

# ***BIOTIC COMMUNITY***

## **Fish Community**

Twenty-six fish sampling stations are present among 9 streams in the basin (Figure fc1). Fish collections were made at 4 sites in 1940, 10 sites in 1961-66, 10 sites in 1977-79, and 21 sites in 1995-98 using drag and kick seines, or backpack electrofishing equipment.

A total of 71 fish species were collected basinwide since 1940. Sixty-six species were represented in the three largest streams, the Moreau, North and South Moreau creeks, and 44 species were represented in the six smaller streams (Burris Fork, Straight Fork, Brush Creek, Clark Fork, Willow Fork, and unnamed tributary) in the basin (Tables 1 and 2). Most streams had appropriately diverse fish fauna, however, some changes in fish species abundance and distribution have occurred in recent years and are discussed below.

The fish fauna of the Moreau basin reflects a blending of Ozark-Missouri and Prairie-Lower Missouri aquatic fauna. In the two most recent collection periods, 1977-79 and 1995-98, across all sizes of streams, approximately 56% of the fauna was Ozark in character, 21% were species of broad adaptability and wide range, 15% were typical prairie species and 5% were lowland species (Figure fc2). Big river fauna (4%) was concentrated in the Moreau River.

Three species (Missouri saddled darter, emerald shiner, and gravel chub) were only found in large river habitats. The Missouri saddled darter was present in the Moreau River, lower South Moreau (RM 5) and lower North Moreau ( $\leq$  RM 16) creeks. The emerald shiner, a species preferring open channels of large rivers with moderate to low gradient, only occurred in the Moreau River. The gravel chub inhabited the lower North Moreau Creek (RM  $\leq$  16) and middle to upper Moreau River (RM  $\geq$  18).

The common carp, the only exotic species found in the basin, was last collected in 1977 in the Moreau River at RM 3. Despite few capture records, carp from the Missouri River probably frequent the lower reaches of the Moreau on a regular basis.

Spotted bass and western mosquitofish have become more widespread in the Moreau, South and North Moreau creeks, and Burris Fork drainages in the last 40 years. Neither species were collected in these rivers in 1940. However, the proportions of sites where spotted bass were collected has increased from 10% to 64% from the 60's to the 90's and the sites having mosquitofish increased from 0 to 36% during this same time period (Table 3). Our findings are consistent with Pflieger's (1997) observation that the range of the mosquitofish has been naturally expanding over the last 50 years. The expansion of spotted bass into the Moreau system is believed to be associated with an undocumented stocking into the Osage drainage sometime prior to the 1940's.

At the same time that the range of the spotted bass has been expanding, the range of smallmouth bass has been shrinking in this watershed. In the 1990's, smallmouth bass were collected at one site on Burris Fork and at one site on the upper Moreau River. At seven other sites (on Straight

Fork, North Moreau Creek, South Moreau Creek) where they had previously been collected, no fish were taken during recent sampling. Pflieger (1997) partly attributes this decline in abundance from hybridization with spotted bass, increased siltation, and poorer base water flows.

Two species, southern redbelly dace and Ozark sculpin, were collected at the fringe or outside of their normal distribution. One southern redbelly dace was collected in 1996 in the small fourth order Clark Fork, a tributary to South Moreau Creek. This locality is along the northern fringe of its normal range. The dace typically inhabits permanently flowing small creeks and spring branches with clear, cool water and sand or gravel substrates. In 1995, one Ozark sculpin was taken at RM 8 on Straight Fork. This sculpin was taken farther north than its typical distribution in the central and southern Ozarks, however, isolated populations do occur in the Osage and Gasconade drainages. In the Ozarks, it is abundant in spring-fed streams. These species suggest the possibility of finding some areas of unique habitat on Straight Fork and Clark Fork.

There were seven species only taken in 1940-1966 surveys. They included the chestnut lamprey, Topeka shiner, white bass, walleye, plains topminnow, common shiner, and blacknose shiner. Four of these seven species (Topeka shiner, walleye, common shiner, blacknose shiner) are considered intolerant of habitat perturbations and are often the first species to decline following changes to their environment. Populations of chestnut lamprey, white bass and walleye are secure in Missouri. Our inability to recapture these species could have been due to sampling method rather than changes in abundance because these are large fish and they are not as susceptible to seining as the smaller-sized species. The plains topminnow, blacknose shiner, and Topeka shiner are imperiled statewide. The abundance of common shiners, although not dangerously low in numbers statewide, has been declining in some central Missouri streams (Pflieger 1997). They were last collected in upper North Moreau Creek (RM 45) and Straight Fork in 1966.

The plains topminnow, common shiner, Topeka shiner, and blacknose shiner were all collected in 1940. Their combined presence suggests that at one time Straight Fork had very high quality habitat and this habitat has subsequently degraded significantly.

The final species that might be declining in this drainage is the blackside darter. These darters generally occur in medium to large-size rivers at low population densities. They are found in pockets in the Prairie and Lowland regions of the state. In 1964 and 1979, one blackside darter was taken on the lower North Moreau Creek and on the lower South Moreau Creek. In collections made in the 1990's, no blackside darters were collected. Because abundance was very low in the past, it is difficult to determine if this change is significant or due to inadequate sampling for a rare species.

Since 1940, 22 intolerant species, those considered highly sensitive to perturbations, have been identified in basin streams (Tables 1 and 2). Four of these species were only observed before 1970. The remaining 18 intolerant species were widely distributed among streams. The great variety of fish species found in this basin as well as the abundance of intolerant species suggests that overall, the fish communities are in good condition. Streams worthy of further evaluation due to species present historically (Topeka shiner, common shiner, blacknose shiner, plains topminnow) or currently unique species (Ozark sculpin, southern redbelly dace) include

Straight and Clark forks. Smith Creek would also be a good candidate for further sampling efforts (it has not been sampled to date) due to its size and close proximity to Straight Fork.

