Sac River

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Executive Summary

The Sac River headwaters originate near Springfield, Missouri. Major tributaries include Little Sac River, Turnback Creek, Sons Creek, Horse Creek, Cedar Creek, Coon Creek, Turkey Creek, Brush Creek, and Bear Creek. Large portions of the Sac River and Little Sac River are inundated by Stockton Lake. Truman Reservoir inundates a large area of the Lower Sac River and occasionally floods the lower portions of Coon Creek, Brush Creek, Turkey Creek, and Cedar Creek.

The Sac River basin as covered in this document encompasses an area of 1,981 square miles in southwest Missouri. Counties that are partially or entirely within the basin are Barton, Cedar, Christian, Dade, Greene, Hickory, Lawrence, Polk, St. Clair, and Vernon.

The basin is divided between the Osage Plains and Ozark Plateau physiographic regions. Most of the basin is located in the Springfield Plateau region of the Ozark Plateau. Caves, springs, and losing streams are found primarily in the southern areas of the watershed due to the soluble bedrocks (limestone and dolomite) that underlay that portion of the basin.

The streams found in the basin range from clear with predominantly chert gravel/cobble streambeds to turbid with silt, sand, and gravel streambeds. The Sac River is a sixth order stream where it enters Truman Reservoir.

The Sac River basin is primarily rural. Land use is primarily pasture/grazing, with smaller amounts distributed among forest, row crop, and urban land practices. Animal agriculture is a major enterprise in the basin with beef cattle and dairy production being predominant.

Non-point source pollution in the basin comes from various sources including urban development and runoff, mining, land conversion from forest to pasture, livestock with free access to streams and riparian corridors, channelization, road construction, and septic tanks. Point source pollution sources include sewage treatment plants, landfills, industrial discharges, and animal feeding operations.

The Sac River basin is divided between the Ozark-Missouri and Prairie-Osage aquatic community divisions. Most streams are clear with rock and gravel substrates. Fish and other aquatic fauna unique to this area include the bluestripe darter, Niangua darter, gilt darter, blacknose shiner, and mottled sculpin.

Eighty-six species of fish have been collected from the Sac River basin in Missouri. There are no fish sample records from the time period 1966-1974 for the Sac River basin. Seventy-five species were collected prior to 1983. Fifteen of these species have not been collected since 1966. The ghost shiner, bluestripe darter, and gilt darter have not been collected since 1966 and are believed to be extirpated in the basin. The least darter and blacknose shiner have not been collected since 1983 and are believed to be extirpated from the basin. Since 1991, Niangua darters have been observed during snorkeling surveys at three locations within one reach of Bear Creek and Brush Creek. Sportfish commonly found in basin streams include smallmouth bass, largemouth bass, spotted bass, white and black crappie, rock bass, and channel catfish. Overall, the fish populations appear healthy, but declines in several species are apparent.

A diverse aquatic fauna including mussels, crayfish, and insects is found in the basin. There are several state listed species of concern including: northern crawfish frog, sharp-shinned hawk, Henslow's sparrow, great blue heron, upland sandpiper, northern harrier, bald eagle, greater-prairie-chicken, bristly cave crayfish, Ozark cavefish, least darter, Niangua darter, southern brook lamprey, blacknose shiner, auriculate false foxglove, pale gerardia, mead's milkweed, Carex arkansana, common leastdaisey, geocarpon, Missouri bladder-pod, Harvey's beak-rush, soapberry, Tragia ramosa, Marsupella sphacelata, Notothylus orbicularis, prairie mole cricket,

regal fritillary, black-tailed jackrabbit, gray bat, rock-pocketbook, spectacle case, elephant ear, pink mucket, *Anomobryum filiforme, Archidium alternifolium, Helodium paludosum, Neckera besseri*, sword moss, hair cup moss, and sphagnum. The federally listed endangered species are the Missouri bladder-pod, gray bat, and pink mucket. The federally threatened species listed for the Sac River basin are bald eagle, Ozark cavefish, Niangua darter, Mead's milkweed, and geocarpon.

Location

The Sac River basin is located in southwest Missouri with its headwaters beginning in Lawrence, Christian, and Greene counties and flowing in a northerly direction to its confluence with the Osage River and Truman Reservoir (Figure 1). The basin drains 1,981 square miles via 2,510 miles of streams (839 miles perennial; U.S. Environmental Protection Agency website, 2000) and all or part of 10 counties (Barton, Cedar, Christian, Dade, Greene, Hickory, Lawrence, Polk, St. Clair, and Vernon; Figure 2). Major tributaries are Turnback Creek, Limestone Creek, Little Sac River, Sons Creek, Horse Creek, Cedar Creek, Coon Creek, Brush Creek, Bear Creek, and Turkey Creek (Figure 3). Figure 4 delineates how the tributary sub-basins fit together to form the Sac River basin in Missouri. The Sac River basin is bound to the southeast by the James River Basin and to the southwest by the Spring River basin both of which are part of the Arkansas-White-Red River basin. It is bound on the west by the Clear Creek sub-basin of the West Osage River basin, and to the east by the Pomme De Terre River basin. To the north it drains into the Truman Reservoir sub-basin of the West Osage River basin.

Human population in the Sac River basin was 83,720 in 1990 (DuCharme and Miller 1996). Cities and towns found partially or entirely within the basin are Springfield, Willard, Republic, Brookline, Billings, Halltown, Miller, Strafford, Ash Grove, Everton, South Greenfield, Lockwood, Greenfield, Arcola, Milford, Jerico Springs, Umber View Heights, El Dorado Springs, Collins, Flemington, Humansville, Stockton, Fair Play, Bolivar, Aldrich, Dadeville, Morrisville, and Walnut Grove (Figure 5). Springfield is the largest municipality in the basin. The major roadways found in the Missouri portion of the basin are U.S. Interstate 44, U. S. Highways 54, 60, 65, and 160, and Missouri state highways 13, 14, 32, 39, 82, 96, 97, 123, 125, 174, 215, 245, and 266 (Figure 6). Many other smaller county roadways allow access to most parts of the basin. Urbanization, intensive animal based agriculture, and poor land use practices are the primary water quality related problems in the watershed.

The Brush Creek Inventory and Management Plan (Groshens 1997) focuses on the Brush Creek sub-basin and includes more detailed information and management objectives for that portion of the Sac River basin. These objectives include efforts to enhance stream and riparian habitats, efforts to improve water quality and information concerning the maintenance and improvement of native aquatic fauna and recreational fishing opportunities.

Figure 1. Sac River basin location.

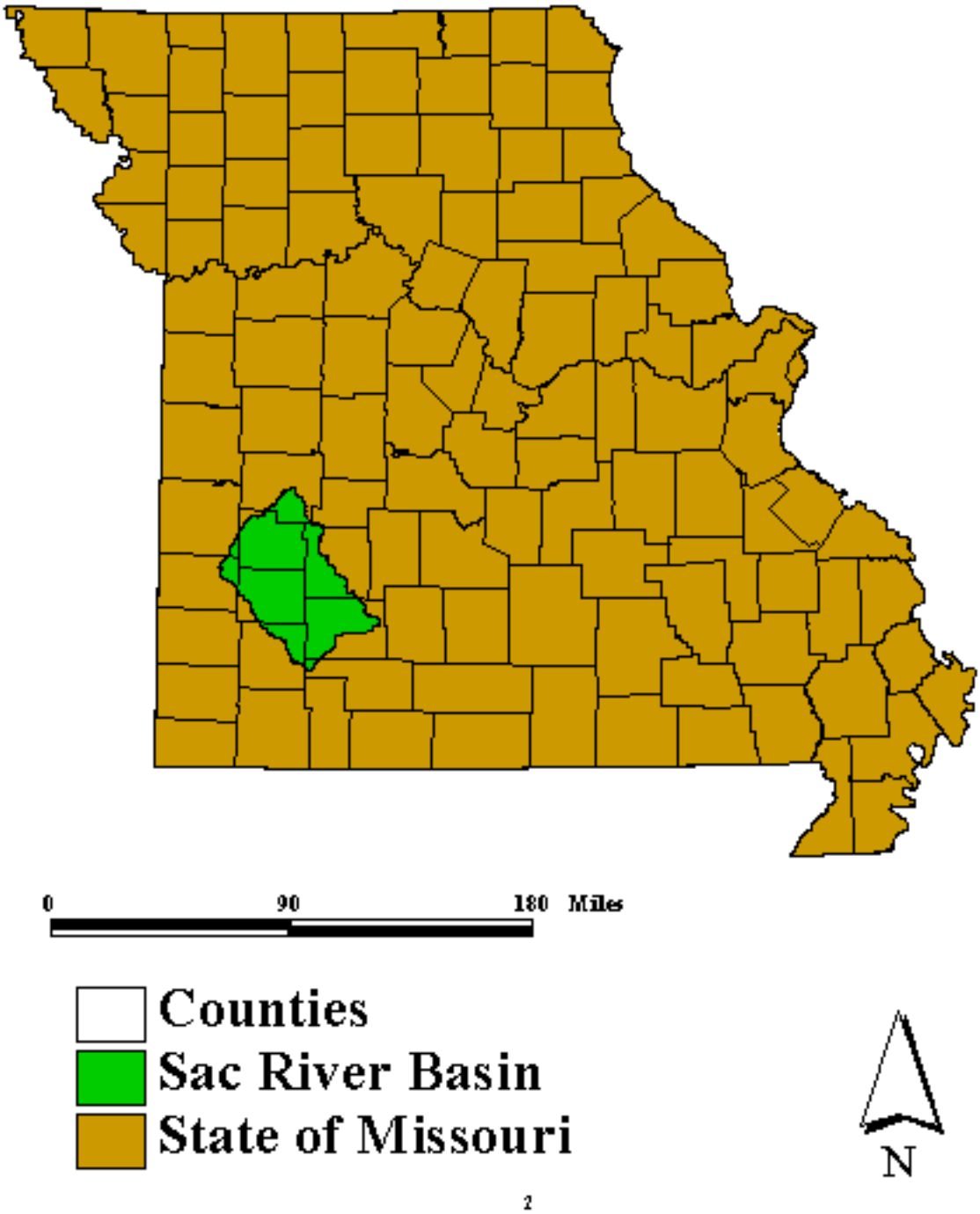


Figure 2. Sac River basin counties.

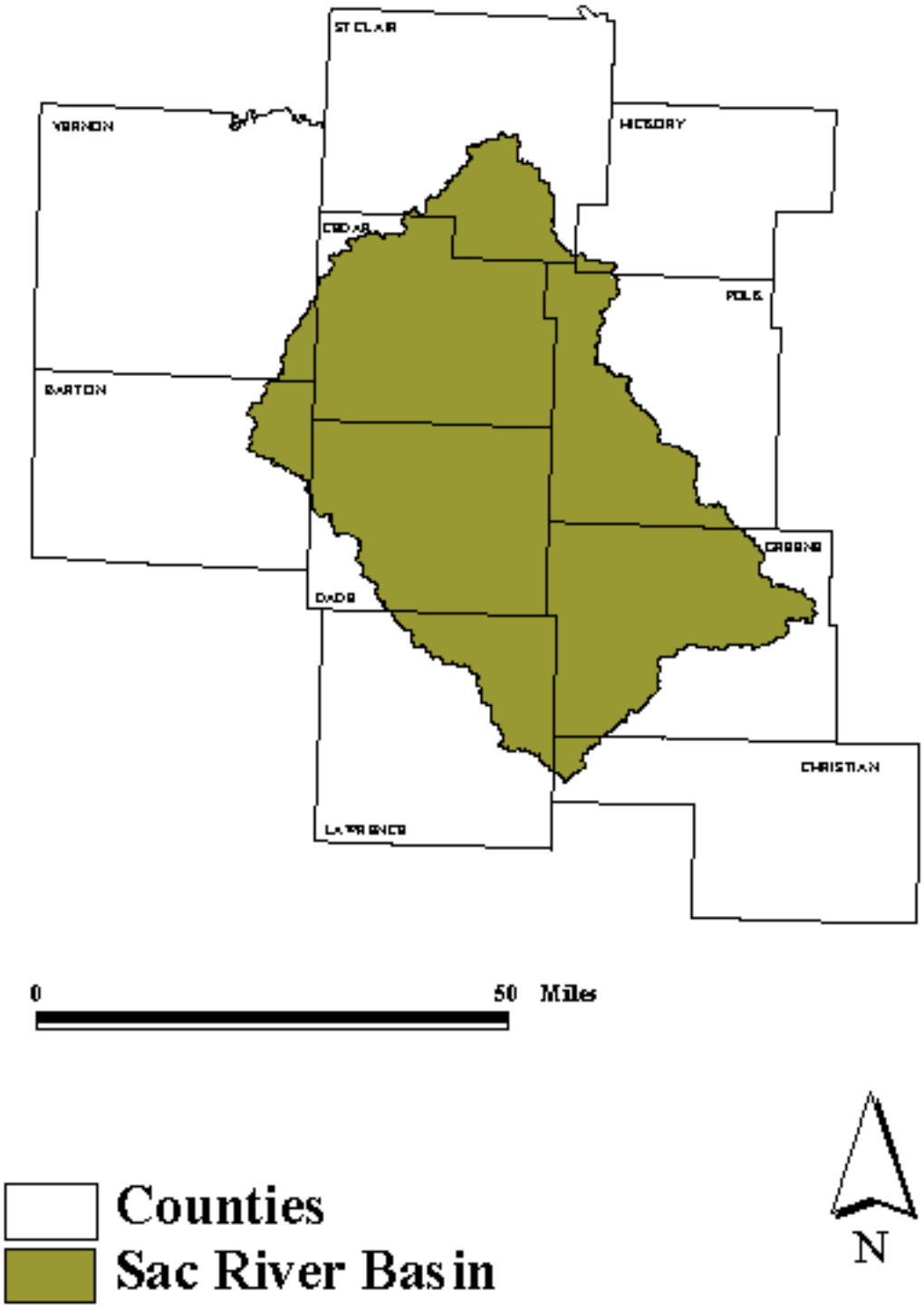


Figure 3. Sub - basins in the Sac River basin.

