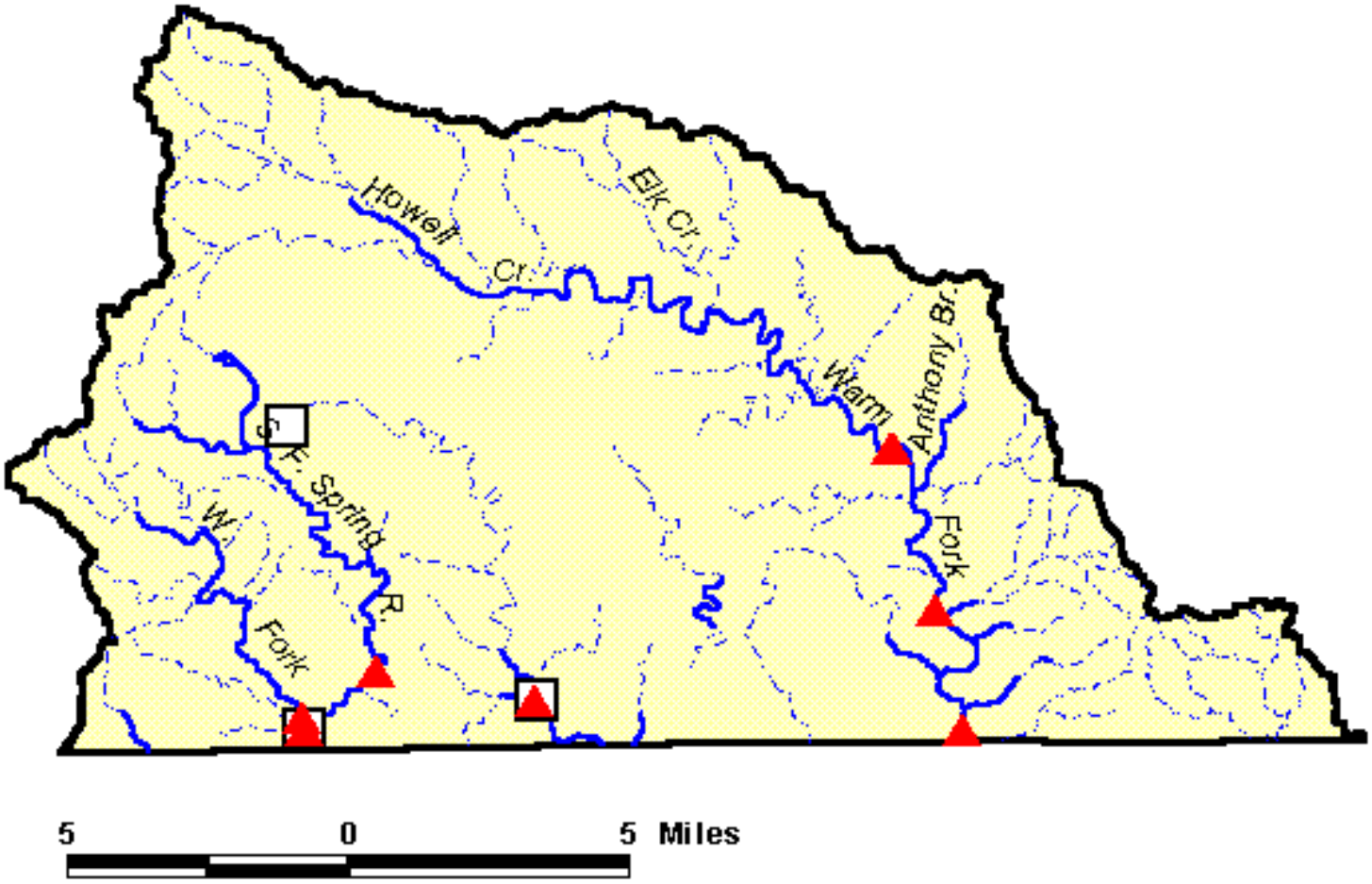
Benthic invertebrate sampling is an important component to water quality monitoring. Unfortunately no long term comprehensive benthic invertebrate data exists for the entire Spring River Tributaries Watershed. Future Benthic invertebrate sampling will be necessary in order to provide adequate benthic invertebrate community as well water quality monitoring for the entire watershed .