### Species of Concern

“Species of concern” are species of special interest because their population is declining, they are extremely rare, or they are particularly vulnerable to extinction. Four fish species, the plains topminnow, blacknose shiner, ghost shiner and Topeka shiner, on this list, once occurred in the basin but were not been observed in the 1990's (Figure sc). The plains topminnow, blacknose shiner, and federally endangered Topeka shiner, were last collected in Straight Fork in 1940. It is doubtful that populations of these species remain in the basin. Low numbers of ghost shiners were observed in North Moreau Creek in 1940 and in the Moreau River in 1962 and 1979. However, when these same localities were resampled in 1995 or 1998, no ghost shiners were collected. This species is imperiled in the state because of rarity but is secure globally. It prefers low-gradient reaches of large, moderately clear creeks with permanent flow.

Non-fish species of concern that have occurred in the basin are as follows: the Northern crawfish frog (*Rana Areolata circulosa*), a Meropid scorpionfly (*Merope tuber*), three Great blue heron rookeries (*Ardea herodias*), Henslow's sparrow (*Ammodramus henslowii*), Upland sandpiper (*Bartramia longicauda*), Northern harrier (*Circus cyaneus*), Cooper's hawk (*Accipiter cooperii*), Greater prairie-chicken (*Tympanuchus cupido*), Running buffalo clover (*Trifolium stoloniferum*), False mermaid (*Floerkea proserpinacoides*), Amethyst shooting star (*Dodecatheon amethystinum*), Wolf's spike rush (*Eleocharis wolfii*), and Columbia water-meal (*Wolffia columbiana*) (Figure sc). Four of the species listed above (Henslow's sparrow, Northern harrier, Wolf's spike rush and Northern crawfish frog) were observed on prairie habitat at Hite Prairie CA near Versailles. The Greater prairie-chicken, Northern harrier, and Running buffalo clover are endangered in the state.

Concentrations of prairie-chickens were last found northeast of Versailles and in the vicinity of Tipton to the north in 1993 (Figure sc). In 1996, a few prairie-chickens were sighted in the vicinity of Tipton and Clarksburg along the divide between the Moniteau and Moreau drainages but none have been sighted on booming grounds in the vicinity of Versailles. It is doubtful that any viable population of prairie-chickens remains in this watershed (Mechlin 2002, *personal communication*). The conversion of vast grasslands to pasture is believed to be contributing to their decline throughout Missouri.

One exotic plant, purple loosestrife (*Lythrum salicaria*), is monitored in the database because it is a noxious exotic wetland plant that is displacing native plants (Missouri Natural Heritage database 2002; Figure sc).

### Sport Fishing

Numerous sport fishing opportunities, especially wade fishing, abound in the Moreau basin. Largemouth bass, spotted bass, bluegill, and longear sunfish are found in all major streams. Channel catfish appear most abundant in the North Moreau, Moreau and South Moreau rivers.

Angling for smallmouth bass is less predictable. Their abundance and distribution has declined since the appearance of spotted bass in the 1950's. Smallmouth bass occurred in recent fish collections made in the Moreau River, South Moreau Creek and Burriss Fork but not in North Moreau Creek. Hybridization with spotted bass, increased siltation, and lowered base flows (i.e. greater intermittent conditions) are believed to have contributed to their decline along the Ozark border and northeastern prairies (Pflieger 1997).

Over the years a few white bass, white crappie, walleye, flathead catfish, and sauger have been taken in fish collections in the Moreau, South Moreau or North Moreau rivers. Local anglers catch these fish seasonally.

Gigging, a popular Ozark sport, is possible in the larger rivers but is challenging due to frequent low water conditions which make boating difficult and poor water clarity. Golden and shorthead redhorse, favorite targets of giggers in the late fall and early winter, are abundant in the larger streams. "Suckers" as they are called, are scored and deep-fat fried.

Public fishing accesses are available at the Moreau 50 access near the Hwy 50-63 bridge in Cole County, at the mouth of Honey Creek, at Stringtown bridge 2 miles east of Lohman, and at Scrivner Road Conservation Area 3 miles southeast of Russellville (Figure pa).

## **Fishing Regulations**

Statewide stream fishing regulations apply to all streams.

## **MACROINVERTEBRATES**

### **Crayfish**

The golden, *Orconectes luteus*, and Northern, *Orconectes virilis*, crayfishes are widely distributed throughout the basin (Pflieger 1996). The golden crayfish prefers rocky and gravelly substrates and permanent water. The Northern crayfish is most at home in fertile, warm, moderately turbid water without strong base flows. They prefer to hide among slab rock, logs, and organic debris. The papershell crayfish, *Orconectes immunis*, is found extensively in the Prairie faunal region and in the floodplain of the Missouri River (Pflieger 1996). Because the Moreau River is a major tributary of the Missouri, it is likely that some papershell crayfish also inhabit the lower reaches of the Moreau. The grassland crayfish, *Procambarus gracilis*, a crayfish that burrows up to 6 feet underground and lives long distances from permanent water, is found in eastern Moniteau County (Pflieger 1996). As its name implies, this crayfish inhabits grassland or prairie areas, a habitat type found in eastern Moniteau County.

### **Naiades**

The Moreau River has a diverse fauna of aquatic mussels. Twenty-five species of naiades have been collected from this watershed since 1965 (Table 4; Figure ms). None are threatened or

endangered, however, one species, the black sandshell (*Ligumia recta*), collected by Oesch (1984) is locally imperiled. Although the commercial harvest of mussels is not permitted in the Moreau River, it does contain a number of mussels of commercial value for the pearl, button and polished chip industries.

### **Aquatic Insects**

The aquatic insect fauna of the Moreau basin is not well known. MDC has no current collection data available for benthic aquatic insect samples in this watershed, however, some macroinvertebrate sampling will be collected from Burriss Fork for the Missouri Resource Assessment Monitoring Project (Fischer 2002, *personal communication*). Informal collection information gathered by private citizens participating in the Missouri STREAM TEAM program is available for selected sites on Logan Creek, Honey Creek, South Moreau Creek, North Moreau Creek and Medlin Creek (Tables 5 and 6). These specimens were broadly categorized into taxa intolerant, somewhat tolerant, and tolerant to pollution. This method provides a general impression of the water quality at these sites ranging from poor to good.