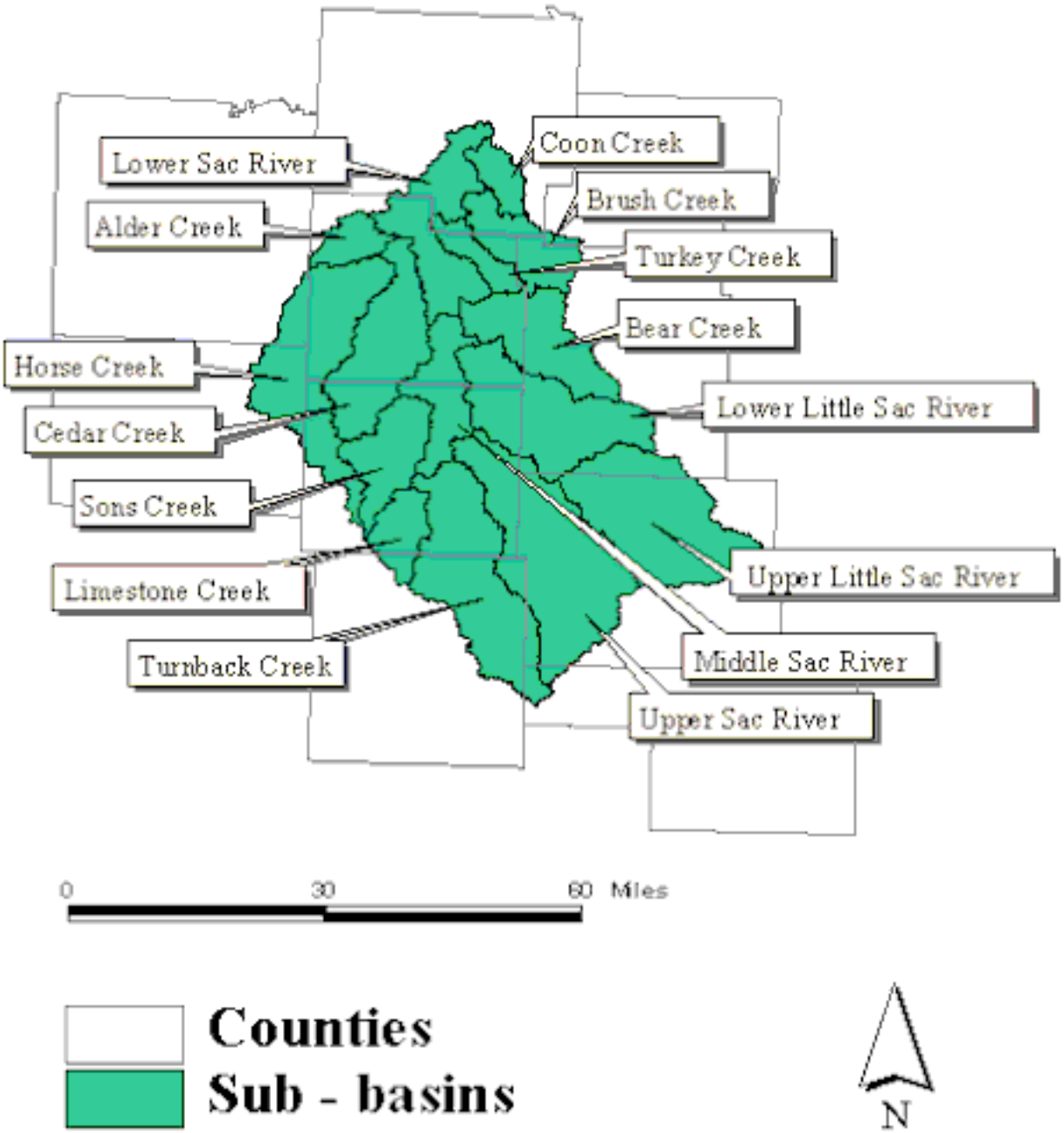


Figure 4. Major streams in the Sac River basin.

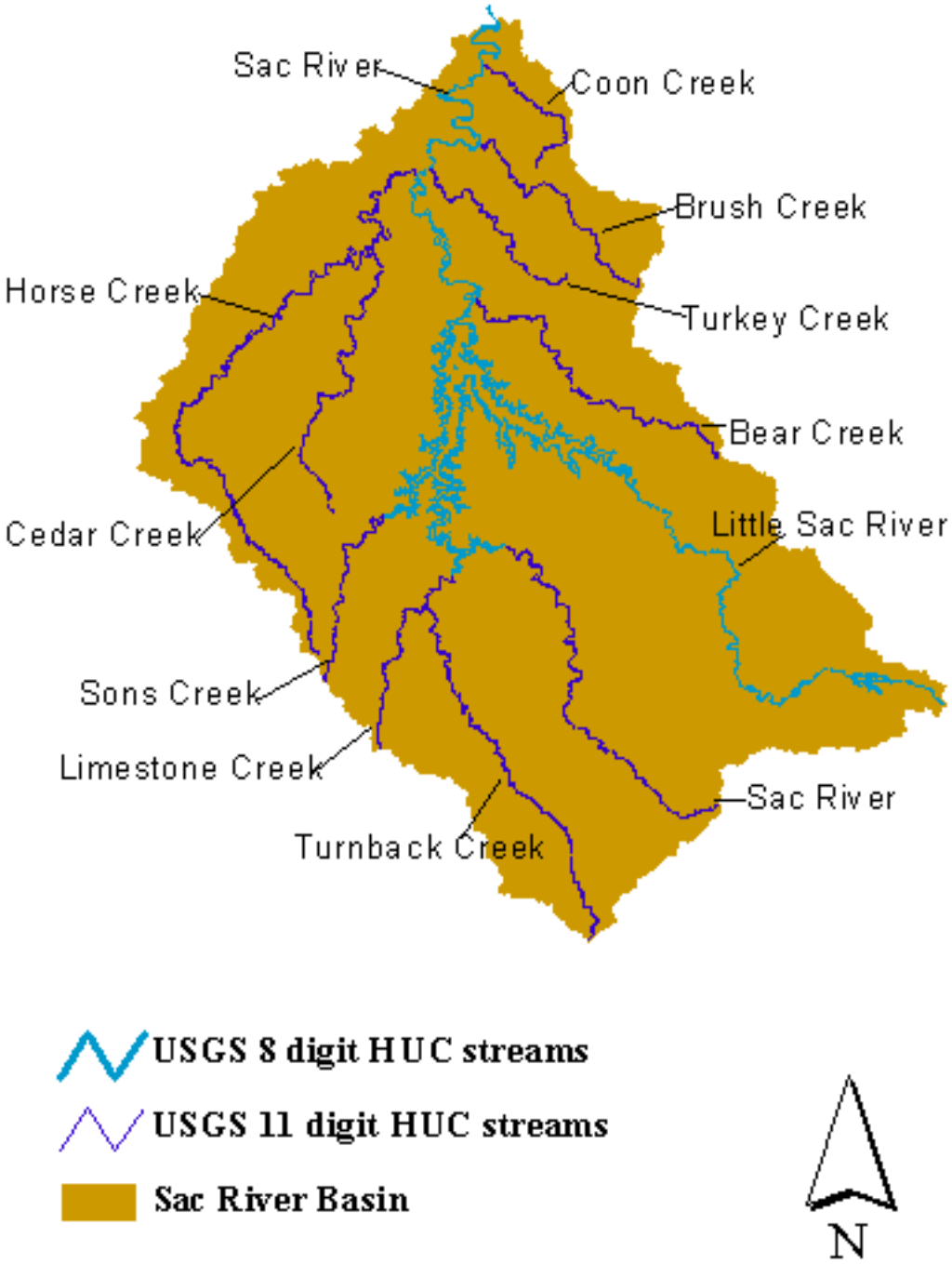


Figure 5. Communities of the Sac River basin.

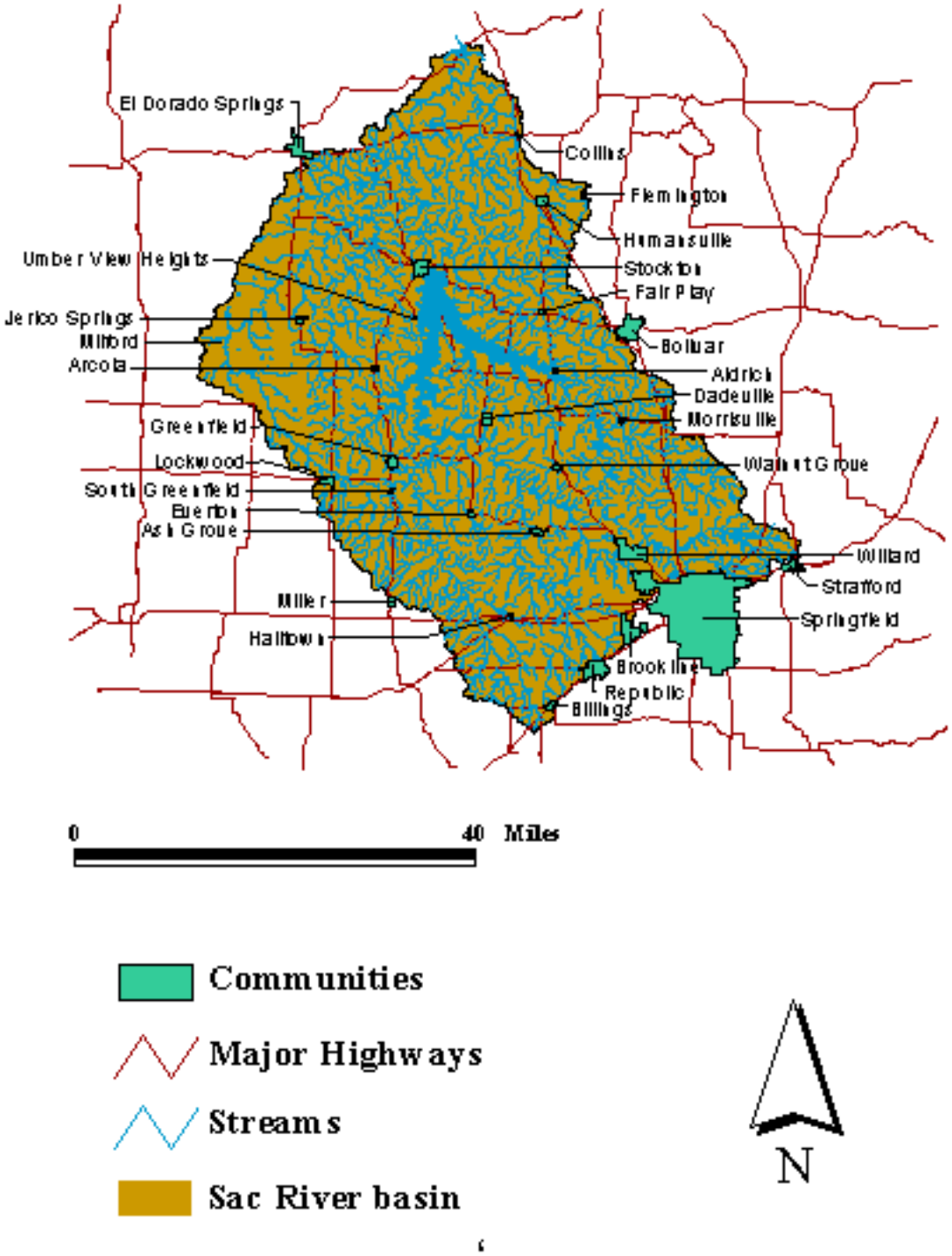
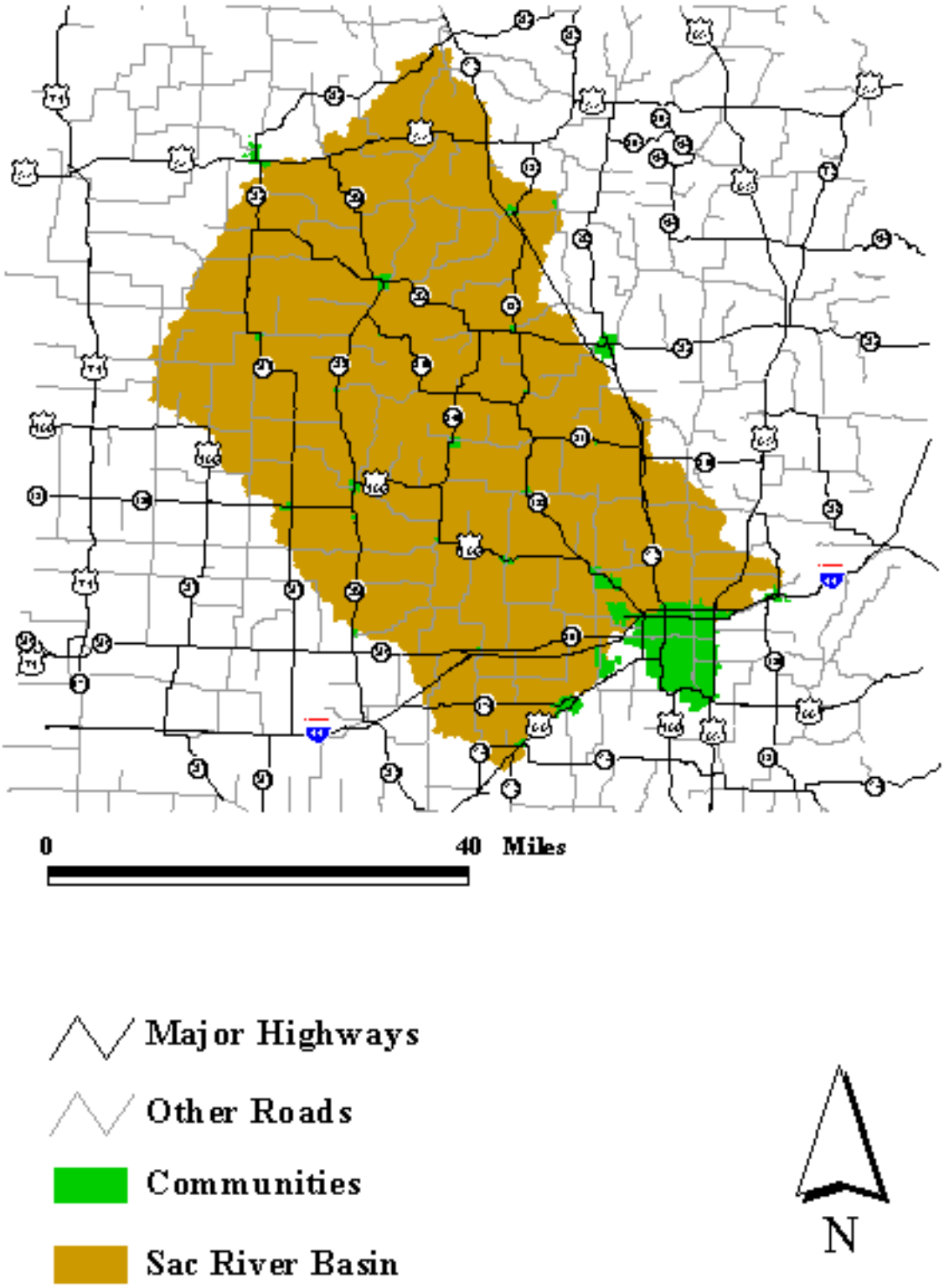


Figure 6. Major highways in the Sac River basin



Geology

Physiographic Region

The Sac River basin is located within the portion of the interior highlands province denoted as the Ozark plateau. It is further divided between the Springfield and Salem plateaus (MDNR 1986). The basin overlays Ordovician dolomite in the northeastern half of the basin and Mississippian limestone, shale, and sandstone in the southwestern half of the basin (MDNR 1986). The Sac River basin is divided between the Osage Plains and the Ozarks natural divisions (Figure 7). The western edge of the basin is part of the Osage Plains natural division. The rest of the basin is located primarily in the Springfield Plateau with a small section in the Upper Ozarks area (Thom and Wilson 1980).

Geology and Soils

The uplands in the Sac River basin are mantled with a thin layer of loess ranging from less than two feet thick in the headwaters areas to about four feet in thickness in the lower portions of the basin. The headwaters originate on Mississippian aged limestones and dissect progressively younger strata going downstream. Ordovician dolomites and thin layers of shale are also incised progressing downstream. The lower Sac River ends up incising Pennsylvanian aged shale in the area of its confluence with the Osage River/Truman Reservoir. Figure 8 shows the geology of the Sac River basin.

Karst areas are found in the Sons Creek sub-basin, along the Sac River upstream of Stockton Reservoir, and throughout the portion of the basin found in Greene County (MDNR 1986). Caves, sinkholes, springs, and other natural features related to Karst terrain are most numerous in the southeastern section of the basin and become progressively less numerous to the northwest (MDNR 1986). Figure 9 shows the location of named springs.

Coal deposits underlay the far northwestern portion of the basin (MDNR 1986).