Species of Conservation Concern

As of this writing, there are 39 species and sub-species of conservation concern within the Spring River Tributaries Watershed (Table Bc06) (MDC 1999a and MDC 1999b). This includes two fish species (blue sucker and southern cavefish), one mussel species (Arkansas Brokenray), and three crayfish species (coldwater crayfish, Mammoth Spring Crayfish, and Salem Cave Crayfish).

Figure Bc01.

Spring River Tributaries Watershed
Fish Community Sampling Sites



Legend

1963-1979

1980-1998

Dates are for collections within MDC fish collection database as well as collections performed by MDC Ozark Fisheries Region Personnel.

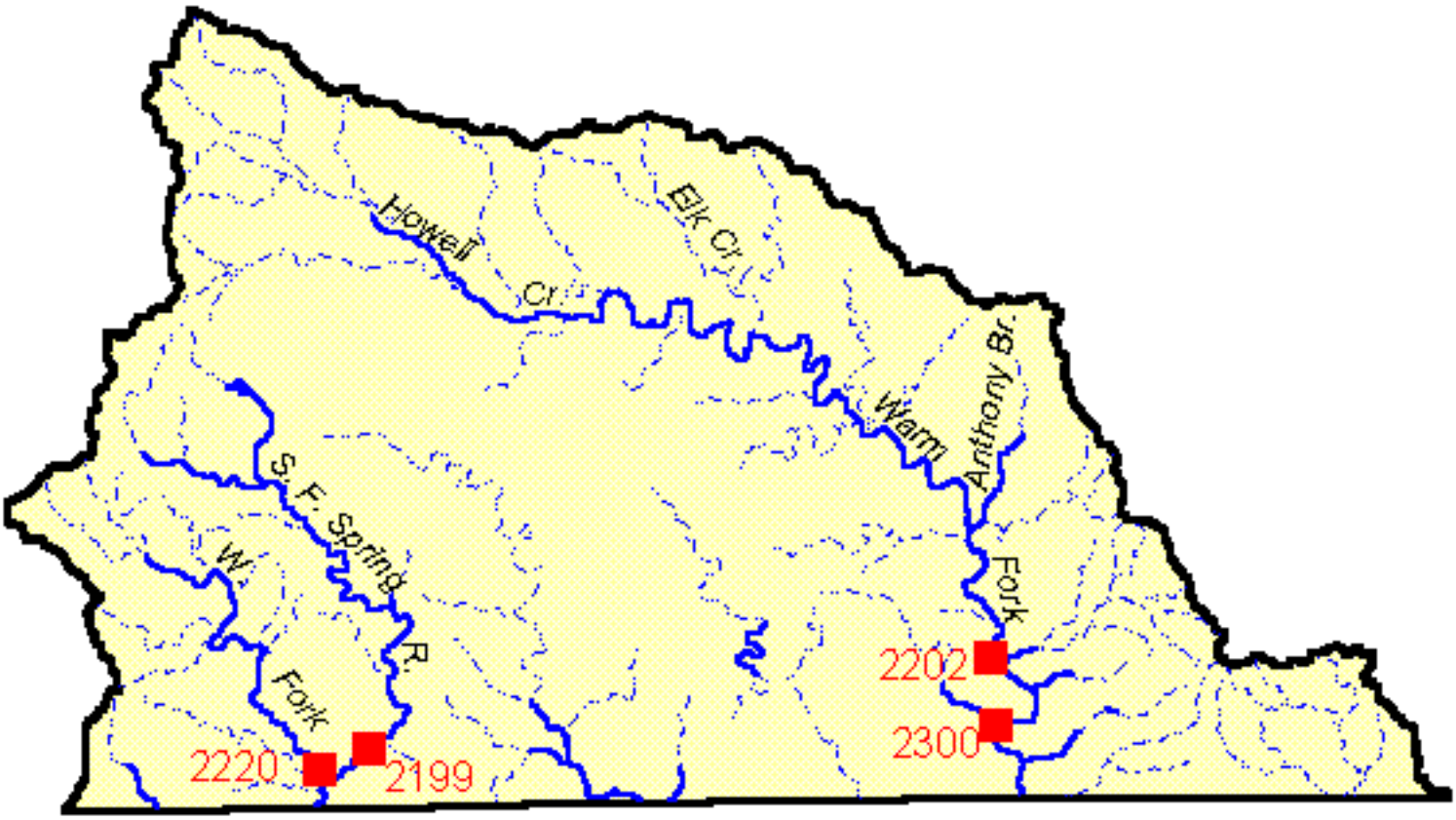
N

MDC 3/1999

Figure Bc02.