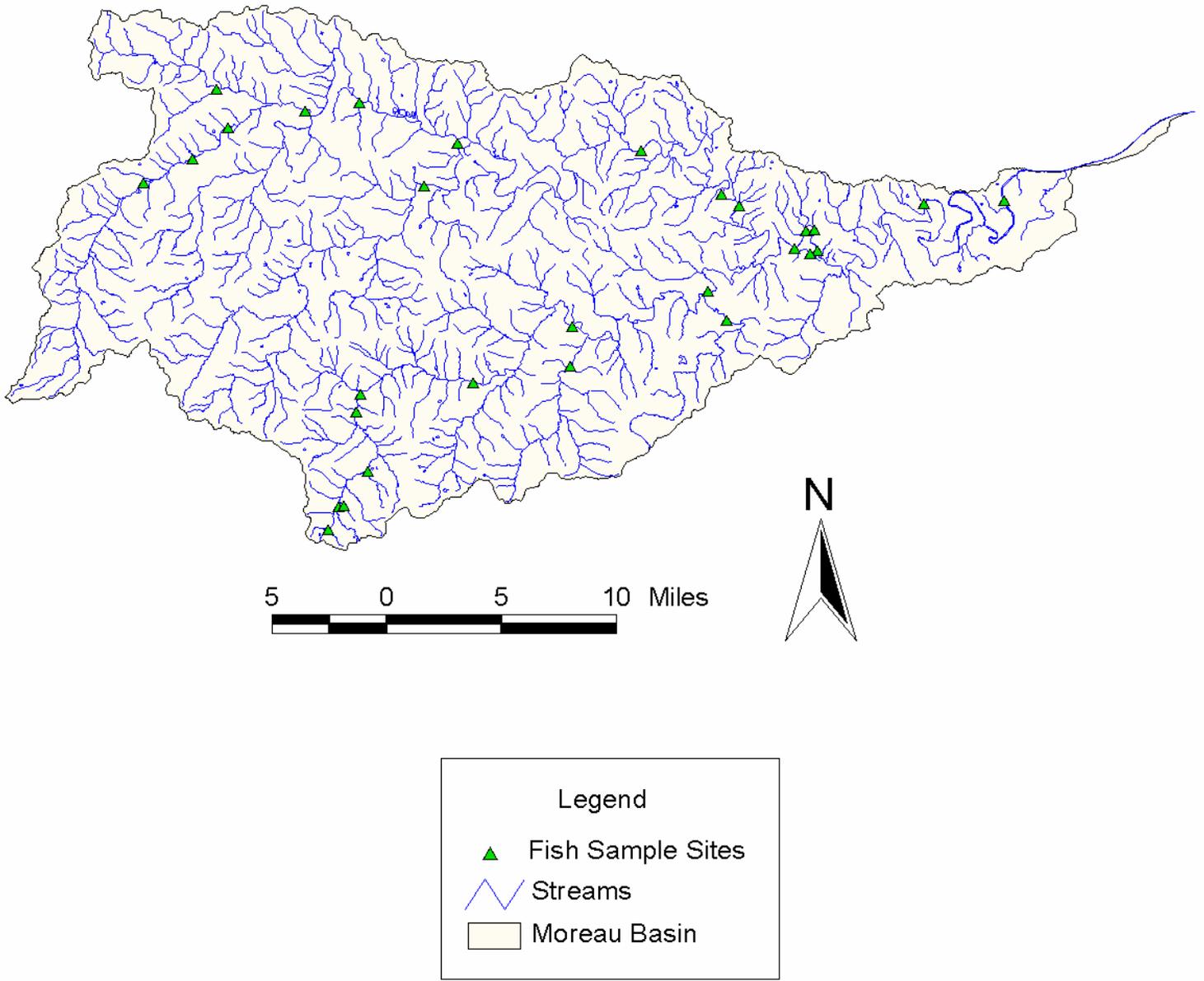


Figure fc1. MDC fish sample sites in the Moreau River basin, 1940-1998.

**Table 1. Fish list of Moreau River, North Moreau Creek, and South Moreau Creek, 1940-1998**

Common Name (intolerant species bolded) <sup>a</sup>	Scientific Name	Collection Period			
		Primary Range <sup>b</sup>	North Moreau Creek	South Moreau Creek	Moreau River
Black Bullhead	<i>Ameiurus melas</i>	Wide	A	C	
Yellow Bullhead	<i>Ameiurus natalis</i>	Wide	A	C,D	
Freshwater Drum	<i>Aplodinotus grunniens</i>	Big River	B	B	C,D
River Carpsucker	<i>Carpoides carpio</i>	Prairie	B		
Quillback	<i>Carpoides cyprinus</i>	Prairie	D		C,D
White Sucker	<i>Catostomus commersonni</i>	Oz-Pr	A,B	B,C,D	
Common Carp	<i>Cyprinus carpio</i>	Wide	B		C
Gizzard Shad	<i>Dorosoma cepedianum</i>	Wide	B,D		C,D
Goldeye	<i>Hiodon alosoides</i>	Big River			D
<b>Northern Hog Sucker</b>	<i>Hypentelium nigricans</i>	Ozark	B,D	B,C,D	D
Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>	Wide		B	B
Channel Catfish	<i>Ictalurus punctatus</i>	Wide	A,B,D	D	D
Smallmouth Buffalo	<i>Ictiobus bubalus</i>	Wide	B		D
Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	Wide	B		C
Longnose Gar	<i>Lepisosteus osseus</i>	Wide	B	B, C	B,C
Shortnose Gar	<i>Lepisosteus platostomus</i>	Big River		B,D	C,D
Green Sunfish	<i>Lepomis cyanellus</i>	Wide	A,B,D	B,C,D	B,C
Orange Spotted Sunfish	<i>Lepomis humilis</i>	Prairie	A,B,D	B,C,D	B,C,D
Bluegill	<i>Lepomis macrochirus</i>	Wide	A,B,D	B,C,D	B,C,D
Longear Sunfish	<i>Lepomis megalotis</i>	Oz-Low	B,D	B,C,D	B,C,D
<b>Smallmouth Bass</b>	<i>Micropterus dolomieu</i>	Ozark	B	B,C,D	D
Spotted Bass	<i>Micropterus punctulatus</i>	Oz-Low	D	B,C,D	C,D
Largemouth Bass	<i>Micropterus salmoides</i>	Wide	A,B,D	B,C,D	B,C,D