The Sac River basin drains a diverse landscape through a variety of tributaries. The watershed soils will be broken down based on the nine major tributary systems. Soil associations and descriptions follow Allgood and Persinger (1979) as Cedar, Dade, and Polk counties, which comprise the majority of the watershed, do not have completed soil surveys available.

Turnback Creek watershed originates in Bolivar-Hector upland association soils. It then flows through Peridge-Wilderness-Goss-Pembroke and Nixa-Clarksville soil associations. The lower reaches flow through the Hartville-Ashton-Cedargap-Nolin bottomland soil association.

Limestone Creek watershed originates in Parsons-Creldon upland soil association. It then flows through Gerald-Creldon-Hoberg-Keeno and Viraton-Wilderness association soils to its confluence with Turnback Creek.

Sons Creek watershed originates in the Parsons-Creldon upland soil association and flows through Gerald-Creldon-Hoberg-Keeno association soils until it is inundated by Stockton Reservoir.

The Little Sac watershed originates in Eldon-Pembroke, Peridge-Wilderness-Goss-Pembroke, and Needleye-Viraton-Wilderness soil associations. It then flows through Peridge-Wilderness-Goss-Pembroke soils. The lower reach flows through Hartville-Ashton-Cedargap-Nolin bottomland soils until it is inundated by Stockton Reservoir. Two impoundments near the headwaters of the Little Sac watershed (Fellows Lake and McDaniel Lake) cause a rapid descent to Hartville-Ashton-Cedargap-Nolin bottomland soils.

Bear Creek originates in Eldon-Pembroke and Peridge-Wilderness-Goss-Pembroke soil associations. Most of the mid-section flows through Peridge-Wilderness-Goss-Pembroke association soils but the uplands near the mouth become Bolivar-Hector association soils. The bottomland soil association is once again Hartville-Ashton-Cedargap-Nolin for a short distance before Bear Creek flows into the Sac River.
Brush Creek originates and flows through Gerald-Creldon-Hoberg-Keeno association soils. Bottomland soils are of the Hartville-Ashton-Cedargap-Nolin association.
Turkey Creek headwaters originate in Bolivar-Hector association soils and the stream flows through Peridge-Wilderness-Goss-Pembroke soils to its confluence with the Sac River.
Coon Creek headwaters originate in Viraton-Wilderness soils and flows through Hartville-Ashton-Cedargap-Nolin bottomland soils to the stream's confluence with the Sac River.
The Cedar Creek - Horse Creek - Alder Creek watershed originates in Parsons-Barden and Liberal-Barco-Collinsville soil associations. They then flow through Bolivar-Hector, Hepler-Radley-Verdigris-Osage, and Gerald-Creldon-Hoberg-Keeno association soils. Bottomland soils are of the Hartville-Ashton-Cedargap-Nolin association to the watershed's confluence with the Sac River.
The Sac River originates in Viraton-Wilderness and Eldon-Pembroke Upland soils associations. It then flows through Gerald-Creldon-Hoberg-Keeno and Peridge-Wilderness-Goss-Pembroke soil associations.
The middle section of the river is inundated by Stockton Reservoir. Uplands near the lower portions of the Sac River are Bolivar-Hector association soils, grading to Gerald-Creldon-Hoberg-Keeno and Peridge-Wilderness-Goss-Pembroke soil associations, with bottomland soils of the Hartville-Ashton-Cedargap-Nolin association. The variety of soil associations found in the Sac River basin is because it is in the transition area between natural divisions. It exhibits characteristics found in the Osage Plains, Ozarks, and Ozark Border natural divisions.

Watershed Area

The Sac River basin encompasses 1,981 square miles in southwest Missouri. The Sac River basin headwaters begin in, and west of the Springfield metropolitan complex and flow northward to their terminus in Truman Reservoir. Stockton Reservoir is a 24,900-acre reservoir in the heart of the basin that inundates large sections of the Sac and Little Sac rivers.

Channel Gradient

The Sac River originates in northwestern Christian County and flows northward until it terminates as a sixth order tributary of the West Osage River in Truman Reservoir. Gradients in the Sac River basin are generally 5 to 10 feet/mile (Barnett et al 1985). Gradients in headwater reaches of the Sac River basin can exceed 40 feet/mile. Elevation ranges from 1,250 feet above mean sea level (msl) near the headwaters to 690 feet msl at the mouth (Barnett et al 1985). Gradient information for streams and rivers third order and larger in the Sac River basin are available from the Missouri Department of Conservation's Southwest Regional Office in Springfield, Missouri.

Figure 7. Natural divisions of the Sac River basin.

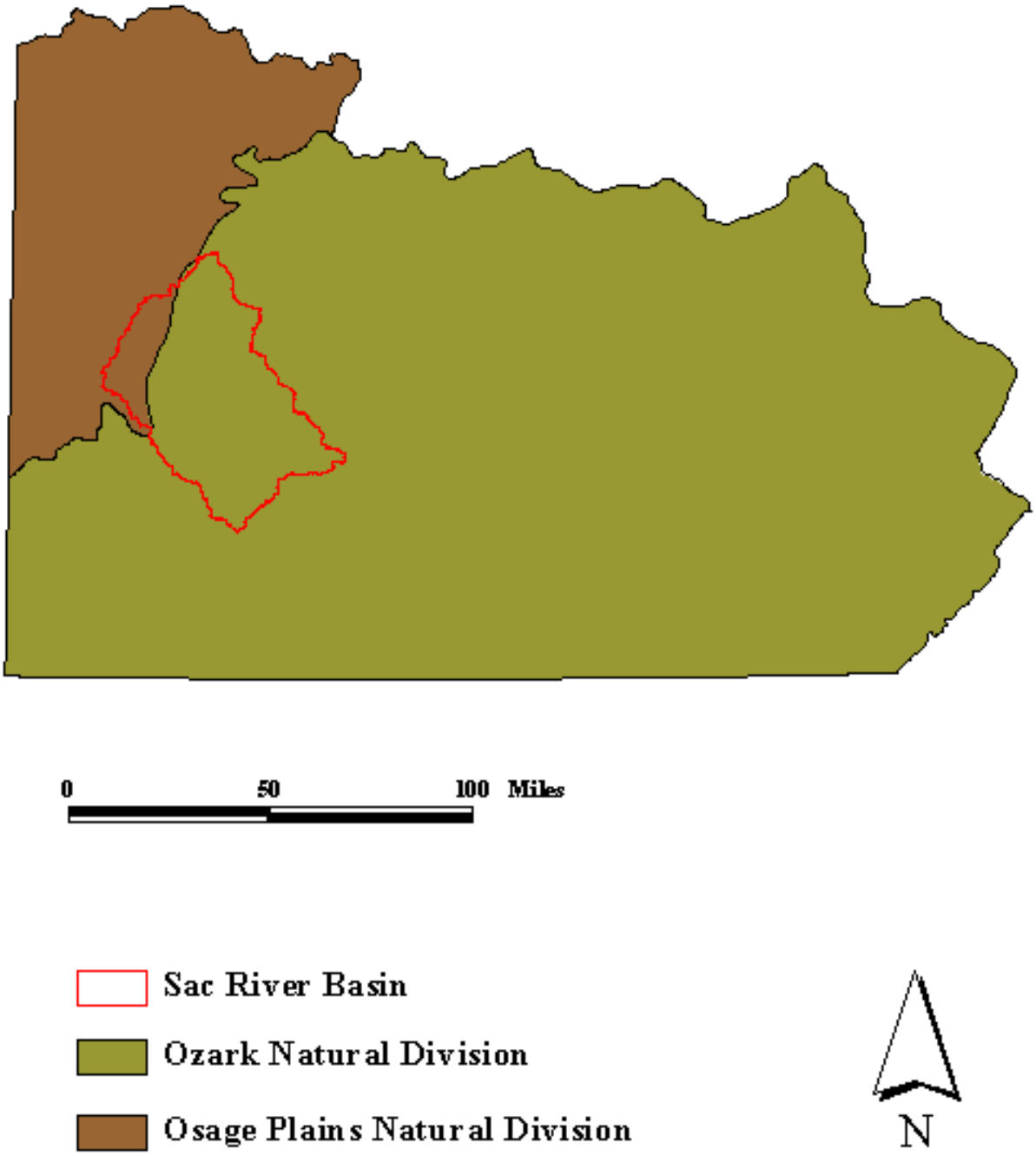


Figure 8. Sac River basin geology.

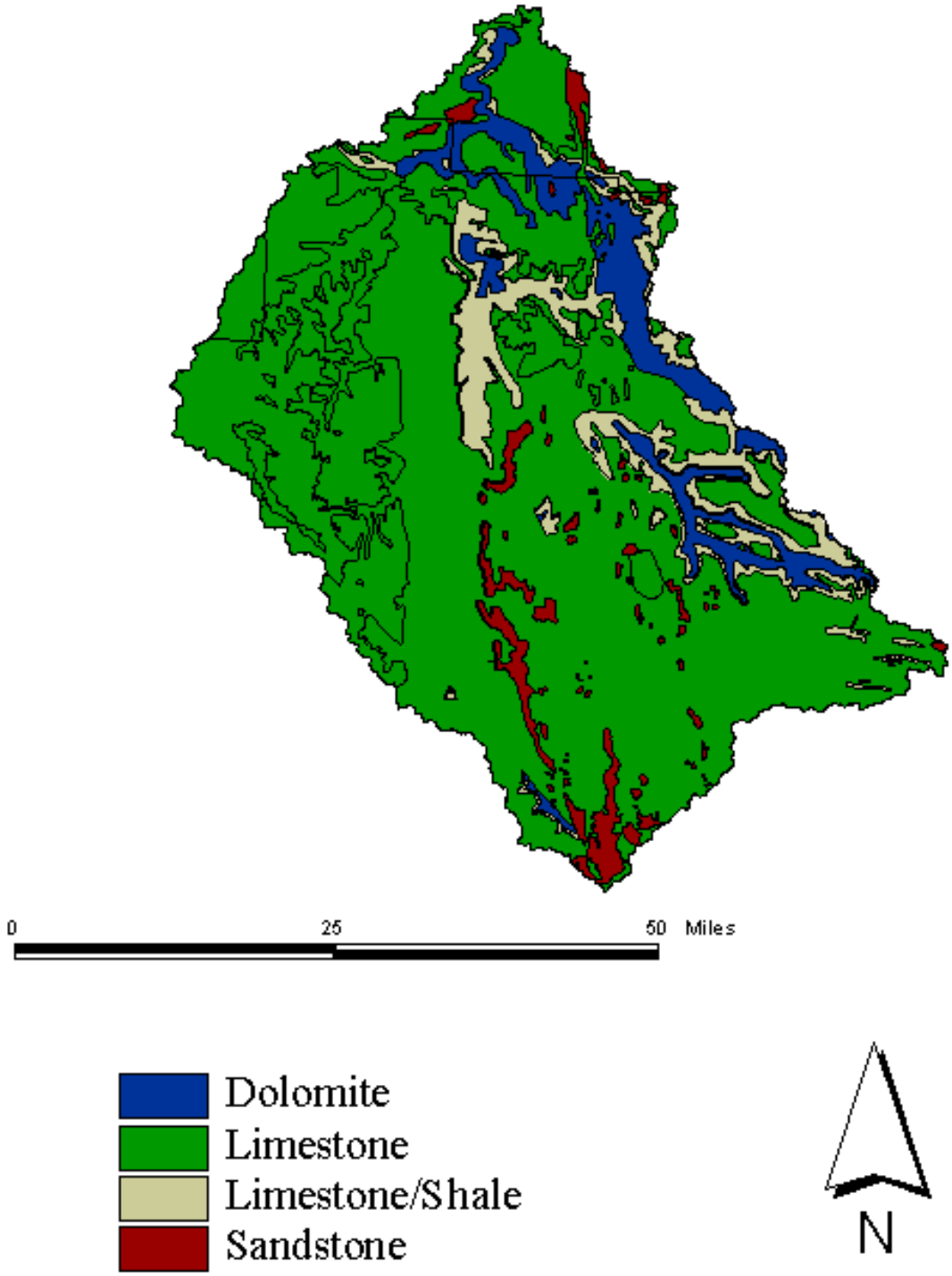
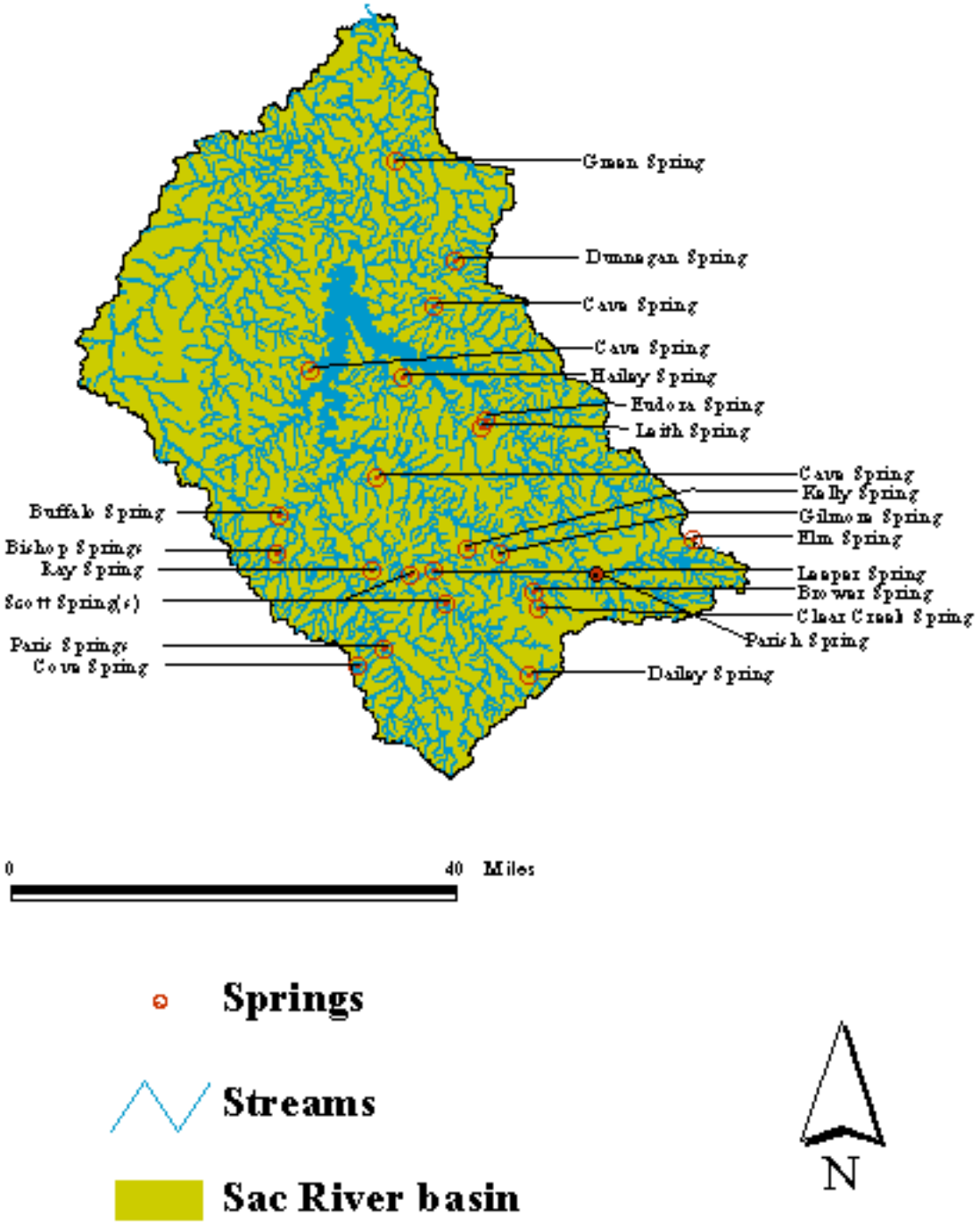


Figure 9. Named springs in the Sac River basin.