Spring River Tributaries Watershed

Crayfish Community Sampling Sites



5 0 5 Miles

N

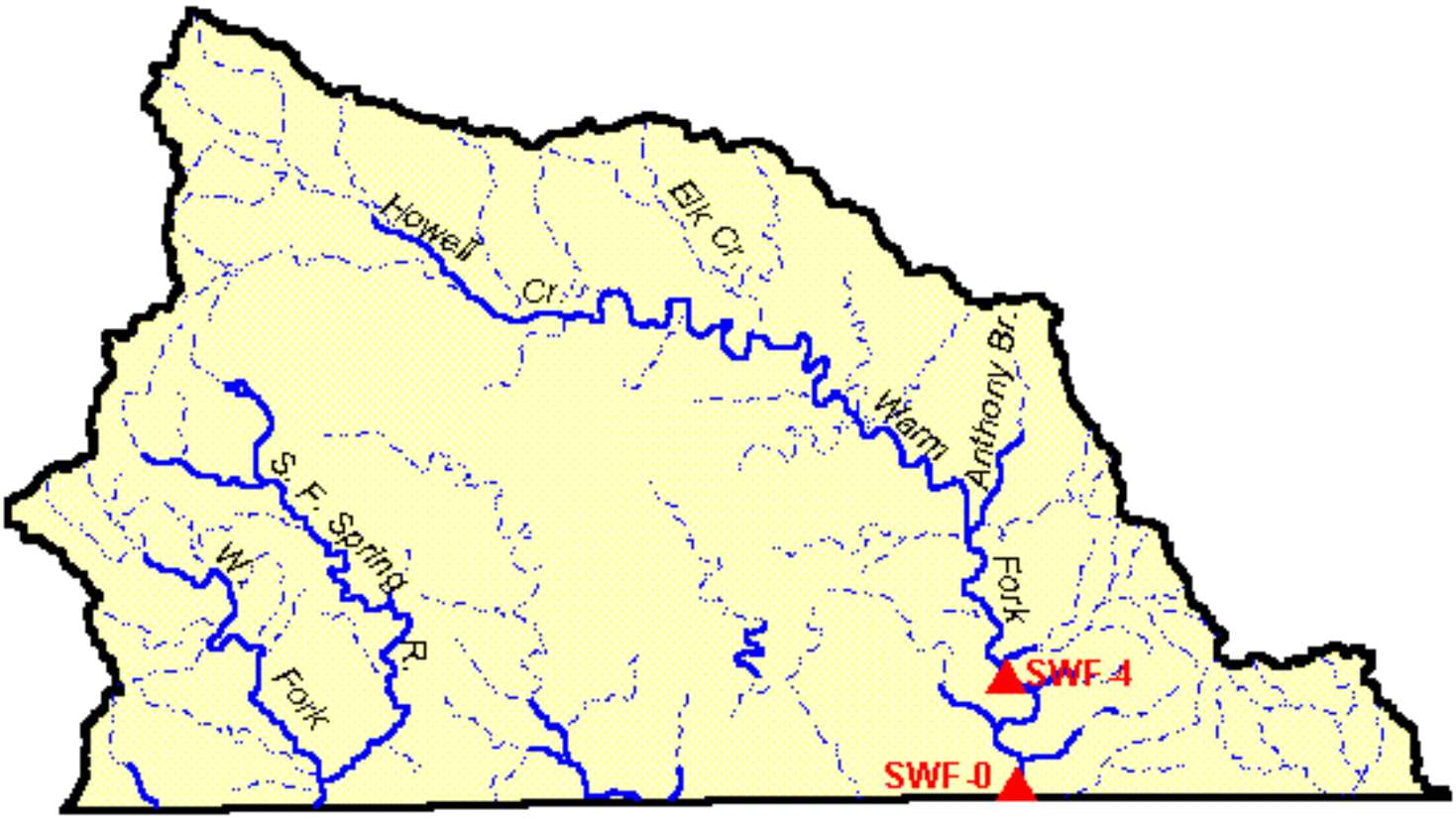
Legend

■ Crayfish Community Sample Site (1998c).

MDC 3/1999

Figure Bc03.

Spring River Tributaries Watershed
Benthic Community Sampling Sites



5 0 5 Miles

Legend

▲ Benthic Community Sample Site (1998d)

N

MDC 3/1999

Table Bc01. Fish species with a distribution range of the Spring River Tributaries Watershed in Missouri.

Common Name	Scientific Name	Trophic Guild	Geo Affinity	Sam. Date
Banded darter	Etheostoma zonale	P	O	1,2
Banded sculpin*	Cottus carolinae	P	O	2
Bigeye chub	Notropis amblops	ND	O	1,2
Bigeye shiner*	Notropis boops	P	O	1,2
Black redhorse*	Moxostoma duquesnei	O	O	2
Black spotted topminnow*	Fundulus olivaceus	O	L,O	1,2
Bleeding shiner	Luxilus zonatus	P	O	1,2
Blue sucker	Cycleptus elongatus	O	R	2
Bluegill	Lepomis macrochirus	P	WIDE	2
Bluntnose minnow	Pimepales notatus	O	WIDE	1,2
Brook silverside*	Labidesthes sicculus	P	O	1,2
Brown trout	Salmo trutta	P	O	2
Central stoneroller	Campostoma anomalum	P	O,P	1,2
Chain pickerel	Esox niger	P	O	2
Creek chub	Semotilus atromaculatus	P	O,P	1
Creek chubsucker	Erimyzon oblongus	P	O	1
Current Orange Throat Darter	Etheostoma uniporum	P	O	1,2
Fathead Minnow	Pimephales promelas	O	P	1