Table 1 continued

Common Name (intolerant species bolded) <sup>a</sup>	Scientific Name	Collection Period			
		Primary Range <sup>b</sup>	North Moreau Creek	South Moreau Creek	Moreau River
Spotted Sucker	<i>Minytrema melanops</i>	Lowland		B,C	
White Bass	<i>Morone chrysops</i>	Big River		B	
<b>Silver Redhorse</b>	<i>Moxostoma anisurum</i>	Ozark	B,D	B,C	C
<b>Black Redhorse</b>	<i>Moxostoma duquesnei</i>	Ozark	B	B,C,D	C
<b>Golden Redhorse</b>	<i>Moxostoma erythrurum</i>	Ozark	A,B,D	B,C,D	C,D
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	Oz-Pr	B,D	B,C,D	B,C,D
White Crappie	<i>Pomoxis annularis</i>	Wide	A,B,D	B,C	B
Flathead Catfish	<i>Pylodictis olivaris</i>	Wide	B	C	
Sauger	<i>Stizostedion canadense</i>	Big River			C
<b>Walleye</b>	<i>Stizostedion vitreum</i>	Wide		B	
<b>Largescale Stoneroller</b>	<i>Campostoma oligolepis</i>	Ozark	B,D	B,C,D	B,C,D
Central Stoneroller	<i>Campostoma pullum</i>	Oz-Pr	A,B,D	B,C,D	B,C,D
Red Shiner	<i>Cyprinella lutrensis</i>	Prairie	A,B,D	B,C,D	B,C,D
Northern Studfish	<i>Fundulus catenatus</i>	Ozark	B,D	B,C,D	B,D
Blackspotted Topminnow	<i>Fundulus olivaceus</i>	Oz-Low	A,B,D	B,C,D	B,C,D
Western Mosquitofish	<i>Gambusia affinis</i>	Lowland	D	D	C,D
<b>Brook Silverside</b>	<i>Labidesthes sicculus</i>	Oz-Low	D	C,D	C,D
<b>Common Shiner</b>	<i>Luxilus cornutus</i>	Prairie	B		
Western Redfin Shiner	<i>Lythurus u. umbratilis</i>	Wide	A,B,D	B,C,D	B,C,D
<b>Hornyhead Chub</b>	<i>Nocomis biguttatus</i>	Ozark	A,B,D	C,D	D
Golden Shiner	<i>Notemigonus crysoleucas</i>	Wide		C	C,D
Emerald Shiner	<i>Notropis atherinoides</i>	Big River			C,D
<b>Ghost Shiner</b>	<i>Notropis buchmanii</i>	Prairie	A		B,C
Ozark Minnow	<i>Notropis nubilus</i>	Ozark		C,D	C,D

Table 1 continued

Common Name (intolerant species bolded) <sup>a</sup>	Scientific Name	Collection Period			
		Primary Range <sup>b</sup>	North Moreau Creek	South Moreau Creek	Moreau River
<b>Rosyface Shiner</b>	<i>Notropis rubellus</i>	Ozark	A,B,D	B,C,D	B,C,D
Sand shiner	<i>Notropis stamineus</i>	Prairie	A,B,D	B,C,D	B,C,D
Bluntnose Minnow	<i>Pimephales notatus</i>	Wide	A,B,D	B,C,D	B,C,D
Fathead Minnow	<i>Pimephales promelas</i>	Prairie	D	B,C,D	
Creek Chub	<i>Semotilus astromaculatus</i>	Oz-Pr	A,B,D	B,C,D	C,D
<b>Gravel Chub</b>	<i>Erimystax x-punctatus</i>	Ozark	A,B,D		B,C,D
Greenside Darter	<i>Etheostoma blennioides</i>	Ozark	B,D	B,C,D	C,D
Striped Fantail Darter	<i>Etheostoma f. lineolatum</i>	Ozark	A,B,D	B,C,D	B,C,D
Johnny Darter	<i>Etheostoma nigrum</i>	Oz-Pr	A,B,D	B,C,D	B,C,D
Northern Orangethroat Darter	<i>Etheostoma s. spectabile</i>	Ozark	A,B,D	B,C,D	B,C,D
Missouri Saddled Darter	<i>Etheostoma tetrazonum</i>	Ozark	A,B,D	C,D	B,C,D
Speckled Chub	<i>Machrybopsis aestivalis</i>	Big River			D
<b>Slender Madtom</b>	<i>Noturus exilis</i>	Ozark	A,D	B,C,D	C
<b>Stonecat</b>	<i>Noturus flavus</i>	Prairie	A,D	D	D
<b>Tadpole Madtom</b>	<i>Noturus gyrinus</i>	Lowland	D	B,D	B,C
<b>Ozark Logperch</b>	<i>Percina c. fulvitaenia</i>	Ozark	A,B,D	B,C,D	B,C,D
<b>Blackside Darter</b>	<i>Percina maculata</i>	Prairie	B	C	
<b>Slenderhead Darter</b>	<i>Perinca phoxocephala</i>	Oz-Pr	A,B,D	C,D	B,C,D
Suckermouth Minnow	<i>Phenacobius mirabilis</i>	Prairie	A,B,D	B,C,D	C,D
<sup>a</sup> Pflieger, personal communication <sup>b</sup> Pflieger, 1971 A= 1940; B=1961-66; C=1977-79; D=1995-98					

Table 2. Fish list for smaller streams in Moreau Basin sampled 1940-98.