Land Use

Historic and Recent Land Use

Historically the area of the Sac River basin was frequented by Osage and Delaware Indians. The first European settlers are speculated to have arrived from Tennessee around 1820. Sparse records make specific information prior to 1832 speculative in nature. The first documented settlers were two brothers from Tennessee that homesteaded in the area southwest of present day Bolivar in 1832-33. The eastern half of the Sac River basin was contained in Polk County as established in 1835 when Greene County was divided. Polk County was given its present day configuration in 1845 as a result of the formation of Cedar, Dade, Dallas, Hickory, St. Clair, and Webster counties.

Diversified farming was the principle occupation in the area through the early 1900s. Livestock production has been a significant agricultural enterprise in the Sac River basin throughout its history. Dairy farming became the primary agricultural enterprise in the basin beginning in the late 1800s and continuing through the 1960s, with peak production occurring in the 1930s. Beginning in the 1950s beef cattle production became the dominant agricultural commodity of the basin. Grain crops were the most frequently cultivated agricultural products in the early 1900s. Grain crops were gradually supplanted by hay and pasture production. Hay and pasture have dominated cultivated crop production since the 1960s for the area. The Sac River basin is one of the top cattle and hay producing areas in Missouri.

About 40% of the Sac River basin area was originally prairie (Schroeder 1982). The remainder was a mix of upland glades, savannahs, and oak-hickory forest.

Landcover in the Sac River basin is predominantly grassland/pasture with forest second in abundance (Figure 10). The majority of grasslands are composed of non-native cool season grasses, primarily fescue. Grazing and hay production are the two most common uses of these expansive grassland areas. Forested areas (primarily deciduous) are more prevalent in the area between Stockton and Truman reservoirs in the northern-most reaches of the basin (Lower Sac River, Turkey Creek, and Brush Creek sub-basins). Row crop agriculture is concentrated in the western section of the basin (Horse-Cedar-Alder creeks sub-basin).

Soil Conservation Projects

Three communities in the basin participate in the National Flood Insurance Program (NFIP); Everton, Ash Grove, and Republic. Five communities in the basin, identified as having flood prone areas but not participating in the NFIP, are Billings, Humansville, and Stockton (FEMA 2001).

Several efforts to reduce erosion and implement environmentally sound practices in various stream systems have been used in the Sac River Basin. Five Special Area Land Treatment (SALT and EARTH) projects have been/are being implemented in the basin. They are Missouri Department of Natural Resources (MDNR) funded projects administered through local soil and water conservation districts.

These projects utilize a variety of practices to reduce impacts while maintaining effective use of the resources. The initial SALT projects were initiated to focus primarily on soil erosion. New SALT projects are focusing on improving water quality in watersheds by reducing all forms of agricultural non-point source pollution and are usually designated as AgNPS SALTs. Currently there are two AgNPS

SALTs in the Sac River basin on the Upper Little Sac River watershed (Table 1 and Figure 11). Proposals have been submitted and funding is pending for similar projects at Valley Water Mill in the upper Little Sac River sub-basin in Greene County and in the Bear Creek basin, primarily in Polk County.

The Upper Little Sac River AgNPS Salt is made up of two watersheds totaling 44,954 acres. There are approximately 100 miles of stream, Fulbright Spring, and McDaniel Lake in these watersheds. Land use is estimated to be 59% grassland, 23% woodland, 3% reservoirs, and 14% other uses. Concerns in the watershed include increased urban growth, stormwater runoff, non-point pollutants resulting from poor land management practices, and contamination of groundwater via septic systems, sinkholes, and abandoned wells. Project goals are to protect and maintain the quality of drinking water resources while enhancing economic sustainability for agricultural producers through education and improved land management practices. The AgNPS SALT project is administered by the Missouri Soil and Water Conservation Service and receives support and technical assistance from a variety of agencies and organizations including Natural Resources Conservation Service (NRCS), MDC, University Outreach and Extension, the City of Springfield, Southwest Missouri State University, and Stream Team volunteers.

Public Areas

Most public areas allow activities such as fishing, hunting, birdwatching, nature study, and wildlife photography. Activities such as horseback riding, biking, camping, etc. that can cause environmental disturbance are restricted to certain areas and may be prohibited on some areas. Restrictions vary between public areas. Table 2 lists the public areas in the Sac River basin and known permitted activities. Figure 12 shows public area locations.

Corps of Engineers 404 Jurisdiction

Most instream and some stream-side projects require 404 permits. Applications for permits should be directed to the U.S. Army Corps of Engineers office. The Sac River basin is under the jurisdiction of the Kansas City District.

Kansas City District USACE 700 Federal Building, Kansas City, MO 64106-2896 (816)426-5357.

Topographic Coverage

Figure 13 depicts 7.5 minute topographic map coverage for the basin.

Figure 10. Landcover in the Sac River basin.

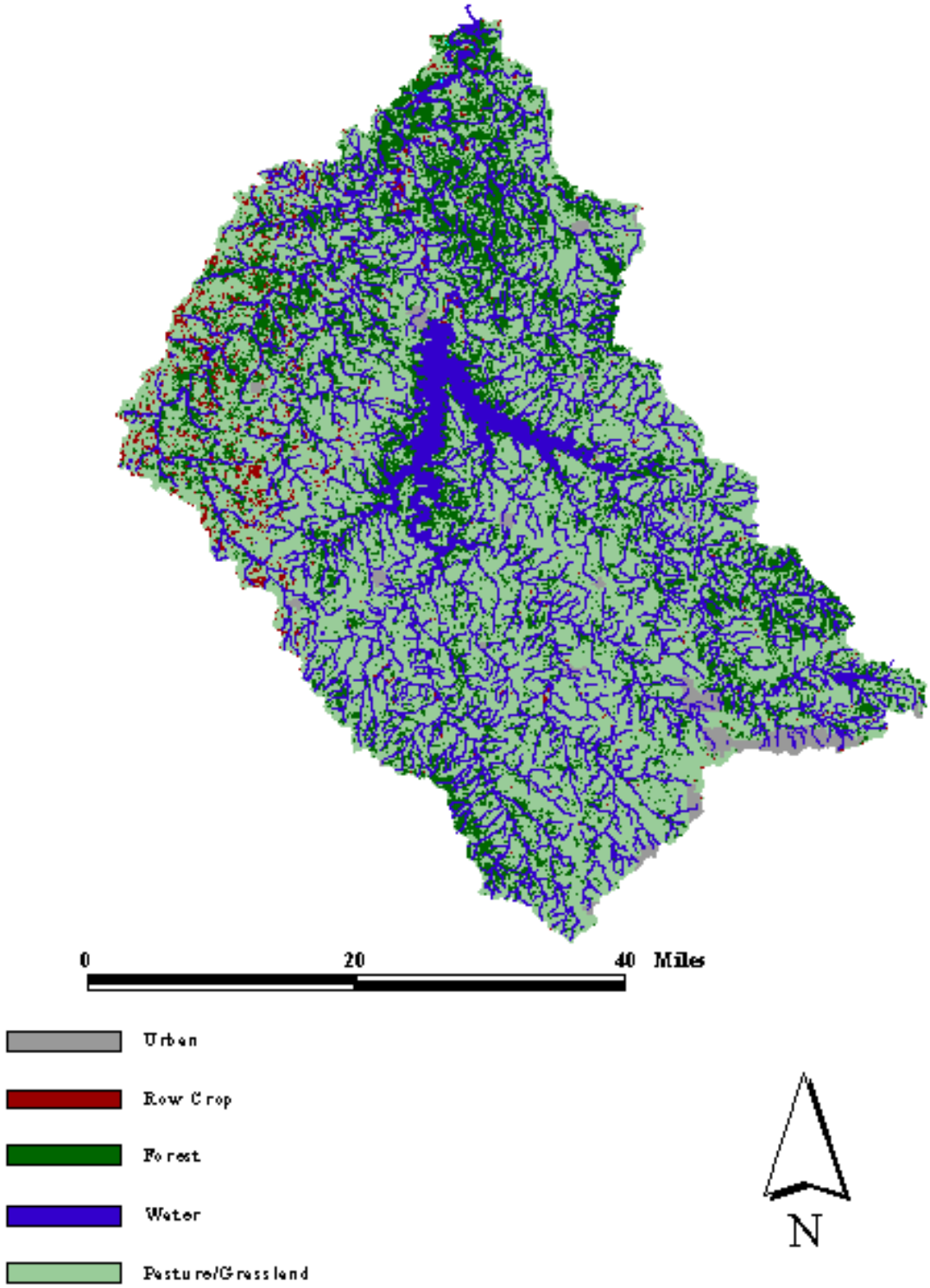
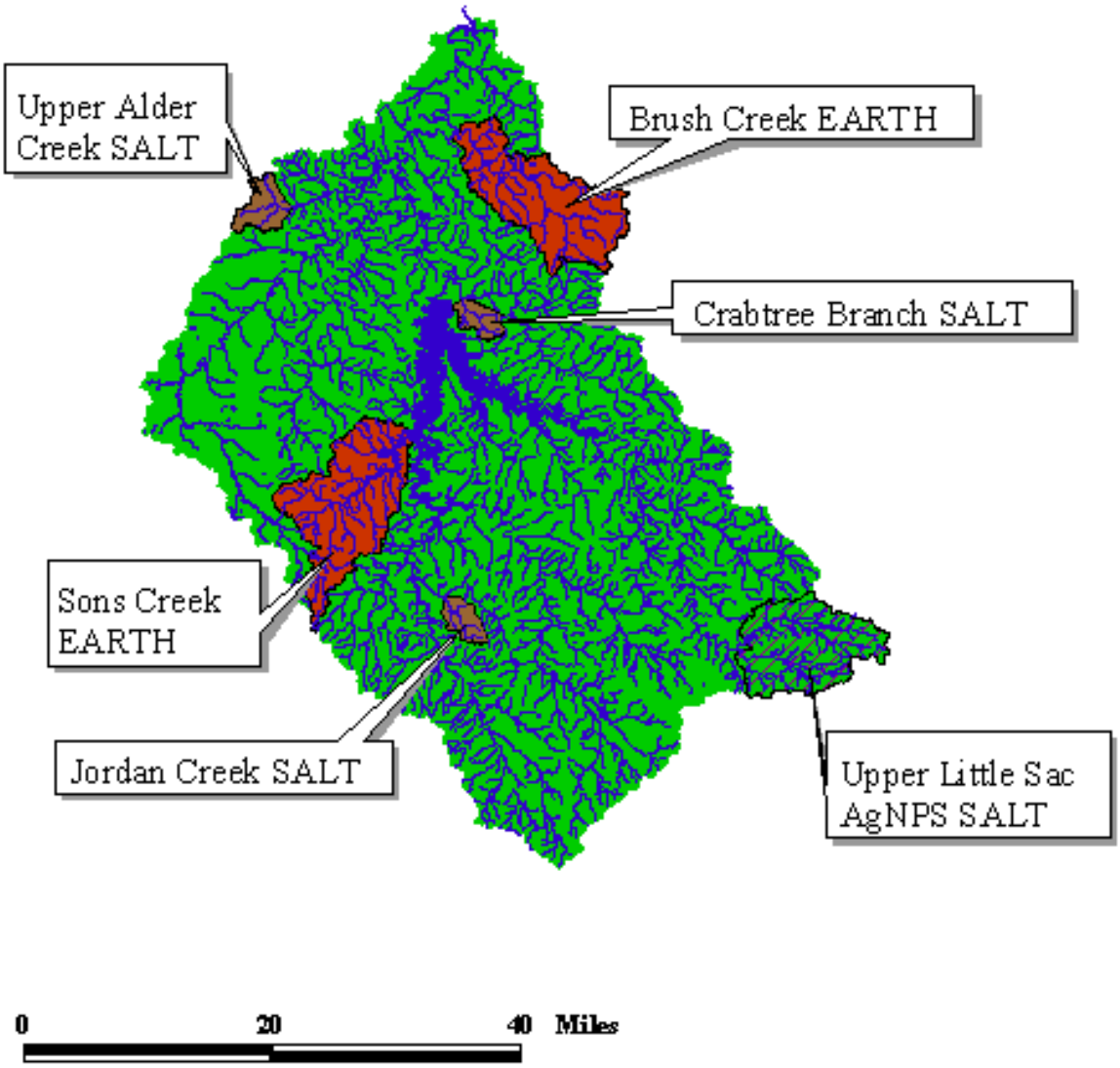


Figure 11. Sac River basin land treatment areas.



SALT - Special Area Land Treatment Projects.

EARTH - Term used to designate a very large SALT Project

AgNPS SALT - Agricultural Non-Point Source Special Area Land Treatment Project

Figure 12. Public lands of the Sac River basin.