Green sunfish	Lepomis cyanellus	P	WIDE	1,2
Greenside darter	Ehtheostoma blennioides	P	O	1,2
Hornyhead chub*	Nocomis biguttatus	O	O	1,2
Largescale stoneroller*	Campostoma oligolepis	H	O	1,2
Largemouth bass	Micropterus salmoides	P	WIDE	2
Larval lamprey	Ichthyomyzon	ND	ND	2
Longear sunfish	Lepomis megalotis	P	L,O	1,2
Northern hogsucker*	Hypentelium nigricans	H	O	1,2
Northern studfish	Fundulus catenatus	P	O	1,2
Ohio logperch	Percina c. caprodes	P	O	1
Ozark chub	Erimystax harryi	ND	ND	2
Ozark minnow	Notropis nubilus	H	O	1,2
Ozark madtom	Noturus albater	P	O	1,2
Ozark sculpin	Cottus hypselurus	P	O	2
Rainbow darter	Etheostoma caeruleum	P	O	1,2

Rainbow trout	Oncorhynchus mykiss	P	O	2
Rosyface shiner*	Notropis rubellus	O	O	2
Shadow bass	Ambloplites ariommus	P	O	1,2
Slender madtom*	Noturus exilis	P	O	1,2
Smallmouth bass*	Micropterus dolomieui	P	O	2
Striped fantail darter	Etheostoma f. lineolatum	P	O,P	1,2
Striped shiner*	Luxilus chrysocephalus	O	O	1,2
Telescope shiner	Notropis telescopus	O	O	1,2
Southern cavefish	Typhlichthys subterraneus	O	O	2
Western Mosquitofish	Gambusia affinis	O	WIDE	2
White River Saddled Darter	Etheostoma e. euzonum	ND	O	1
White sucker	Catostomus commersoni	P	O,P	2
Whitetail shiner	Cyprinella galactura	P	O	1,2