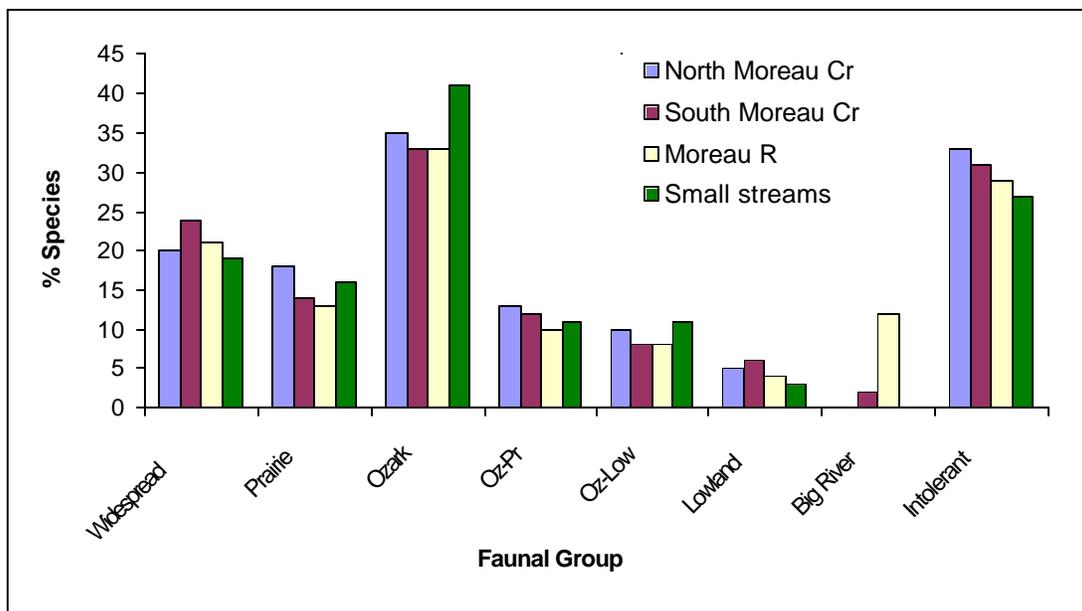
Common Name (intolerant species in bold) <sup>a</sup>	Presence in A=1940; B=1961-66; C=none; D=1995-98					
	Straight Fork	Burriss Fork	Brush Creek	Willow Fork	Clark Fork	Trib 1 <sup>st</sup> order
Black bullhead	B	A				
Yellow Bullhead	A,D	B	D	B,D		
River Carpsucker	D					
Quillback	D					
White Sucker	A,B,D	A	D			
<b>Northern Hog Sucker</b>		A,D				
Green Sunfish	A,B,D	A,B,D	D	B,D	D	D
Orange Spotted Sunfish	A	A,D	D			
Bluegill	B,D	B,D		B,D	D	D
Longear Sunfish	B,D	D	D	D	D	
<b>Smallmouth Bass</b>	B	A,D				
Spotted Bass		D				
Largemouth Bass	A,B,D	A,B,D			D	
<b>Black Redhorse</b>	B					
<b>Golden Redhorse</b>	A,B,D	A,D				
<b>Largescale Stoneroller</b>	B,D	D		B,D	D	
Central Stoneroller	A,B,D	A,B,D	D	B,D	D	
Red Shiner	A,B,D	A,B,D		B,D		
Northern Studfish	D	D	D		D	
Blackspotted Topminnow	B,D	B,D	D	B		
Plains Topminnow	A					
Western Mosquitofish		D				
<b>Brook Silverside</b>	A,D	D				
<b>Common Shiner</b>	A,B					
Western Redfin Shiner	A,B,D	A,D		B,D		
<b>Hornyhead Chub</b>	A,B,D	A		D		
Golden Shiner	D				D	
<b>Blacknose shiner</b>	A					
Ozark Minnow			D		D	
<b>Rosyface Shiner</b>	A,B,D	A,B,D	D	B,D		
Sand Shiner	A,D	A,B,D	D	B,D		
<b>Topeka Shiner</b>						

Table 2 continued

Common Name (intolerant species in bold) <sup>a</sup>	Presence in A=1940; B=1961-66; C=none; D=1995-98					
	Straight Fork	Burriss Fork	Brush Creek	Willow Fork	Clark Fork	Trib 1 <sup>st</sup> order
<b>Southern Redbelly Dace</b>					D	
Bluntnose Minnow	A,B,D	A,B,D		B,D	D	
Fathead Minnow		B	D			
Creek Chub	A,B,D	A,B,D	D	B,D	D	D
Ozark Sculpin	D					
Greenside Darter	B,D	B,D	D			
Striped Fantail Darter	B,D	A,B,D	D	B,D	D	
Johnny Darter	A,B,D	A,B,D		B,D		
Northern Orangethroat Darter	A,B,D	A,B,D	D	B,D	D	
<b>Slender Madtom</b>	B,D	D	D		D	
<b>Ozark Logperch</b>	B,D	A,D				
Suckermouth Minnow	A,B			B		

<sup>a</sup>Pflieger, personal communication

Figure fc2. Fish faunal groups in the Moreau River Watershed, 1977-1998.