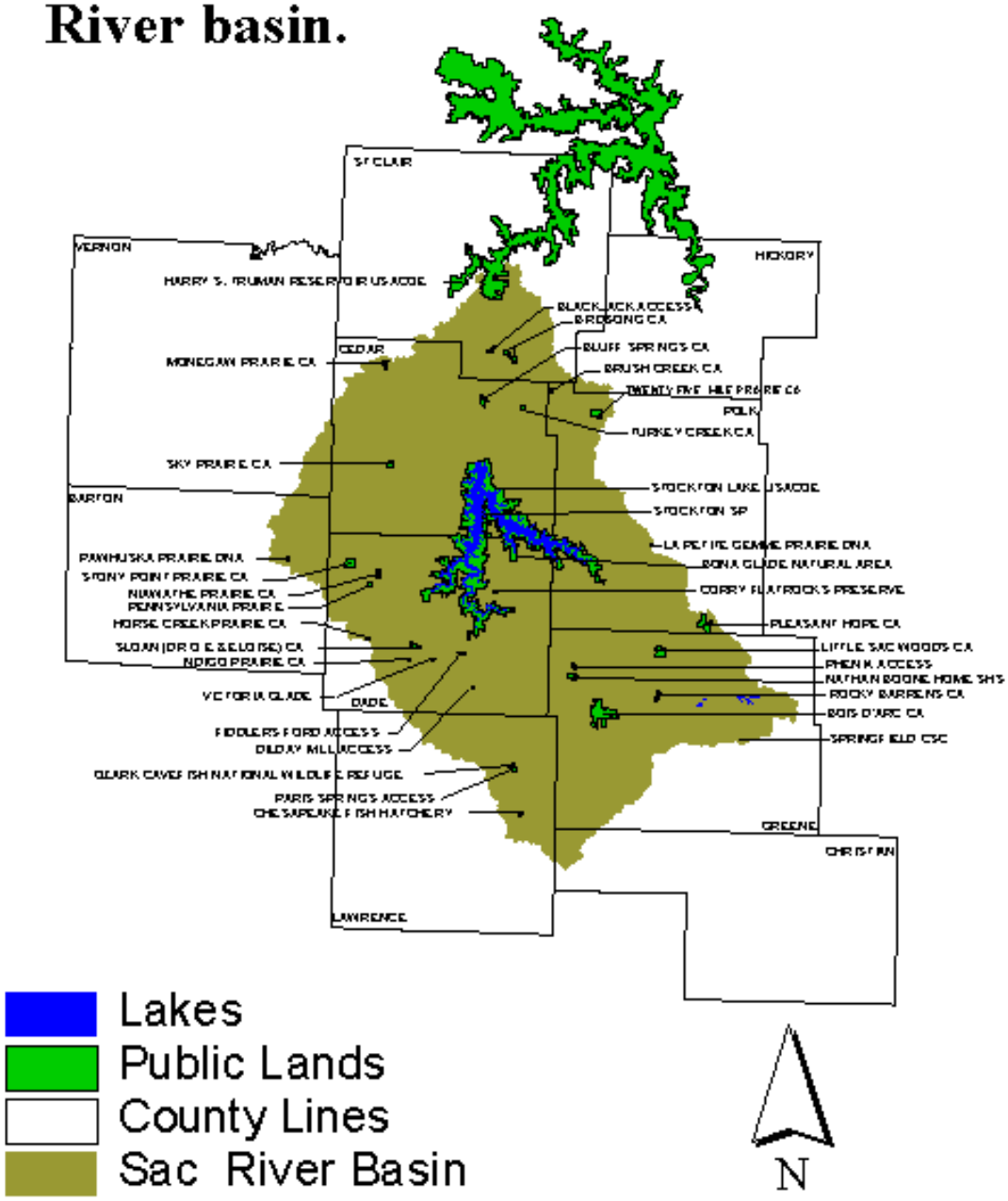
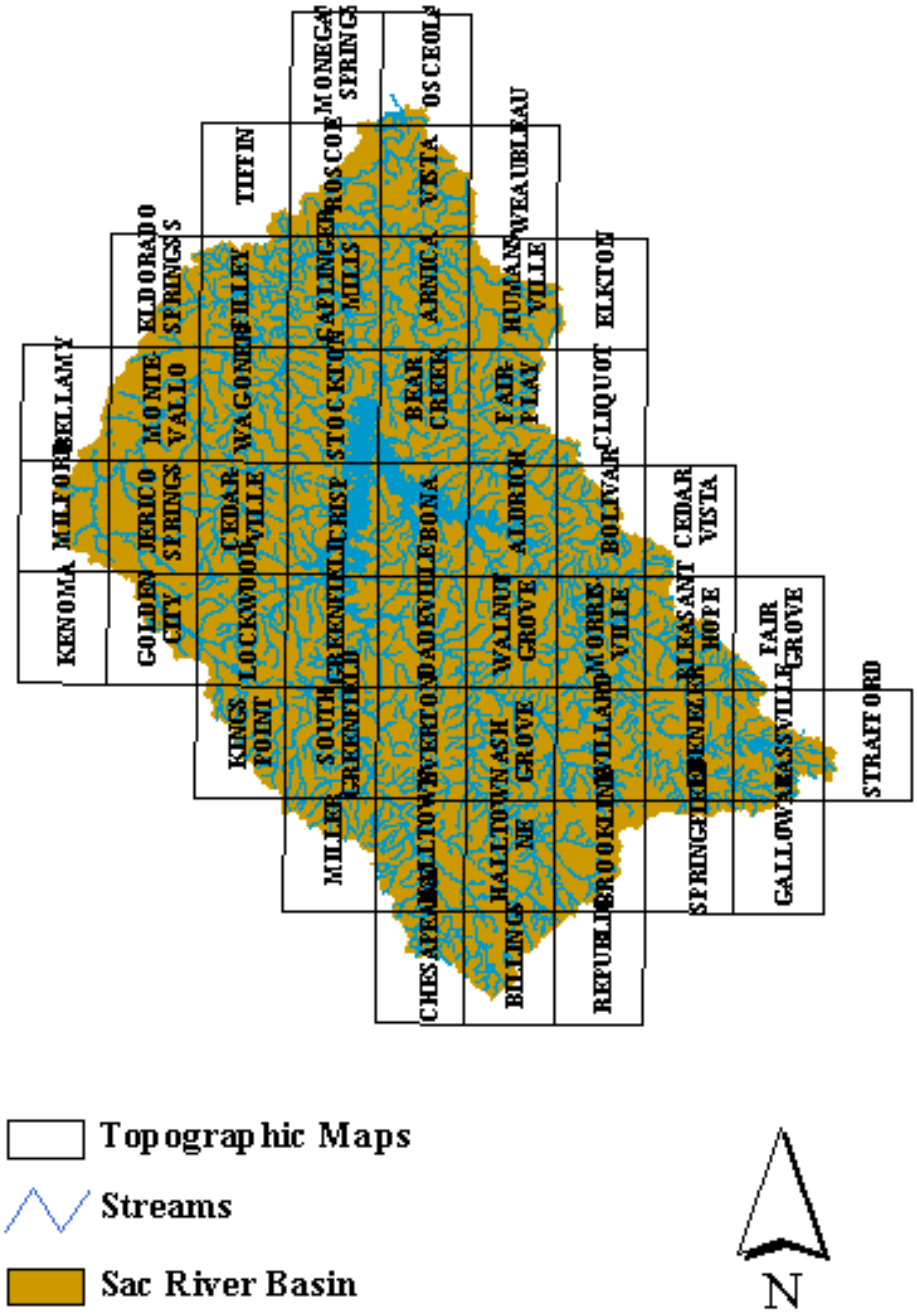


Figure 13. Topographic map coverage for the Sac River basin.



Topographic Maps

Streams

Sac River Basin

N

Table 1. Soil conservation projects in the Sac River basin.

Name	Type	Total Acres	Treated Acres	Dates
Upper Alder Creek	SALT	8,189	2,577	1994 - 1998
Crabtree Branch	SALT	5,070	2,120	Completed 6/94
Jordan Creek	SALT	5,565	1,312	Completed 6/94
Sons Creek	EARTH	57,639		1995 - 1999
Brush Creek	EARTH	54,341	13,811	1995 - 2001
Upper Little Sac River	AgNPS SALT	44,954		Sept. 1997 - June 2002
Sac River	AgNPS SALT	1,260,800		Oct 2000 - June 2006

Table 2. Public areas in the Sac River basin.

Area	Acres	Activities	Ownership
Antioch Bridge Access	83	Fishing, Hunting, Boating (Turnback Creek frontage)	MDC
Birdsong CA	430	Fishing, Hunting, Camping	MDC
Blackjack Access	212	Fishing, Hunting, Camping, Boating (Sac River and Brush Creek frontage)	MDC
Bluff Springs CA	415	Hunting, Fishing	MDC
Bois D'Arc CA	2,892	Hunting, Fishing, Hiking, Shooting Range	MDC
Bona Glade Natural Area	18	Hiking, Wildlife Viewing, Nature Study	MDC
Brush Creek CA	158	Hunting, Camping, Hiking	MDC
Chesapeake Fish Hatchery	119	Hatchery Tours	MDC
Dilday Mill Access	4	Fishing, Hunting, Camping, Boating (Sac River Access)	MDC
Fiddlers Ford Access	50	Fishing, Hunting, Camping, Boating (Turnback Creek frontage)	MDC
Fellows Lake	820	Fishing, picnicking	CU
Horse Creek Prairie CA	80	Hunting	MDC
Indigo Prairie CA	40	Hunting, Fishing	MDC
La Petite Gemme Prairie CA	37	Wildlife Viewing, Nature Study	MPF
Little Osage Prairie CA	38	Hunting, Hiking, Wildlife Viewing	MDC
Little Sac Woods CA	772	Hunting, Fishing, Camping, Hiking (Little Sac River frontage)	MDC
McDaniel Lake	300		CU
Monegaw Prairie CA	270	Hunting, Fishing	MDC
Nathan Boone Home	356	In development	MDNR
Ozark Cavefish National Wildlife Refuge	40	Hiking, Wildlife Viewing, Nature Study	USFWS
Niawathe Prairie CA	320	Wildlife Viewing, Nature Study	MDC/NC
Paris Springs Access	208	Fishing, Hunting, Camping, Boating (Turnback Creek frontage)	MDC
Pawhuska Prairie	76	Wildlife Viewing, Nature Study	MDC
Pennsylvania Prairie	133	Hiking, Wildlife Viewing	MPF
Phenix Access	155	Fishing, Hunting, Boating (Clear Creek frontage)	MDC
Pleasant Hope CA	1,106	Hunting, Fishing, Camping, Hiking, Shooting Range (un-manned)	MDC
Rocky Barrens CA	191	Hunting	MDC
Sky Prairie CA	200	Hunting	MDC

Area	Acres	Activities	Ownership
Sloan (Dr. O. E. & Eloise) CA	320	Hunting, Fishing	MDC
Stockton Reservoir	41,472	Hunting, Fishing, Camping	USACE
Stony Point Prairie CA	640	Hunting, Fishing	MDC
Truman Reservoir	162,495	Hunting, Fishing, Camping	USACE
Turkey Creek CA	160	Hunting, Camping	MDC
Twenty-Five Mile Prairie CA	220	Hunting, Fishing, Hiking	MDC

1. CA = Conservation Area, NA = Natural Area
2. MDC = Missouri Department of Conservation, CU= City Utilities of Springfield, MPF = Missouri Prairie Foundation, NC = The Nature Conservancy, USACE = U. S. Army Corps of Engineers.

Hydrology

Precipitation

Precipitation averages 40 inches per year. Runoff averages about 10 inches per year. Annual snowfall is approximately 14 inches (MDNR 1986). The highest runoff is in April-May and the lowest in December-January, coinciding with seasonal rainfall patterns.

Gauging Stations

There have been 22 gauging stations used in the Sac River basin to monitor stream flows and water quality (Table 3; USGS 1999). The longest running active gauging station is station 06919500 on Cedar Creek near Pleasant View. It has been in service from 1923-1926 and 1948 to present (USGS 1999a).

Currently active stations include: 06918440 on the Sac River near Dadeville, 06918460 on Turnback Creek above Greenfield, 06918493 on the South Dry Sac near Springfield, 06918740 on the Little Sac River near Morrisville, 06918990 on Stockton Lake near Stockton, 06919020 on the Sac River at Highway J below Stockton, 06919500 on Cedar Creek near Pleasant View, and 06919900 on the Sac River near Caplinger Mills. Figure 14 shows the average annual discharge for three gauging stations in the Sac River basin.

Stream Order

Stream orders were assigned using 7.5 minute USGS topographic maps and the methodology originally proposed by Horton (1932) and detailed by Gordon et al (1992). Table 4 depicts the number of streams third order and larger and stream mileage by sub-basin for the Sac River basin.

Losing streams

It takes 4.7 square miles of area to maintain one mile of permanently flowing stream in the Sac River basin (MDNR 1986). Funk (1968) listed the Sac River basin as having 419 miles of permanently flowing stream and 173 miles of intermittently flowing streams with permanent pools. There are several losing streams in the Sac River basin primarily located in the Upper Sac River, Turnback Creek, and Little Sac River watersheds. Table 5 lists losing streams along with their location and Figure 15 gives a graphic location of these stream reaches in the Sac River basin.

Stream Flow

The highest recorded discharge for the Sac River (post-impoundment) at gauging station 06919900 near Caplinger Mills was 61,500 cubic feet per second (cfs) on April 12, 1994 (USGS 1999). The highest recorded discharge for gauging station 06919000 near Stockton, Missouri (pre-impoundment) was 120,000 cfs on May 19, 1943 (USGS 1999). The impoundment of the Sac River by Stockton Dam has dramatically affected the hydrology in the river and its tributaries below the dam. Flood events prior to impoundment were undoubtedly larger in magnitude and most likely of shorter duration. The flow magnitude at present, from the records presented, are probably half the historic magnitude but could be weeks or even months longer in duration. Peaking hydropower operations probably simulate daily mini-floods and droughts as pulses of water are repeatedly sent downstream through the generation turbines. Short term flow

fluctuations can be dramatic. Instantaneous flows can vary rapidly between less than 20 cfs to more than 8,300 cfs in the Sac River below Stockton Dam during peaking operations. Flow fluctuations of this nature can drastically alter stream channel hydrology, contribute to extensive streambank erosion and interfere with recreational use of the lower Sac River.

Stream base flows in the basin tend to be well maintained in Turnback Creek, Upper Sac River, and Little Sac River sub-basins due to the permeable nature of the soils and bedrock in those areas. Springs also tend to be more common in these sub-basins. Base flows become less stable further north and west in the basin due to the changes in soil permeability and bedrock. Appendix A shows stream information for third order and larger streams in the Sac River basin.

7-Day Q^2 and Q^{10} Low Flows

Low flows for streams in the Sac River basin are listed in Table 6. The 7-day Q^2 is the minimum flow expected for a seven day period that will occur on average once in two years. The 7-day Q^{10} is the minimum flow expected for a seven day period that will occur on average once in ten years. The lowest flows usually occur in the late summer and fall (August, September, and October).

Flows tend to be sustained through dry periods by springs and groundwater. Flows are variable for the Sac River basin, but the ready infiltration of surface water into the groundwater system reduces the magnitude of high flows. The corollary discharge of groundwater during dry periods tends to maintain stream flow. This exchange between groundwater and surface water tends to moderate and maintain more "consistent" flows in all but extreme conditions. In the lower Sac River flows tend to be lower in magnitude but sustained over longer periods of time due to the operation of Stockton Reservoir dam releases. Water temperatures are lower as a result of deep water releases through the hydro-power generation outlets. Also, oscillations from high flow to low flow conditions in the lower Sac River tend to be rapid and dramatic due to the "peaking" method of electrical generation. Hydrology in the lower Sac River and the lower Sac River basin tributaries has been dramatically altered due to impoundment and hydro-power operations.

Dam and Hydropower Influences

A total of 39 miles of the Sac River has been lost to impoundment by Stockton Dam. Stockton Dam began impounding water in 1969 (Vandike 1995). The dam is 5,100 feet long, projects 153 feet above the Sac River streambed, and creates a 24,900 acre reservoir with 298 miles of shoreline. Normal pool is at 867 feet msl with storage of 875,000 acre-feet. The flood storage capacity of Stockton Lake is 1,674,000 acre-feet of water at an elevation of 892 feet msl. The surface area of Stockton Lake at flood pool swells to 63,200 acres. Stockton Lake is operated primarily for flood control and hydroelectric generation and has an installed capacity to produce 45,200 kilowatts of electricity (MDNR 1986).

Stockton Dam operation has negatively impacted the lower Sac River and lower basin tributaries. Impacts include bank erosion, siltation, instream flow problems, poor water quality, loss of riparian corridor, loss of invertebrate habitats (and concurrent reduction in productivity), and reduction of spawning habitat for fish (MDC 1999a). As a result of extensive streambank sloughing along the Sac River below Stockton Dam, the COE has purchased sloughing easements from streamside landowners. Positive impacts of Stockton Lake are water supply, electricity production, recreation/tourism, and flood control. Prior to the building of Stockton Dam, average monthly discharge was less uniform than it is today (Figure 16). The economic impact of recreation/tourism on the area around Stockton Lake has been substantial. The

estimated combined annual benefit of angling for Stockton Lake was $23,098,263 in 1999 (Banek, MDC, pers. com). Diversification of sport fisheries for species including walleye, largemouth bass, and white bass have been an additional impact of Stockton Lake. Lakes with large areas of deep open water also provide opportunity for boating, skiing, and sailing that are not available on streams. Management objectives and summary information concerning the Stockton Lake fishery are available by contacting MDC's Southwest Region Fisheries staff in Springfield.

Fellows Lake was constructed by damming the Little Sac River in 1955. The dam was raised to enlarge storage capacity in 1992. The lake covers 812 surface acres at normal pool with a storage capacity of 10.1 billion gallons. The primary purpose for Fellows Lake is drinking water (Watershed Committee of the Ozarks 1999). McDaniel Lake was constructed by damming the Little Sac River in 1929. The dam was raised to enlarge storage capacity in 1990. The lake covers 226 surface acres at normal pool with a storage capacity of 1.5 billion gallons. The primary purpose for McDaniel Lake is drinking water (Watershed Committee of the Ozarks 1999).