*** = (intolerant species)**

Trophic Guild: H = Herbivore, P = Predator, O = Omnivore

Geographic Affinity: L = Lowland, O = Ozark, P = Prairie, R = Big River

Table Bc02. Freshwater mussel species found within the Spring River Watershed in Missouri (bold) and the South Fork of the Spring River in Arkansas (Bruenderman, personal communication-1; Duchrow 1977-2; Faiman, personal correspondence-3; MDC 1998d-4; Oesch 1995-5; and Turgeon et al.1998).

Scientific Name	*Common Name*	*Source*	*State Status*	*Federal Status*
Actinonaias ligamentina	*Mucket*	*3*		
*Alasmidonta marginata**	*Elk Toe*	*3*		#
Amblema plicata	*Threeridge*	*3*		
Corbicula fluminea	*Asian Clam*	*4*		
Cyclonaias tuberculata	*Purple Wartyback*	*3*		
Elliptio dilatata	*Spike*	*3*		
*Epioblasma florentina curtisi**	*Curtis' Pearlymussel*	*1*	*E*	*E*
Fusconaia flava	*Wabash Pigtoe*	*3*		
Fusconaia ozarkensis	*Ozark Pigtoe*	*2*		
Lampsilis cardium	*Plain Pocketbook*	*3*		
Lampsilis reeviana brevicula	*Ozark Brokenray*	*2*		
*Lampsilis reeviana reeviana**	*Arkansas Brokenray*	*5*		
Lampsilis teres teres	*Yellow Sandshell*	*2*		
Lasmigona costata	*Flutedshell*	*3*		
Pleurobema sintoxia	*Round pigtoe*	*3*		
Potamilus purpuratus	*Bleufer*	*3*		
*Ptychobranchus occidentalis**	*Ouachita Kidneyshell*	*3*		#

Quadrula metanevra	*Monkeyface*	*3*		
Strophitus undulatus	*Creeper*	*5*		
*Toxolasma lividus**	*Purple Lilliput*	*3*		#
Utterbackia imbecillis	*Paper Pondshell*	*5*		
Venustaconcha pleasi	*Bleedingtooth Mussel*	*3*		
Villosa iris	*Rainbow*	*3*		
Villosa lienosa	*Little Spectaclecase*	*3*		

**** Species of Conservation Concern (MDC 1999a)***

 # Former category-2 candidate (In December of 1996, the USFWS discontinued the practice of maintaining a list of species regarded as "category-2 candidates". MDC continues to distinguish these species for information and planning purposes.)

Note: Data in table subject to revision. This table is not a final authority.

Table Bc03. Summary of Missouri Department of Conservation crayfish collection database for collections within the Spring River Tributaries Watershed (MDC 1988 and MDC 1998c).

Stream Date	Site	*Cambarus hubbsi*	*Orconectes eupunctus*	*Orconectes marchandi*
Warm Fork 13 Nov. 1985	*2202E*	*23*	*-*	*24*
Warm Fork 17 July, 1985	*2202D*	*17*	*-*	*33*
Warm Fork 18 Sep. 1984	*2202C*	*-*	*-*	*48*
West Fork 18 Sep. 1984	*2220D*	*5*	*39*	*-*
West Fork 22 Mar. 1984	*2220C*	*7*	*4*	*-*
South Fork 27 Mar. 1985	*2199C*	*-*	*-*	*-*
*BASIN TOTALS**		*52(8.3)*	*43(6.8)*	*105(16.7)*

Stream Date	*Site*	*Orconectes ozarkae*	*Orconectes punctimanus*
Warm Fork 13 Nov. 1985	*2202E*	*19*	*60*
Warm Fork 17 July, 1985	*2202D*	*7*	*28*
Warm Fork 18 Sep. 1984	*2202C*	*4*	*47*
West Fork 18 Sep. 1984	*2220D*	*66*	*9*

West Fork 22 Mar. 1984	***2220C***	***34***	***5***
South Fork 27 Mar. 1985	***2199C***	***132***	***18***
BASIN TOTALS*		***262(41.7)***	***167(26.5)***

****Percent of total collected in watershed given in parentheses***

Note: Two species which occur within the Spring River Tributaries aren't currently included in the database. These are the Salem Cave Crayfish, Cambarus hubrichti and the northern crayfish, Orconectes virilis (Pflieger 1996).