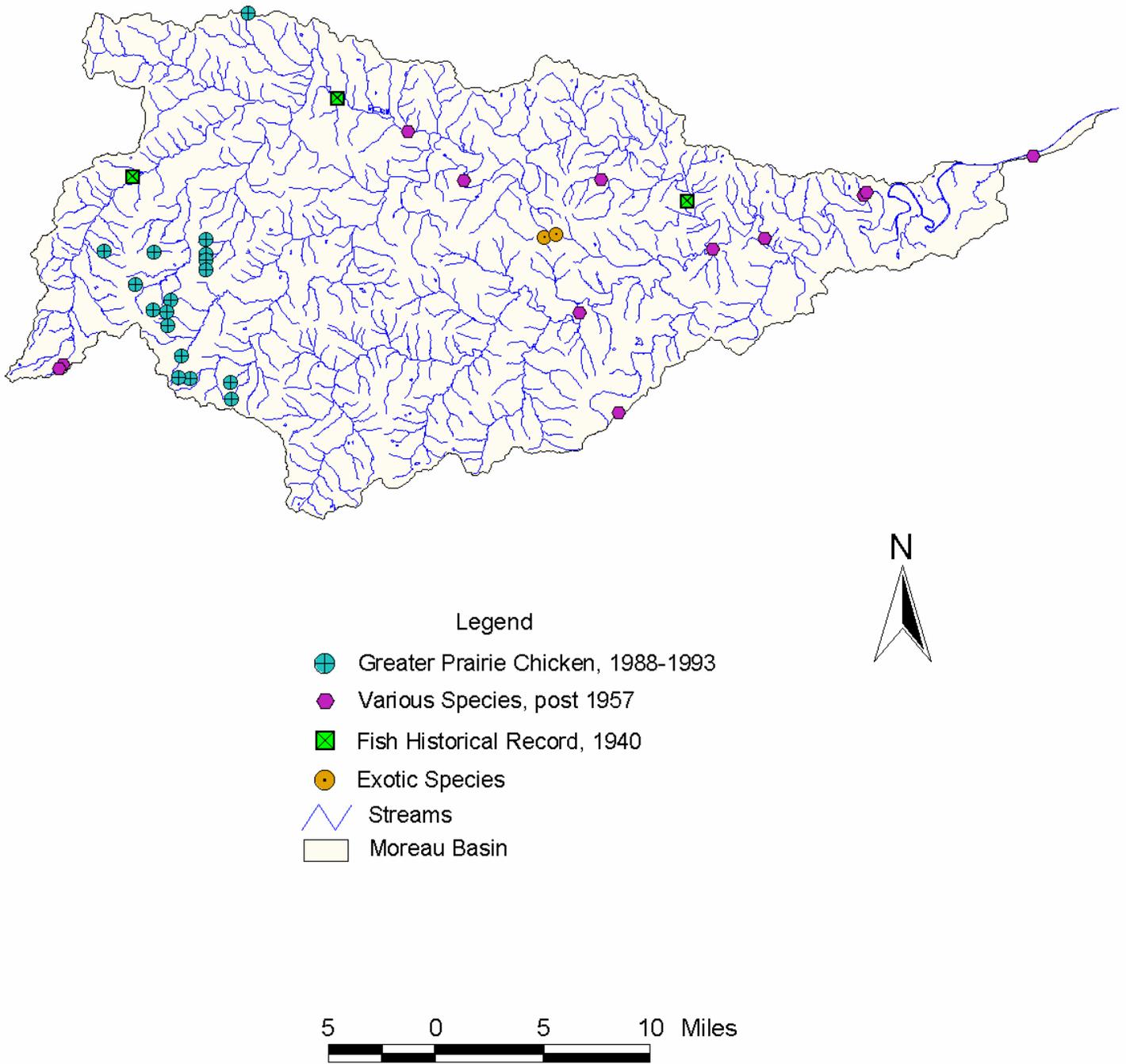


Figure sc. Species of concern tracked in the Natural Heritage Database (2002).

**Table 3. Prevalence of spotted bass and western mosquitofish in the Moreau watershed, 1940-1998.**

Species	Percent of sites where collected			
	1940's (4 sites)	1960's (10 sites)	1970's (10 sites)	1990's (22 sites)
Spotted bass	0	10	50	64
Western mosquitofish	0	0	10	36

**Table 4. Mussel fauna of Moreau basin (Oesch 1984, Missouri natural heritage database1999, MDC 2002c).**

Common Name (Status)	Scientific Name	Habitat type	Sample site
Three-Ridge	<i>Amblema plicata</i>	gravel, gravel-mud, tolerant of polluted water	95111
Paper floater	<i>Anodonta imbecilis</i>	ponds, lakes, rivers, quiet backwaters, eddies, sandy to muddy substrate	-
Asiatic clam	<i>Corbicula fluminea</i>	any habitat, small-medium rivers, lakes, stable gravel in swift water	96089
Wabash Pig-toe	<i>Fusconaia flava</i>	gravel and sand with moderate current	96089
Pocketbook	<i>Lampsilis cardium</i>	quiet-swift water, any substrate except sand	79076, 79079
Fat mucket	<i>Lampsilis siliquoidea</i>	any substrate, moderate-slow moving water, soft mud of lakes	95111
Yellow sandshell	<i>Lampsilis teres</i>	large, warm, turbid rivers	96089, 95111
White heel-splitter	<i>Lasmigona c. complanata</i>	rivers assoc. with large rivers, sluggish, turbid with mud, mud-gravel substrate	96089
Fragile papershell	<i>Leptodea fragilis</i>	small-large streams, mud, mud-gravel, gravel, clear or murky water	79076, 79079, 96089
Black sandshell (S1, S2, G5)*	<i>Ligumia recta</i>	small-large size gravel, good current	lower Moreau
Pond mussel	<i>Ligumia subrostrata</i>	quiet river pools, sloughs, shallow ponds	96089, 95111, 80074