There are a few small public and private lakes and a large number of farm ponds in the Sac River basin. Due to small size and ease of construction, the number of ponds can change very rapidly. Many ponds are built without needing permits and statistics on ponds are usually compiled by county rather than watershed. These factors complicate getting accurate, up-to-date information on ponds. Concern exists over the effects these ponds have on low-flow conditions as they intercept runoff and allow little or no adjustment for maintenance of stream flows.

Table 3. Gauging stations operated in the Sac River basin.

Gauge Number	Location	Gauge Type1	Years of operation
6918400	Pickerel Creek near Republic	Miscellaneous site	1968-1970
6918420	Sac River at Ash Grove	Miscellaneous site	1962-65, 67, 71
6918430	Clear Creek near Phenix	Miscellaneous site	1962-64, 67, 70-71
6918440	Sac River near Dadeville	Continuous discharge	1966 to present
		Water quality	1974 - 87, 94-95
6918444	Chesapeake Spring at Chesapeake	Miscellaneous site	1926, 32, 36, 54, 63-68
6918450	Limestone Creek at South Greenfield	Miscellaneous site	1962-64, 66-67, 71-72
6918460	Turnback Creek at Greenfield	Continuous discharge	1965 to present
6918470	Turnback Creek near Greenfield	Miscellaneous site	1943, 45-46, 49, 62-65
6918480	Sac River near Neola	Miscellaneous site	1964-1965, 1967
6918490	Sons Creek near Neola	Miscellaneous site	1964-65, 67
6918493	S. Dry Sac near Springfield	Continuous discharge	1996 to present
6918600	Little Sac at Walnut Grove	Water quality	1974 - 90, 94-96
6918700	Oak Grove Branch near Brighton	Miscellaneous site	1958-72
6918740	Little Sac near Morrisville	Continuous discharge	1968 to present
6918750	Franca Branch near Brighton	Crest gauge	1955-84
6918800	Little Sac at Aldrich	Miscellaneous site	1962-65, 67-68
6918990	Stockton Lake near Stockton	Continuous discharge/water quality	1969 to present
6919000	Sac River near Stockton	Continuous discharge	1921- 89
6919020	Sac River near Stockton (Hwy J)	Continuous discharge	1973 to present
6919200	Sac River Tributary near Caplinger Mills	Crest gauge	1955 - 62, 63 - 84
6919500	Cedar Creek near Pleasant View	Continuous discharge	1948 to present
6919900	Sac River near Caplinger Mills	Continuous discharge	1974 to present
6919950	Brush Creek near Collins	Continuous discharge	1995 to present

[1] - Miscellaneous sites were set up and run for specific information needs and time periods. They may have been discharge, water quality, crest, or other types of gauging stations.

Table 4. Number of streams third order and larger and stream mileage by sub-basin for the Sac River basin.

Sub-basin name	Number of streams (>3 order)	Total stream miles
Bear Creek	10	84.7
Brush Creek	18	93.3
Coon Creek	8	38.5
Horse-Cedar-Alder Creeks	42	328.9
Little Sac River	26	254.4
Sons Creek	10	71
Turnback Creek	23	197.4
Turkey Creek	3	31.9
Sac River + minor tributaries	43	353.2
Sac River basin (total)	183	1,453.40

Table 5. Losing streams in the Sac River basin in Missouri.

Stream	Receiving Stream	Location		
		T	R	Sec.
First Order Tributary	Turnback Creek	27N	24W	6,7,8,17,20
First Order Tributary	Second Order Tributary	27N	25W	4
Second Order Tributary	Goose Creek	28N	25W	26, 34, 35
Second Order Tributary	Goose Creek	27N	25W	1, 2, 13
		28N	25W	26, 35, 36
First Order Tributary	Second Order Tributary	27N	25W	2
		28N	25W	35
First Order Tributary	Pickerling Creek	28N27N	24W	33
			24W	3
First Order Tributary	Pickerling Creek	27N	24W	4, 9
		28N	24W	33
Pickerling Creek	Sac River	28N	24W	2, 10, 11, 15, 16, 22, 21, 28
		29N	24W	22, 23, 26, 35
First Order Tributary	Sac River	28N	23W	1, 6, 7, 12, 18
		29N	24W	35, 36
First Order Tributary	Pickerel Creek	29N	24W	21, 22, 28, 29
First Order Tributary	Sac River	29N	23W	23, 30, 34, 35
		29N	24W	5, 25, 24
		28N	23W	3, 4, 5
Second Order Tributary	Sac River	29N	23W	19-22, 27-29
Second Order Tributary	Sac River	29N	23W	1, 2, 9, 10, 11
First Order Tributary	Clear Creek	29N	23W	2, 3
		30N	23W	35
First Order Tributary	Clear Creek	30N	23W	26, 27, 28
First Order Tributary	Clear Creek	30N	24W	2
		31N	24W	23, 26, 35
First Order Tributary	Little Sac River	30N	23W	25
		30N	22W	19, 30
South Dry Sac	Little Sac River	29N	21W	3, 4, 5
		30N	21W	31, 32
		30N	22W	36
Stinking Creek	Turnback Creek	30N	26W	10, 11, 12
First Order Tributary	Asher Creek	30N	23W	

Table 6. Seven-day Q^2 and 7-day Q^{10} low flows for streams in the Sac River basin.

USGS Gauge No.	Stream	Period of Record	7-Day Q^2 (cfs)	7-Day Q10 (cfs)
6918400	Pickerel Creek near Republic	1968-1970		0
6918420	Sac River at Ash Grove	1962-65, 67, 71	13	3.5
6918430	Clear Creek near Phenix	1962-64, 67, 70-71	5	1
6918440	Sac River at Dadeville	1966-72	18	6
6918444	Chesapeake Spring	1926, 32, 36, 54, 64-69	0.9	0.5
6918450	Limestone Creek at South Greenfield	1962-64, 66-67, 71-72	2.3	0.3
6918460	Turnback Creek above Greenfield	1965-72	22	4.5
6918470	Turnback Creek near Greenfield	1943, 45-46, 49, 62-65	23	4.5
6918480	Sac River near Neola	1964-1965, 1967	64	23
6918490	Sons Creek near Neola	1964-65, 67	0	0
6918700	Oak Grove Branch near Brighton	1958-72	0	0
6918740	Little Sac River at Morrisville	1968-72	6	0
6918800	Little Sac River at Aldrich	1962-1965, 1967	5	
6919500	Cedar Creek near Pleasant View	1949-1972	0.7	0

Source: Skelton (1976).

Water Quality

Beneficial Use Attainment

The Sac River basin has 173 miles of streams classified as supporting whole body contact recreation (MDNR 1986). McDaniel Lake, Fellows Lake, and Fulbright Spring Branch are the only waters designated for drinking water supply in the Sac River basin (8 miles total) (MDNR 1986). Water quality problems for the Sac River basin noted in 1994 by the MDNR were suspended solids in Stockton Branch originating from the town of Stockton (two miles of affected stream) and nutrient pollution of McDaniel and Fellows lakes from urban/agricultural sources. Another area of concern was potential groundwater contamination from various sources (faulty septic tanks, leaking storage tanks, agricultural runoff, etc.) in the area around Springfield (MDNR 1996).

All streams and lakes in the Sac River basin are classified for aquatic life protection and livestock/wildlife watering. McDaniel Lake is classified for drinking water supply as well as aquatic life protection and livestock/wildlife watering. In addition to these previously mentioned uses, Stockton Lake includes whole body contact and Fellows Lake includes whole body contact and boating and canoeing as designated uses. Chesapeake Creek from its mouth upstream for 3 miles and 14 miles of Turnback Creek (T30N, R26W, section 35 to T28N, R25W, section 24) are classified for cold water fisheries. Cedar Creek from its mouth upstream for 27 miles is classified for whole body contact, boating, and canoeing. Brush Creek from its mouth upstream 13 miles is classified for whole body contact and cool water fishery. The lower 24.5 miles of Horse Creek have irrigation as an approved designated use. The Little Sac River from McDaniel Lake Dam to its mouth (lower 29 miles) is classified for whole body contact, boating and canoeing, and cool water fishery. The Sac River from Stockton Lake Dam downstream for 40 miles is classified for whole body contact, boating and canoeing, and irrigation. The Sac River from Stockton Lake upstream for 32.5 miles is also classified for these uses. Turnback Creek is classified for whole body contact from its mouth upstream for 33.5 miles and for boating and canoeing in the lower 14 miles.

Section 305(b) of the Clean Water Act requires states to report on the status of water quality in their surface waters. The MDNR summarizes the quality of Missouri waters every two years in these reports. Significant improvements have been made over the past quarter century in controlling pollution from sanitary wastes, such as that from cities, but major work still remains to restore waters that suffer from non-point source pollution. The Little Sac River from McDaniel Lake to Stockton Reservoir and the Sac River from Stockton Dam to Hwy J are listed as 305(b) impaired streams.

Section 303(d) of the Clean Water Act requires states to list waters not expected to meet established, state water quality standards even after application of conventional technology-based controls for which total maximum daily load (TMDL) studies have not yet been completed. The list is produced every four years by the MDNR and includes waters for which existing required pollution controls are not stringent enough to maintain state water quality standards. Examples of waters on this list include streams below coal or lead mining areas, streams or lakes with pesticide problems, rivers that have problems related to dams, and streams that were channelized long ago. The Little Sac River watershed is included in Missouri's 303(d) listings. Water quality problems listed as 303(d) impairments are fecal coliform suspected as originating from the Springfield Northwest Waste Water Treatment Plant, and agricultural/suburban non-point source nutrient pollution of Fellows and McDaniel lakes.

There are approximately 1,300 miles of impaired streams and 1,013 impaired lake acres found within the Sac River basin. Sources of biological impairment include damming, riparian degradation, channel alteration, urbanization, flow alteration, sedimentation, point source pollution, and non-point source pollution.
For more information, contact DNR's Water Pollution Control Program at 1-800-361-4827 or (573) 751-1300

Chemical Quality of Stream Flow

The EPA index of watershed indicators report on ambient water quality monitoring of copper, nickel, zinc, chromium, phosphorus, pH, dissolved oxygen, and ammonia in the Sac River basin found that levels exceeded established criteria in less than 10 percent of the observations (EPA website 1999).
Water quality problems associated with increased urban development are an ongoing concern in the Little Sac portion of the Sac River basin. Population increases in the Springfield metropolitan area are the primary reason for increased nutrification and algal growth in the Little Sac watershed. Occasionally high phosphate, nitrate, and sulfate levels are likely due to localized agricultural practices, overflow from the northwest treatment plant, or leachate from the Springfield landfill (Sparks and Pavlowsky, 2000).
For detailed information, call Watershed Committee of the Ozarks at 417-866-1127.

Contaminants, Fish Kills, and Health Advisories

Reports of pollution and fish kills have increased in recent years. This may be the result of increased pollution events, increased environmental awareness and activism, better monitoring by state and federal agencies, or a combination of these factors. Table 7 lists pollution investigations involving MDC from 1977 through 2000.
All fish in the Sac River basin are considered safe to eat in any amount (MDOH 1999).

Water Use

High utilization of groundwater in and around the Springfield metropolitan area has caused a cone of depression to form in the water table (Barnett et al 1985). This cone of depression will expand, may cause shallow wells to go dry, and increase pumping costs for groundwater users in the area.
Groundwater yields from bedrock range from 2 to 40 gallons per minute per foot of drawdown (MDNR 1986). The quality of the groundwater ranges from good to excellent throughout the basin (MDNR 1986). Water use is highest in Greene County (Springfield) and second highest in Cedar County (Stockton Lake power generation) (MDNR 1986). There are four public water supply districts in the Sac River basin (MDNR 1986). In 1996, City Utilities of Springfield constructed a pipeline to pump water from Stockton Lake to Fellows Lake (Watershed Committee of the Ozarks 1999). The two public water supply surface water intakes in the basin are on Fellows Lake and McDaniel Lake (MDNR 1986). Water use in the Sac River basin in Missouri is about 10.9 trillion gallons per year. Public and domestic use accounts for 7.4 trillion gallons, industrial/commercial for 920 million gallons, and agriculture for 2.5 trillion gallons (Ducharme and Miller 1996). Table 8 and Figure 17 show the public water facilities in the Sac River basin.

Point Source Pollution

Several waste water treatment facilities (WWTF) in the basin have historically violated their discharge permits. As population increases are occurring these problems are likely to increase. Water quality concerns associated with point sources were listed in the Missouri Water Quality Basin Plan (MDNR 1996). The problems associated with point source discharges at this time included: problems meeting the permit limits for nickel and cadmium at the Republic WWTF affecting 3 miles of unclassified stream; potential for instream toxicity of ammonia in the Little Sac River below Springfield's Northwest WWTF;
0.2 miles of an unclassified stream minimally impacted by two Greenfield WWTFs; dissolved oxygen depletion and discoloration problems in receiving streams from the Fair Play South WWTF; and dissolved oxygen depletion and discoloration from the Stockton WWTF caused a partial loss of beneficial use of Stockton Branch.

The Clean Water Act requires wastewater dischargers to have a permit establishing pollution limits, and specifying monitoring and reporting requirements. National Pollutant Discharge Elimination System (NPDES) permits regulate household and industrial wastes that are collected in sewers and treated at municipal wastewater treatment plants. These permits also regulate industrial point sources and concentrated animal feeding operations that discharge into other wastewater collection systems or that discharge directly into receiving waters. Table 9 lists NPDES permitted point source discharges in the Sac River basin.

The Toxic Release Inventory (TRI) is an EPA generated source of information about toxic chemicals that are being used, manufactured, treated, transported, or released into the environment from various sources. Table 10 lists toxic release inventory facilities in the Sac River basin.

Hazardous waste information is tracked by state and federal agencies as part of the Resource Conservation and Recovery Act (RCRA). EPA maintains this information in a database called the Resource Conservation and Recovery Information System (RCRIS). Table 11 lists various facilities in the Sac River basin that generate, transport, treat, or dispose of hazardous wastes that are monitored under RCRA.

Air emissions of pollutants are reported as part of the Aerometric Information Retrieval System (AIRS). The AIRS facility subsystem (AFS) contains information on compliance and emissions of facilities with air pollution point sources that are monitored by EPA and/or state regulatory agencies. Table 12 lists facilities with airborne pollutant emissions in the Sac River basin.

Years ago, many wastes were dumped on the ground, in rivers, or left out in the open. As a result, thousands of uncontrolled or abandoned hazardous waste sites were created. Some common hazardous waste sites include abandoned warehouses, manufacturing facilities, processing plants, and landfills. In response to growing concern over health and environmental risks posed by hazardous waste sites, Congress established the Superfund Program in 1980 to clean up these sites. The Superfund Program is administered by the EPA in cooperation with individual states throughout the United States. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is the official repository for site and non-site specific Superfund data in support of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). It contains information on hazardous waste site assessment and remediation from 1983 to the present. Table 13 lists inactive superfund sites in the Sac River basin.