Table Bc04. Summary of riffle habitat benthic invertebrate collections from the Spring River Tributaries Watershed (Missouri). Numbers beside taxa indicate total number collected with the average number/ft^2 in parentheses. (*) indicates none found(MDC 1998d).

	Location 8 22 Jan. 1974	Location 8 17 Apr. 1974	Location 8 13 Aug. 1974
Total No. Organisms	214 (35.7)	2251 (187.6)	782 (97.7)
Amphipoda	*	*	*
Coleoptera	3 (<1.0)	40 (3.3)	24 (3.0)
Decapoda	*	*	*
Diptera	16 (2.7)	310 (25.8)	59 (7.4)
Ephemeroptera	80 (13.3)	1019 (84.9)	408 (51.0)
Hemiptera	*	*	*
Hydracarina	*	4 (<1.0)	*
Isopoda	*	*	*
Lepidoptera	*	*	*
Lymnophila	3 (<1.0)	6 (<1.0)	1 (<1.0)
Megagastropoda	54 (9.0)	54 (4.5)	2 (<1.0)
Megaloptera	*	*	8 (1.0)
Odonata	*	*	*
Plecoptera	5 (<1.0)	24 (2.0)	2 (<1.0)
Trichoptera	50 (8.3)	661 (55.1)	256 (32.0)
Tricladida	*	6 (<1.0)	4 (<1.0)
Unionoida	2 (<1.0)	*	*
Veneroida	*	2 (<1.0)	*
Oligochaeta (species)	1 (<1.0)	124 (10.3)	12 (1.5)
Gordiida (species)	*	1 (<1.0)	*
Nemata (species)	*	*	6 (<1.0)

Branchiobdellidae (species)	*	*	*
	Location 8 24 Oct. 1974	Location 9 22 Jan. 1974	Location 9 17 Apr. 1974
Total No. Organisms	892 (111.5)	461 (57.6)	1268 (158.5)
Amphipoda	1 (<1.0)	1 (<1.0)	1 (<1.0)
Coleoptera	51 (6.4)	10 (1.3)	42 (5.2)
Decapoda	2 (<1.0)	1 (1.0)	*
Diptera	110 (13.7)	51 (6.4)	217 (27.1)
Ephemeroptera	307 (38.4)	323 (40.4)	713 (89.1)
Hemiptera	*	*	*
Hydracarina	7 (<1.0)	*	*
Isopoda	*	1 (<1.0)	8 (1.0)
Lepidoptera	1 (<1.0)	*	*
Lymnophila	3 (<1.0)	3 (<1.0)	4 (<1.0)
Megagastropoda	84 (10.5)	19 (2.4)	15 (1.9)
Megaloptera	5 (<1.0)	2 (<1.0)	3 (<1.0)
Odonata	*	*	1 (<1.0)
Plecoptera	1 (<1.0)	5 (<1.0)	18 (2.3)
Trichoptera	290 (36.3)	38 (4.7)	212 (26.5)
Tricladida	20 (2.5)	5 (<1.0)	8 (1.0)
Unionoida	*	*	*
Veneroida	*	*	*
Oligochaeta (species)	8 (1.0)	2 (<1.0)	26 (3.3)
Gordiida (species)	*	*	*
Nemata (species)	2 (<1.0)	*	*
Branchiobdellidae (species)	*	*	*