Table 4 continued

Common Name (Status)	Scientific Name	Habitat type	Sample site
Threehorn wartyback	<i>Obliquaria reflexa</i>	medium- large rivers, moderate current, gravel, gravel-sand, gravel-mud	79076
Pink heel-splitter	<i>Potamilus alatus</i>	slow-swift water, lake, lake-like river, any habitat	79076, 79079
Giant floater	<i>Pyganodon grandis grandis</i>	quiet water with mud or mud-gravel substrate, lakes	96089
Pimple-back	<i>Quadrula pustulosa</i>	small-large streams, any substrate except shifting sand	79076
Maple leaf	<i>Quadrula quadrula</i>	clear or turbid, small-medium gravel or rocks with or without mud interspersed, large rivers	79076, 96089
Peaclam	<i>Sphaerid sp.</i>	-	96089, 95111
Squaw foot	<i>Strophitus undulatus</i>	gravel to gravel-mud, flowing water	79076, 95111
Liliput shell	<i>Toxolasma parvus</i>	quiet waters, lake, mud, mud-sand	80074
Pistol-grip	<i>Tritogonia verrucosa</i>	any substrate	79076, 96089
Fawn's Foot	<i>Truncilla donaciformis</i>	small & large rivers	79076, 79079
Deer-toe	<i>Truncilla truncata</i>	mud-gravel to larger rocks, moderately swift water	79076
Pondhorn	<i>Unio merus tetralasmus</i>	mud bottom lakes, pools, oxbows, sloughs	80074
Paper pondshell	<i>Utterbackia imbecillis</i>	ponds or lakes, small-large rivers in backwaters and eddies with sand to mud substrate	96089, 80074
Ellipse	<i>Venustaconcha ellipsiformis</i>	small-medium streams, stable gravel bottom	96089
<p>*S1=critically imperiled in the state because of extreme rarity or because of some factor(s) making it vulnerable to extirpation from the state (typically 5 or fewer occurrences or very few remaining individuals).</p> <p>*S2=imperiled in the state because of rarity because of some factor(s) making it vulnerable to extirpation from the state (typically 6-20 occurrences or few remaining individuals or acres).</p> <p>*G5=Demonstrably widespread, abundant, and secure globally, although it may be rare in parts of its range, especially at the periphery.</p>			

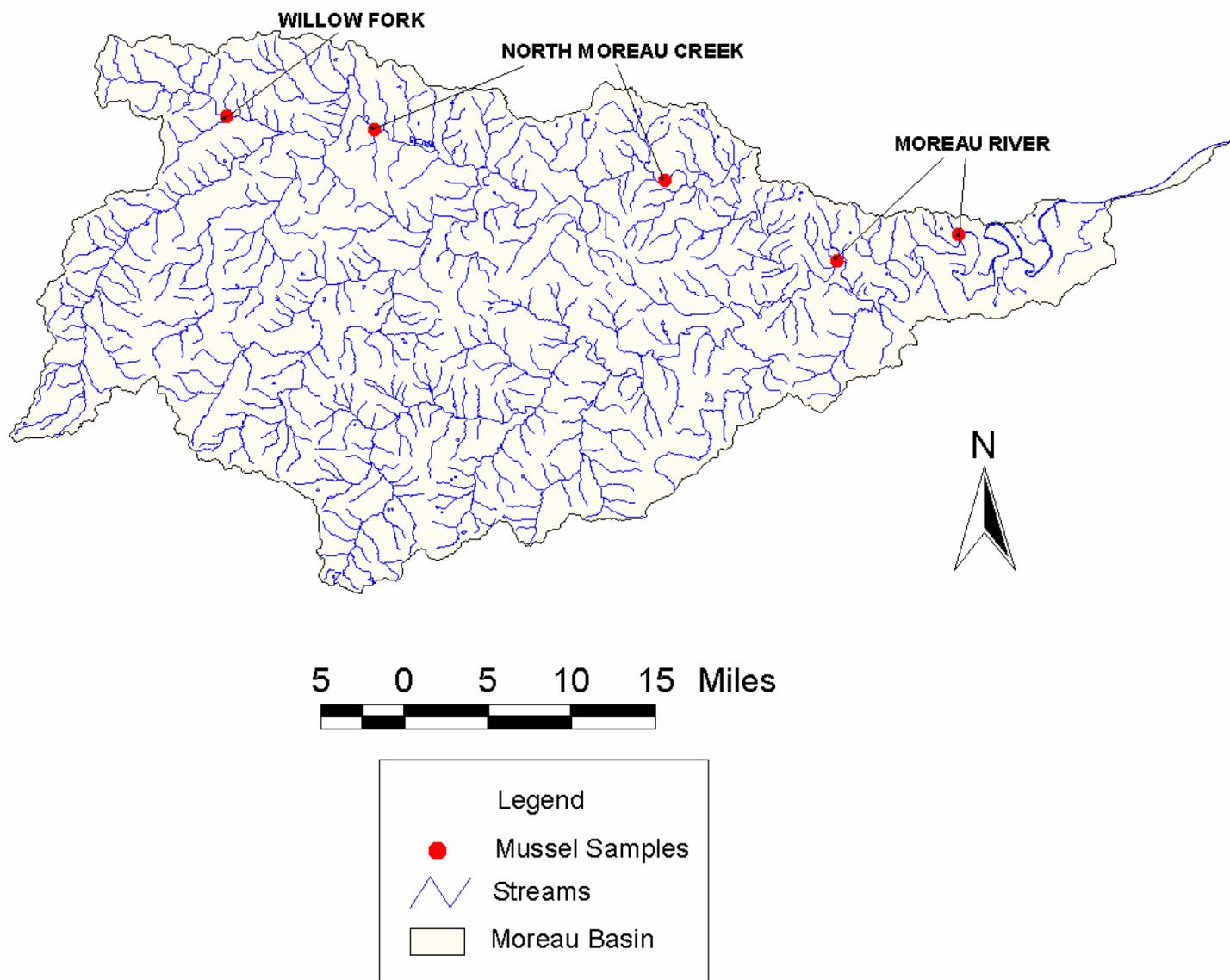


Figure ms. MDC mussel sampling sites in the Moreau River basin, 1979-1996.