Non-Point Source Pollution

Concentrated Animal Feeding Operations

Total effect from livestock in the basin was estimated to be 3,850,000 population equivalency (MDNR 1985). Animal feeding operations are starting to increase throughout the basin and corporate hog feeding operations are increasing north and west of Stockton Lake (Kevin Hess, MDNR, pers. comm.). Livestock is the most significant source of non-point pollution in the Sac River basin (MDNR 1996). Missouri as a state ranks second in the U.S. in the number of cattle operations and fifth in total number of cattle (NASS 2000). Lawrence County is the number one county in Missouri for cattle and calf population, and Polk County is the number one hay producing county in Missouri (MASS 2000) and also ranks very high in cattle and calves. Both of these counties lie partly within the Sac River basin. The basin as a whole is one of the top cattle and hay producing areas in Missouri. Pastured cattle and fertilization for hay production and subsequent nutrient runoff may contribute to the nutrification of watershed streams. Concentrated animal feeding operations (CAFO) that have more than 1,000 animal units in Missouri are regulated by MDNR. MDNR CAFO regulations require (based on the number of animal units) a specified area of vegetated land be available and used for the spreading of waste. If enough land is not available, the waste must be hauled and spread elsewhere, sold, or contained in closed lagoons. Land application of animal waste has added to soil productivity and improved pasture and hay production.

These elements led to an unquantified increase in land clearing and cattle production in the Elk River basin of southwest Missouri (G. Parsons and V. Kugler, MDNR, pers. com.). A similar relationship probably exists in the Sac River basin. It is thought that some CAFO operators, who land apply dry waste, may over-apply the manure. Phosphorus contamination of streams in the watershed is inevitable if wastes are over-applied. In recent years, the number of CAFOs (primarily hog operations) have increased in the northwest portion of the watershed. Table 14 and Figure 18 show the CAFOs found in the Sac River watershed.

Erosion

Watershed land use was listed as approximately 50% row crops, pasture, and hayfield and 50% forest from 1985 through 1995 (MDNR 1985; MDNR 1996). Land in cultivation and pasture production has probably increased throughout the watershed as the number of CAFOs have increased.

Sheet and rill erosion on tilled and pasture lands is 2.5-5 tons/acre/year. Sheet and rill erosion on non-grazed forest is less than 0.25 tons/acre/year. Gully erosion is slight, with less than 0.15 tons/acre/year. These figures are low and agricultural erosion is not considered a basin-wide problem. Sediment yield by streams in the Sac River basin is 0.3--1.0 tons/acre/year, primarily from sheet and rill erosion (Anderson 1980). Helicopter video taken in 2000 revealed localized streambank erosion problems throughout the watershed.

Urbanization

Water quality problems associated with increased urban development are an ongoing concern in the Little Sac River sub-basin (MDNR 1985; MDNR 1996). Little Sac River headwaters originate in the Springfield area. Springfield is the fastest growing metro area in the state. Including the urbanized area outside the city limits, the population figure is 240,500. Population in the greater Springfield area (40 mile radius) is 476,574 (U.S. Census Bureau 2000). Due to the weathering of the limestone and karst features in the Springfield area, urban runoff is a threat to

groundwater. Increasing algae and nutrients in local reservoirs are the suspected cause of odor and taste problems in the drinking water supply (MDNR 1996). The abandoned Fullbright and Sac River landfills are in close proximity to the Little Sac River and have leached low levels of chemicals into the local aquifer (MDNR 1996). During the building of Springfield's northwest treatment plant, a leachate interception drain was constructed to stop the leaching of toxic metals and organic compounds into the Little Sac River. Today, the abandoned landfills are not thought to exert an environmental impact on the river (MDNR 1996).

Mining

Little information on gravel mining (including removal of gravel from streambeds) is known for the Sac River basin. There is one permitted gravel mining operation on Limestone Creek. There are many small localized areas where it appears landowners have removed gravel from or re-arranged gravel bars to use on farm roads and/or to prevent bank erosion. Another type of rock mining that is significant in the Sac River basin is limestone quarrying. Coal mining affects the Horse and Cedar creek drainages with the potential for acid drainage to reduce water quality. To date the effects have not been significant. (MDNR 1996). In the past, mining of lead, zinc, and iron was conducted in the Sac River basin. Most of this mining activity has ceased, but old mine shafts and mine tailings can be found and may create water quality problems with leaching of materials or by providing avenues for mixing of surface waters with groundwater. Figure 19 shows the locations of past and present mining operations of the Sac River Basin. Table 15 contains the known information about non-point pollution in the Sac River basin. Known information on gravel, limestone, and mineral mining in the Sac River basin is presented in Appendix B.

Figure 15. Losing streams in the Sac River basin.

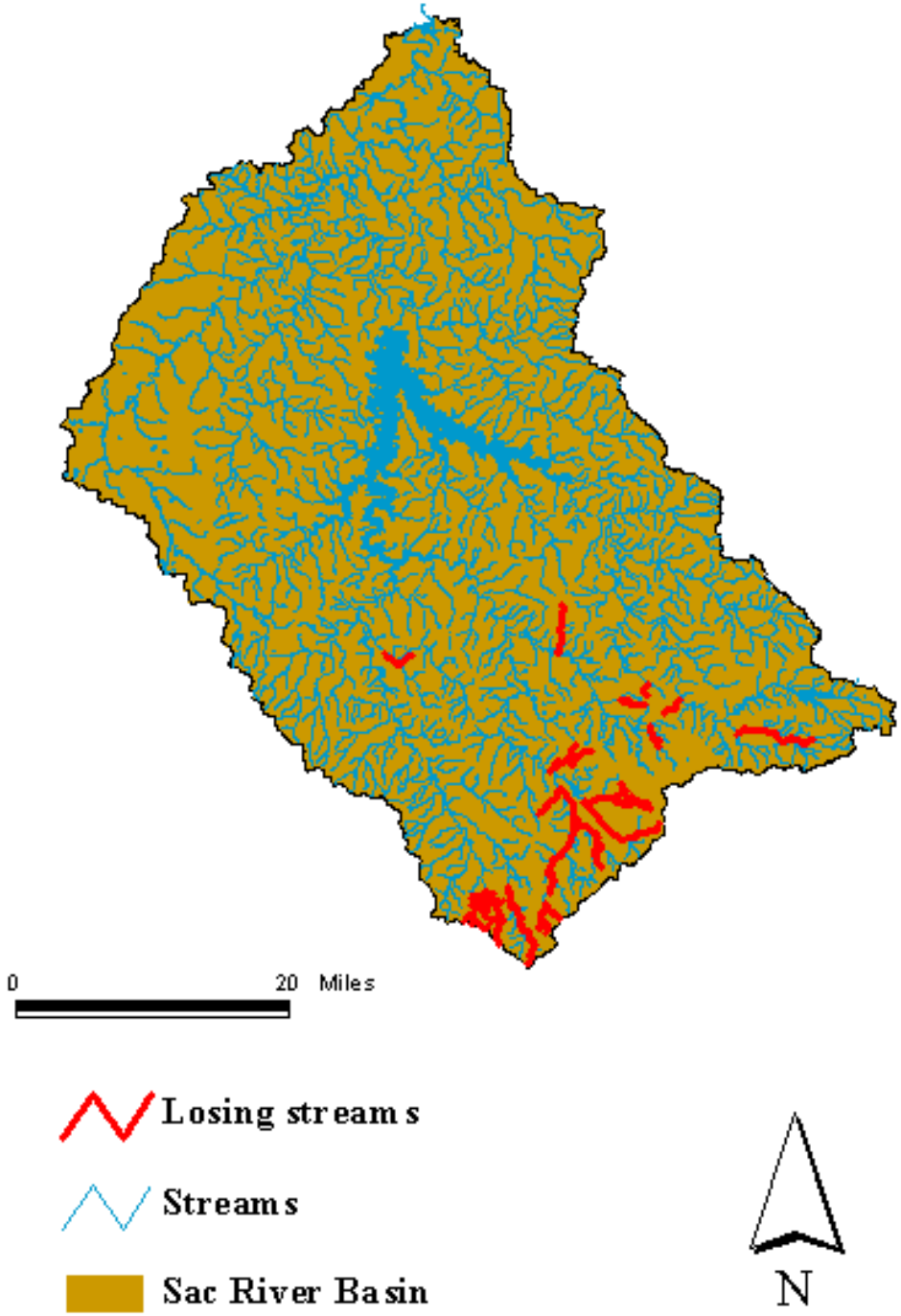


Figure 17. Public drinking system wells in the Sac River basin

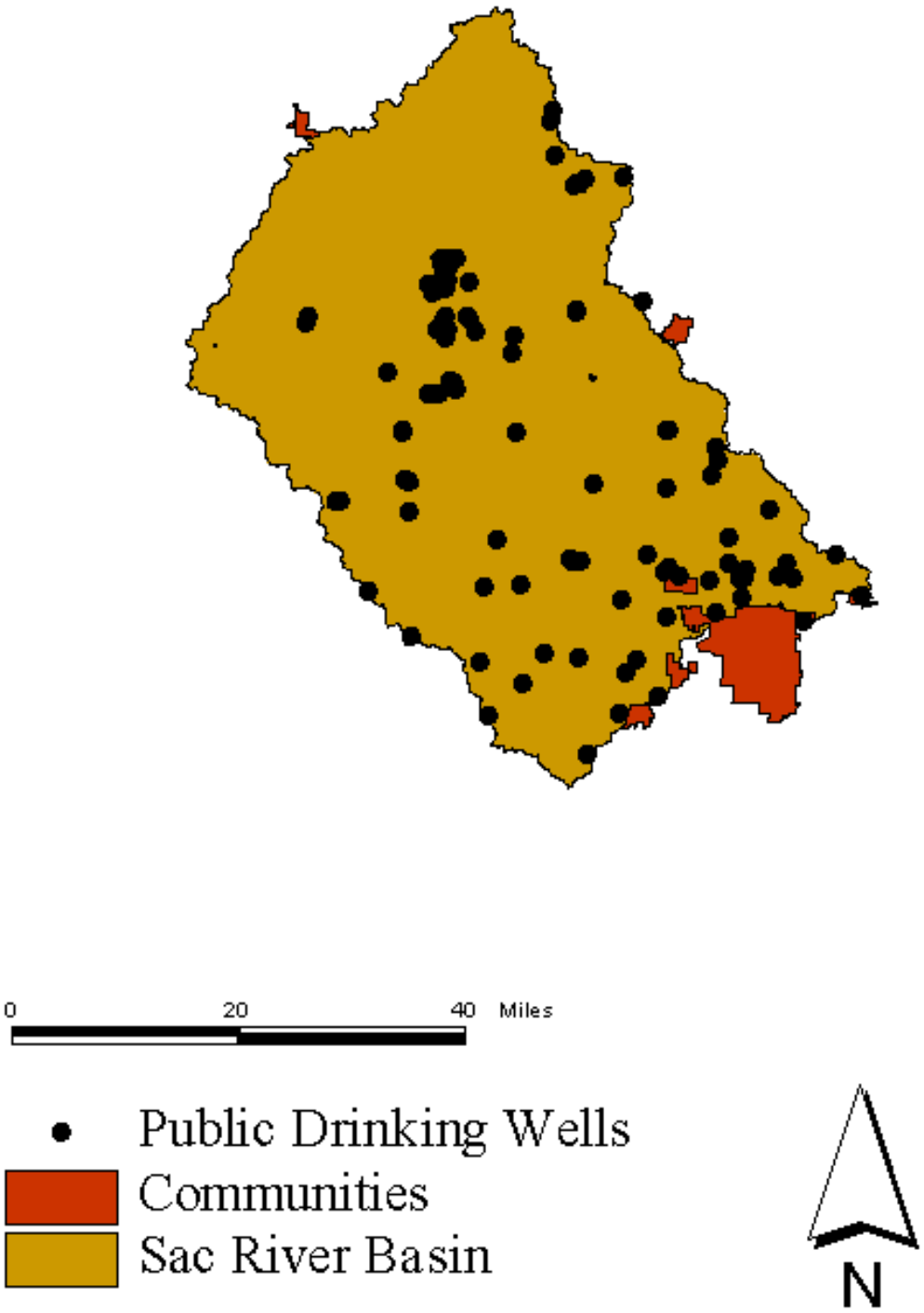


Figure 18. Concentrated Animal Feeding Operations (CAFOs) of the Sac River basin.