	Location 9 13 Aug. 1974	Location 9 24 Oct. 1974
Total No. Organisms	1304 (108.7)	791 (98.9)
Amphipoda	*	*
Coleoptera	89 (7.4)	36 (4.5)
Decapoda	7 (<1.0)	2 (<1.0)
Diptera	119 (9.9)	101 (12.6)
Ephemeroptera	693 (57.7)	450 (562)
Hemiptera	2 (<1.0)	*
Hydracarina	2 (<1.0)	8 (1.0)
Isopoda	3 (<1.0)	1 (<1.0)
Lepidoptera	*	*
Lymnophila	61 (5.1)	22 (2.7)
Megagastropoda	39 (3.3)	22 (2.7)
Megaloptera	7 (<1.0)	6 (<1.0)
Odonata	1 (<1.0)	*
Plecoptera	8 (1.0)	1 (<1.0)
Trichoptera	255 (21.3)	124 (15.5)
Tricladida	4 (<1.0)	15 (1.9)
Unionoida	*	*
Veneroida	*	*
Oligochaeta (species)	13 (1.1)	3 (<1.0)
Gordiida (species)	*	*
Nemata (species)	*	*
Branchiobdellidae (species)	1 (<1.0)	*

Table BC05. Dominant benthic invertebrate taxonomic groups for two sample sites on the Warm Fork of the Spring River (Duchrow 1977). Site: SWF-4

Mayflies 57% (Ephemeroptera)	**Caddisflies 16% (Trichoptera)**	**True flies 13% (Diptera)**
Pseudocloeon sp. 40%	**Hydropsyche bifida(gp.) 52%**	**Chironomidae 82%**
Baetis sp. 19%	**Psychomyia flavida 20%**	**Empididae 16%**
Tricorythodes sp. 14%	**Cheumatopsych sp. 19%**	**Ceratopogonidae 1%**
Stenonema nepotellum 12%		

Site: SWF-0

Mayflies 44% (Ephemeroptera)	**Caddisflies 30% (Trichoptera)**	**True flies 12% (Diptera)**
Pseudocloeon sp. 33%	**Cheumatopsych sp. 39%**	**Chironomidae 85%**
Tricorythodes sp. 16%	**Hydropsyche bifida(gp.) 29%**	**Empididae 14%**
Stenonema nepotellum 16%	**Psychomyia flavida 23%**	**Simulidae < 1%**
Baetis intercalaris 14%		

Table Bc06. Species of conservation concern within the Spring River Tributaries Watershed, Missouri (Oesch 1995, Pflieger 1996, MDC 1999a and MDC 1999b).

Scientific Name	*Common Name*	*Federal Status*	*State Status*	*Grank*	*Srank*
Birds					
Accipiter cooperii	*Cooper's Hawk*			*G5*	*S3*
Ardea herodias	*Great Blue Heron*			*G5*	*S5*
Fish					
Cycleptus elongatus	*Blue Sucker*	*		*G4*	*S3*
Typhlichthys subterraneus	*Southern Cavefish*			*G3*	*S2S3*
Invertebrates					
Cambarus hubrichti	*Salem Cave Crayfish*			*G2*	*S3*
Lampsilis reeviana reeviana	*Arkansas Brokenray*			*G3T1T2*	*S2?*
Orconectes eupunctus	*Coldwater Crayfish*			*G2*	*S3*
Orconectes marchandi	*Mammoth Spring Crayfish*			*G2*	*S1S2*
Plants, Ferns, Fern Allies, and Mosses					
Amsonia ciliata var. filifolia	*Ciliate Blue Star*			*G5?T4?*	*S2S3*

Aster dumosus var. strictior	*Tradescant Aster*			*G5T4*	*S2*
Aster fragilis var. fragilis	*Small White Aster*			*G4G5T?*	*S1*
Boltonia decurrens	*Decurrent False Aster*	*T*	*E*	*G2*	*S1*
Carex alata	*Broadwing Sedge*			*G5*	*S2S3*
Carex buxbaumii	*Brown Bog Sedge*			*G5*	*S2*
Carex decomposita	*Epiphytic Sedge*			*G3*	*S3*
Carex oklahomensis	*Oklahoma Sedge*			*G3?*	*S2*
Scientific Name	*Common Name*	*Federal Status*	*State Status*	*G rank*	*S rank*
Castanea pumila var. ozarkensis	*Ozark Chinquapin*	*		*G5T3*	*S2*
Coelorachis cylindrica	*Joint Grass*			*G4G5*	*S1*
Dalea gattingeri	*Gattinger Prairie-clover*			*G3G4*	*S1*
Delphinium exaltatum	*Tall Larkspur*	*		*G3*	*S2*
Dichondra carolinensis	*Pony-foot Grass*			*G5*	*S1*