**Table 5. Aquatic benthic samples for the Moreau watershed collected by STREAM TEAMS.**

Common Name	Taxa <sup>1</sup>	Number of organisms collected				
		3/11/01	3/11/01	6/18/95, 5/4/97	4/17/94, 9/11/94, 4/8/95	9/13/95
		Logan Creek <sup>2</sup>	Logan Creek <sup>3</sup>	Honey Creek <sup>4</sup>	South Moreau <sup>5</sup>	South Moreau <sup>6</sup>
		Hwy D BR	E. Lohman Rd BR	DS Low water BR	UP low water BR	Scrivner Rd CA
<b>Pollution Sensitive</b>						
Stonefly	<i>O. Plecoptera</i>	2,2,1	6,15,0	0,2	2,1,3	
Caddisfly	<i>O. Trichoptera</i>		0,1,0		2,0,2	44
Water penny	<i>O. Coleoptera</i>				0,1,0	
Riffle beetle	<i>O. Coleoptera</i>	2,1,0		1,1		
Other beetle	<i>O. Coleoptera</i>			2,0		1
Mayfly	<i>O. Ephemeroptera</i>	5,4,2	0,4,1	5,9	2,1,0	4
Gilled snail	<i>C. Gastropoda</i>				1,1,0	3
Dobsonfly Hellgrammite	<i>F. Corydalidae</i>				3,0,0	1
<b>Somewhat Pollution Tolerant</b>						
Crayfish	<i>O. Decapoda</i>	1,0,0			0,2,0	
Sowbug	<i>O. Isopoda</i>	5,2,1	2,4,7		2,0,0	
Scud	<i>O. Amphipoda</i>	40,20,6 0	50,60,60	1,3		
Fishfly	<i>F. Corydalidae</i>			50,0	0,1,0	
Damselfly	<i>S. Zygoptera</i>			0,1		4
Dragon fly	<i>S. Anisoptera</i>				0,2,0	
Crane fly	<i>S. Nematocera</i>	2,0,0	0,1,1	2,0		
<b>Pollution Tolerant</b>						

Table 5 continued

Common Name	Taxa <sup>1</sup>	Number of organisms collected				
		3/11/01	3/11/01	6/18/95, 5/4/97	4/17/94, 9/11/94, 4/8/95	9/13/95
		Logan Creek <sup>2</sup>	Logan Creek <sup>3</sup>	Honey Creek <sup>4</sup>	South Moreau <sup>5</sup>	South Moreau <sup>6</sup>
		Hwy D BR	E. Lohman Rd BR	DS Low water BR	UP low water BR	Scrivner Rd CA
Aquatic worm	<i>C. Oligochaeta</i>		0,0,1	4,0	3,3,4	
Midge fly larva	<i>S. Nematocera</i>		0,1,0	0,73		3
Blackfly larva	<i>F. Simulidae</i>			0,4	0,0,1	
Leech	<i>O. Hirudinea</i>	0,0,1		6,0	0,0,2	
Pouch and Pond snails	<i>C. Gastropoda</i>	1,0,3				
<b>Pollution Sensitive</b>		3	3	3,3	5,4,2	5
<b>Semi-Pollution Tolerant</b>		4	3	3,2	1,3,0	1
<b>Pollution Tolerant</b>		2	2	2,2	1,1,3	1
<b>Total groups represented</b>		9	8	8,7	7,8,5	7
<b>Water quality assessment</b>		Good	Good	Good, Fair	Good, Good, Poor	Good
<sup>1</sup> O=Order; F=Family; S=Suborder; C=Class <sup>2</sup> Logan Creek, NW NE NW S28 T44N R13W <sup>3</sup> Logan Creek, NW SW SW S22 T44N R13W <sup>4</sup> Honey Creek, NW SE NW S10 T43N R12W <sup>5</sup> South Moreau Creek, SW SW S30 T42N R15W <sup>6</sup> South Moreau Creek, SE SE NW S17 T43N R13W						

Table 6. Aquatic benthic samples for the Moreau watershed collected by STREAM TEAMS.

Common Name	Taxa <sup>1</sup>	Number of organisms collected			
		200' Upstream from mouth of Burris Fork	Scott's Ford at end of Stauffers Rd		
<b>Pollution Sensitive</b>					
Stonefly	<i>O. Plecoptera</i>	22,0			
Caddisfly	<i>O. Trichoptera</i>	5,0	5,1,4	0,1,0	2,2,0

Table 6 continued

Common Name	Taxa <sup>1</sup>	Number of organisms collected			
		200' Upstream from mouth of Burris Fork	Scott's Ford at end of Stauffers Rd		
Water penny	<i>O. Coleoptera</i>	2,1			2,0,0
Riffle beetle	<i>O. Coleoptera</i>	3,2	10,10,10	10,10,4	
Other beetle	<i>O. Coleoptera</i>	0,4			
Mayfly	<i>O. Ephemeroptera</i>	15,14		0,0,8	5,0,5
Dobsonfly Hellgrammite	<i>F. Corydalidae</i>		1,0,0	0,0,1	
<b>Somewhat Pollution Tolerant</b>					
Sowbug	<i>O. Isopoda</i>				2,0,0
Fishfly	<i>F. Corydalidae</i>		50,10,10	10,10,0	4,5,5
Damselfly	<i>S. Zygoptera</i>	0,1		0,0,8	
Crane fly	<i>S. Nematocera</i>	0,1			
Dragon fly	<i>S. Anisoptera</i>		2,0,4		
<b>Pollution Tolerant</b>					
Aquatic worm	<i>C. Oligochaeta</i>	0,1		0,6,0	
Midge fly larva	<i>S. Nematocera</i>	3,3			4,5,4
Blackfly larva	<i>F. Simulidae</i>	4,2		10,0,0	
Leech	<i>O. Hirudinea</i>				3,0,1
Pouch and Pond snails	<i>C. Gastropoda</i>		50,1,0		3,0,0
Other snails	<i>C. Gastropoda</i>		1,0,0		
<b>Pollution Sensitive</b>					
		6	3	4	3
<b>Semi-Pollution Tolerant</b>					
		2	2	2	2
<b>Pollution Tolerant</b>					
		3	2	2	3
<b>Total groups represented</b>					
		11	7	8	8
<b>Water quality assessment</b>					
		Excellent	Fair	Good	Fair
<sup>1</sup> C=Class; S=suborder; F=Family; O=Order <sup>2</sup> Medlin Creek, NE SW NE S6 T43N R15W <sup>3</sup> North Moreau Creek, SW SW S5 T44N R15W					