Echinodorus tenellus var. parvulus	*Dwarf Burhead*	*	*G3T3*	*S1*
Glyceria acutiflora	*Sharp-scaled Manna Grass*		*G5*	*S3*
Hydrolea ovata	*Ovate Fiddleleaf*		*G5*	*S2*
Hypericum lobocarpum	*A St. John's Wort*		*G4Q*	*SH*
Juncus validus	*A Rush*		*G5*	*S1*
Marshallia caespitosa var. caespitosa	*Barbara's Buttons*		*G4T4*	*S3*
Mecardonia acuminata	*Water Hyssop*		*G5*	*S1*
Najas flexilis	*A Naiad*		*G5*	*S1S2*
Ophioglossum crotalophoroides	*Bulbous Adder's-tongue*		*G5*	*S1*
Platanthera flava var. flava	*Pale Green Orchid*		*G4T4?Q*	*S2*

Platanthera flava var. herbiola	*Northern Rein Orchid*			*G4T4Q*	*S2*
Potamogeton pulcher	*Spotted Pondweed*			*G5*	*S2S3*
Schoenoplectus hallii	*Hall's Bulrush*	*		*G2*	*S1*
Scleria reticularis var. pubescens	*Muhlenberg's Nut-rush*			*G5*	*S1*
Scientific Name	*Common Name*	*Federal Status*	*State Status*	*G rank*	*S rank*
Sida elliottii	*Elliott Sida*			*G4G5*	*S1*
Sisyrinchium atlanticum	*Eastern Blue-eyed Grass*			*G5*	*S2*
Trillium pusillum var. ozarkanum	*Ozark Wake Robin*	*		*G3T3*	*S2*
Xyris torta	*Yellow-eyed Grass*			*G5*	*S1*
Yucca arkansana	*Arkansas Yucca*			*G5*	*S2*

Federal Status
E=Endangered
T=Threatened
*** =Former category-2 candidate (In December of 1996, the USFWS discontinued the practice of maintaining a list of species regarded as "category-2 candidates". MDC continues to distinguish these species for information and planning purposes.***
State Status
SRrank
S1=Critically imperiled in the state because of extreme rarity or because of some factor(s) making it

especially vulnerable to extirpation from the state. (typically 5 or fewer occurrences or very few remaining individuals)
S2=Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. (6 to 20 occurrences or few remaining individuals or acres)
S3=Rare and uncommon in the state. (21 to 100 occurrences)
S4=Widespread, abundant, and apparently secure in state, with many occurrences, but the species is of long-term concern. (usually more than 100 occurrences)
S5=Demonstrably widespread, abundant, and secure in the state, and essentially ineradicable under present conditions.
SU=Unrankable: Possibly in peril in the state, but status uncertain; need more information.
SE=Exotic: An exotic established in the state; may be native in nearby regions.
SH=Historical: Element occurred historically in the state (with expectation that it may be rediscovered). Perhaps having not been verified in the past 20 years, and suspected to be still extant.
SX=Extirpated: Element is believed to be extirpated from the state.
S?=Unranked: Species is not yet ranked in the state.
Qualifier:
? =Inexact or uncertain: for numeric ranks, denotes inexactness. (The ? qualifies the character immediately preceding it in Srank)
Q=Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.
Grank
G1=Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. (typically 5 or fewer occurrences or very few remaining individuals or acres)
G2=Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction throughout its range. (6 to 20 occurrences or few remaining individuals or acres)
G3=Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range. (21 to 100 occurrences)
G4=Widespread, abundant, and apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery. Thus, the element is of long-term concern. (usually more than 100 occurrences)
G5=Demonstrably Widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery.
Subrank:
T=Taxonomic subdivision: rank applies to subspecies or variety.
Note: Data in table subject to revision. This table is not a final authority.