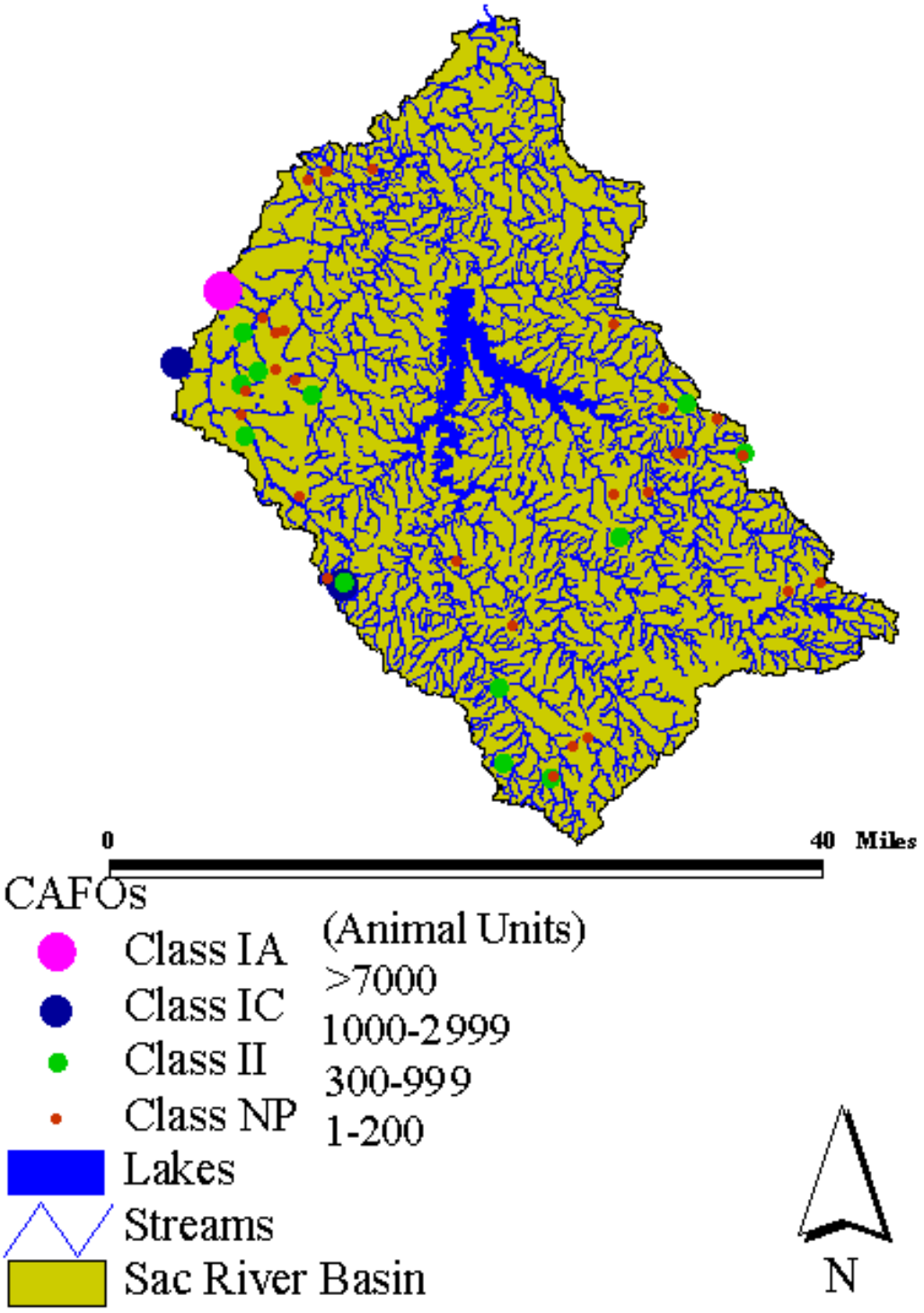


Figure 19. Mining operations of the Sac River basin

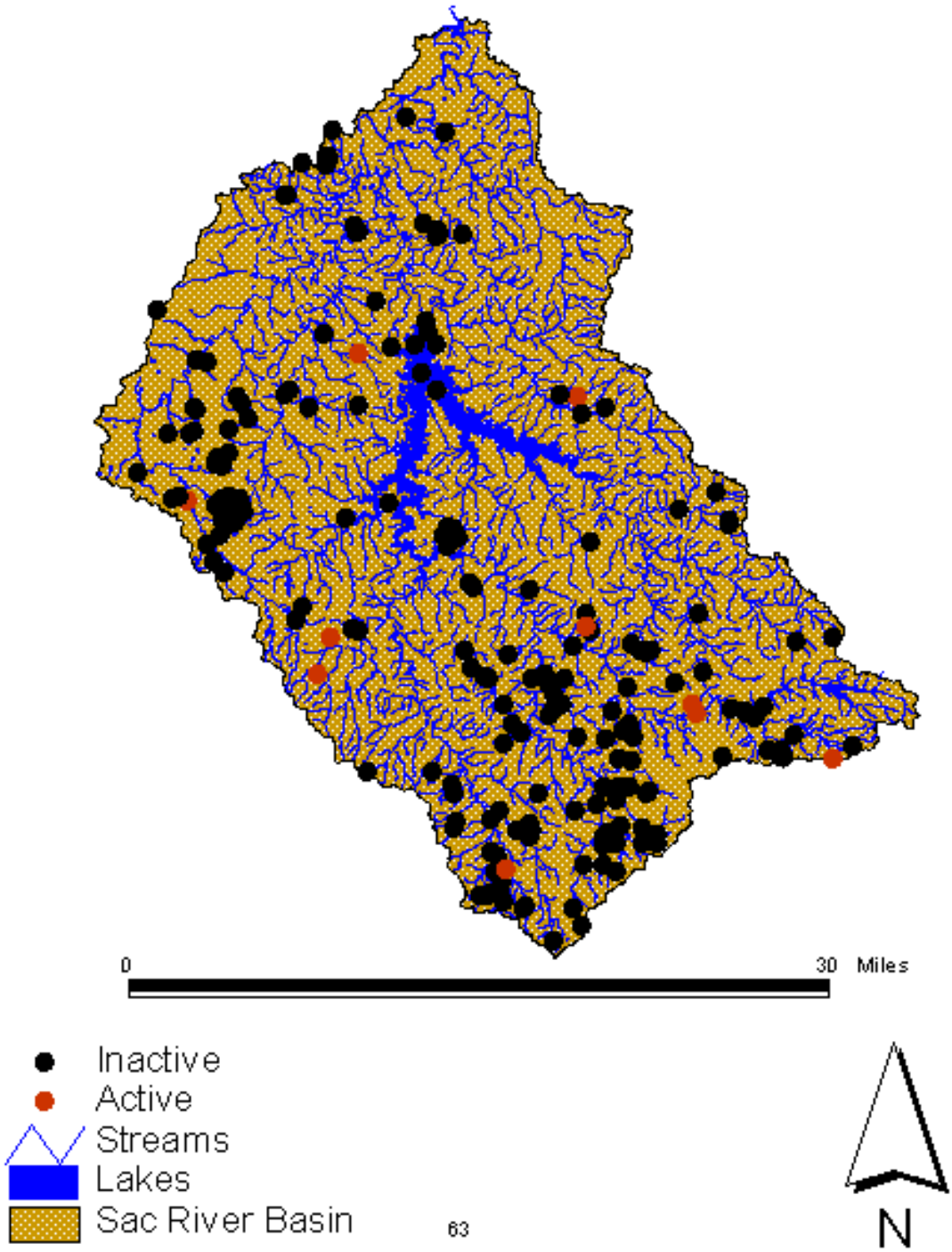


Table 7. Known information on fish kills in the Sac River basin.

Stream/Pond	County	Date	Cause	Number	Value$	Area
S. Dry Sac River	Greene	7/31/77	Sewage	1,400		1 mile
Limestone Creek	Dade	6/30/78	Timber clearing/soil erosion			
Horse Creek	Dade	4/26/78	WWTF effluent			
Little Sac River	Greene	11/30/78	Landfill seepage			
Coon Creek	St. Clair	4/7/78	Petroleum			
Giddings Pond	Dade	6/23/79	Unknown	9,255		12 acres
Grus Pond	St. Clair	12/3/79	Chlorine suspected	Unknown		0.3 acres
Asher Creek	Greene	8/24/79	Petroleum pipeline rupture	42,112	14891*	5 miles
Mile Branch Trib	Polk	1/26/80	Petroleum			
Little Sac River	Greene	9/22/82	WWTF effluent			unknown
S. Dry Sac River	Greene	4/2/82	WWTF effluent	169	147.8	0.7 miles
Little Sac River	Greene	7/12/82	WWTF effluent	4,046	1,657.67	7.5 miles
Coon Creek Trib	St. Clair	8/19/82	Animal Manure	100	4	0.5 miles
McConnell Pond	Dade	8/25/81	Unknown	83		1.5 acres
Little Sac River	Greene	8/1/83	Oxygen depletion	108	56.62	0.1 miles
Little Sac River	Greene	10/18/83	WWTF effluent			1.0 miles
Limestone Creek	Dade	9/8/83	Unauthorized			0.5 miles
			Channelizat i0n			
Sac River	Dade	1/9/84	Chemical spill			unknown
Sons Creek	Dade	2/21/84	Industrial effluent			unknown
Sons Creek	Dade	3/9/84	Uncontrolled			unknown

Stream/Pond	County	Date	Cause	Number	Value$	Area
Sons Creek	Dade	4/11/84	Uncontrolled dumping			unknown
Sons Creek	Dade	7/11/85	Industrial effluent	0		
Turnback Creek	Dade	10/16/85	Low DO (natural)	1,192+		
Hunter Branch	Cedar	2/18/86	Industrial effluent	200	12	
Stockton Lake	Cedar	5/6/86	Bacteria	2,000		
Turnback Creek	Lawrence	7/20/86	Transportation spill	0	0	
Little Sac River	Polk	3/14/86	Human Waste	0	0	
Deere Creek	Polk	8/4/86	Transportation spill	0	0	
Kile Creek	Dade	5/3/87	Animal manure	1,364	833.68	
none	Dade	5/11/87	Transportation spill	0	0	
Stockton Lake	Dade	7/13/87	Bluegreen algae	unknown	unknown	
Little Sac Trib.	Greene	2/26/87	Garbage	0	0	
Doling Branch	Greene	5/11/87	Sewage	0	0	
N. Dry Sac Trib	Greene	7/27/87	Sewage	0	0	
Stahl Creek	Lawrence	7/20/87	Sewage	0	0	
Stahl Creek	Lawrence	8/11/87	Sewage	0	0	
Little Sac River	Greene	8/3/90	Sewage	4,071	705.74	
Stahl Creek	Lawrence	3/18/91				
Johnson Creek	Lawrence	8/17/91				
Slagle Creek Tributary	Polk	3/10/91	Winterkill	200		.25 mile
Kay Pond	Polk	6/26/91	Summerkill	unknown		.5 acre
Faucett Pond	Cedar	6/1/92	Summerkill	unknown		1 acre
Stockton Lake	Cedar	4/10/92	Disease	unknown		

Stream/Pond	County	Date	Cause	Number	Value$	Area
McLanahan Pond	Dade	8/28/92	Summerkill	400		2 acres
Eft Pond	Dade	7/24/92	Summerkill	12		.5 acres
Bois D'Arc CA	Greene	7/7/92	Summerkill			0.5
Milsap Pond	Greene	7/28/92	Summerkill			0.25
Boyce Pond	Greene	10/7/92	Disease			
Bois D'Arc CA	Greene	7/7/92	Summerkill			1
Bois D'Arc CA	Greene	6/20/94	Parasites			1.5 acres
Chat Creek, tributary to	Lawrence	3/13/95	#2 Diesel fuel			
Palmer Pond	Vernon	3/20/95	28% Nitrogen fertilizer			
Jordan Creek	Greene	3/27/95	Milk			
Clear Creek, tributary to	Vernon	6/14/95	Diesel oil			
Chaney Branch of Horse Creek	Barton	8/30/95	Hog manure (likely FALSE report)			
Southern Hills Lake	Greene	9/22/95				
Doling Park Lake	Greene	9/28/95	Sewage (suspected)	60	18.6	
Clear Creek Spring	Greene	1/19/96	Petroleum			
Pomme de Terre Lake	Hickory	2/6/96		7,000	6,894.74	
Jordan Creek	Greene	2/13/96	Specific cause undetermined	2,198	343.11	
Jordan Creek	Greene	3/14/96				
Jordan Creek	Greene	3/14/96	Specific cause undetermined			
Clear Creek, tributary to	Vernon	9/11/96	Sewage			

Stream/Pond	County	Date	Cause	Number	Value$	Area
Brush Creek	Polk	9/25/96	Sewage			
Valley Water Mill Lake	Greene	9/30/96	Low dissolved oxygen	68	28.18	
Burrell Park Lake (on Ward Branch)	Greene	4/21/97	Yellow Paint-like substance	56	50.56	
Ingram Mills/Shady Glenn Streets Retention pond	Greene	6/2/97	Low dissolved oxygen (suspected)	199	283.75	
Wilson Creek	Greene	6/23/97	Raw sewage	53,440	10,147.11	
Christian Creek	Vernon	7/23/97	Gasoline	14	1.96	
Brush Creek	Polk	8/11/97	Sewage			
Griesmers Quarry Pond	Greene	9/9/97	Low dissolved oxygen	100		
Wilson Creek	Greene	9/22/97	Low dissolved oxygen	215	22.54	
Monegaw Creek	St Clair	10/7/97	Poorly treated sewage			
Miller Branch	Vernon	3/25/98	Diesel fuel	12	1.2	
Honey Creek	Lawrence	4/1/98	Concrete			
Little Sac River & Ritter Spring Branch	Greene	4/22/98	Untreated sewage.			
Simpson's Lake	Lawrence	4/24/98	Unknown. Pesticide	32	57.31	
Pea Ridge Creek	Greene	11/18/98	Sewage			
Douglas Branch	Vernon	11/23/98	Hog Manure			
Spangler Pond/Dry Wood Creek	Vernon	6/2/99		12	1.2	

Stream/Pond	County	Date	Cause	Number	Value$	Area
Jordan Creek	Greene	12/30/99	Unknown	2286	267.97	

Table 8. Public water supply facilities in the Sac River basin (MDNR 1986).

Community	County	Type	Capacity
Jerico Springs	Cedar	Well	.25 - .999 mgd
Stockton	Cedar	Well	.25 - .999 mgd
Umber View Heights	Cedar	Well	< .25 mgd
Billings	Christian	Well	.25 - .999 mgd
Arcola	Dade	Well	< .25 mgd
Dadeville	Dade	Well	< .25 mgd
Everton	Dade	Well	< .25 mgd
Greenfield	Dade	Well	.25 - .999 mgd
Lockwood	Dade	Well	.25 - .999 mgd
South Greenfield	Dade	Well	.25 - .999 mgd
Ash Grove	Greene	Well	.25 - .999 mgd
Republic	Greene	Well	.25 - .999 mgd
Springfield	Greene	Reservoir	> 10 mgd
Strafford	Greene	Well	< .25 mgd
Walnut Grove	Greene	Well	.25 - .999 mgd
Willard	Greene	Well	.25 - .999 mgd
Halltown	Lawrence	Well	< .25 mgd
Miller	Lawrence	Well	.25 - .999 mgd
Bolivar	Polk	Well	1.00 - 9.99 mgd
Fair Play	Polk	Well	.25 - .999 mgd
Flemington	Polk	Well	< .25 mgd
Humansville	Polk	Well	.25 - .999 mgd
Morrisville	Polk	Well	< .25 mgd
Pleasant Hope	Polk	Well	< .25 mgd
Collins	St. Clair	Well	< .25 mgd

Table 9. Permitted point source discharges in the Sac River basin.

Facility[1]	Type Facility	Design PE[2]	Receiving Stream	NPDES Permit
Fair Play South WWTF	1 Cell lagoon	376	Tributary of Barren Creek	31305
Fair Play West WWTF	1 Cell lagoon	159	Tributary of Bear Creek	43931
Humansville WWTF	1 Cell lagoon	2,650	Brush Creek	25739
Lockwood WWTF	Trickling Filter 2 Cell Lagoon	900	Horse Creek	30473
Stockton WWTF	3 Cell Lagoon	1,200	Stockton Branch	55280
Stockton Lake Powerhouse	Extended Aeration	5	Sac River	99244
Maple Hill Mobile Home Park	2 Cell Lagoon	172	Tributary of Bear Creek	45691
Old Mill PUA	1 Cell Lagoon		Sac River	60151
Greenfield North WWTF	1 Cell Lagoon	200	Tributary of Wetzel Creek	55638
Greenfield West WWTF	2 Cell Lagoon	2,560	Wetzel Creek	55590
Stockton PUA	1 Cell Lagoon		Stockton Lake	60071
Orleans Trail PUA	1 Cell Lagoon		Stockton Lake	59374
Orleans Trail PUA	Extended Aeration	100	Stockton Lake	30287
American Resorts	Extended Aeration	72	Tributary to Stockton Lake	93220
Hawker Point(N) PUA	1 Cell Lagoon		Stockton Lake	60135
Hawker Point(S) PUA	1 Cell Lagoon		Stockton Lake	60143
Ruark Bluff PUA	1 Cell Lagoon		Stockton Lake	60089
Mutton Creek(S) PUA	1 Cell Lagoon		Stockton Lake	60160
Mutton Creek(N) PUA	1 Cell Lagoon		Stockton Lake	60178
Mutton Creek Marina	2 Cell Lagoon		Stockton Lake	59382
Stockton State Park	1 Cell Lagoon	80	Stockton Lake	95893

Facility[1]	Type Facility	Design PE[2]	Receiving Stream	NPDES Permit
Mt. Carmel Estates	Extended Aeration	342	Stockton Lake	35530
Cedar Ridge PUA	1 Cell Lagoon		Stockton Lake	60101
Masters PUA	1 Cell Lagoon		Stockton Lake	60119
Crabtree Cove PUA	1 Cell Lagoon		Stockton Lake	60127
Ash Grove WWTF*			Sac River	MO0001750538
Litton Systems Inc.*				MOD007152903
MHTD I-44 Rest Area*	3 Cell Lagoon			MO0001744044
Springfield NW WWTF*	Extended Aeration		Little Sac River	MOD985770288
Republic WWTF			Dry Branch	MO0022098
Billings WWTF			Turnback Creek	MO0042480
Alpine Village MHP	Extended Aeration		Tributary to Pond Creek	MO0052281
Jump Oil & Propane	Septic Tank		Coon Creek	MO0098191
Collins Waste Treatment and Col	1 Lagoon		Coon Creek	MO0103756
Springfield Sanitary Landfill	1 Lagoon		North Dry Sac River	MO0106658
Walnut Grove WWTF			Sugar Creek	MO0107174
Git-N-Go Store #86	Septic Tank		Tributary to Little Sac	MO0113123
Roadway Express			Tributary to South Dry Sac	MO0113476
Kerr-Mcgee Chemical			Tributary to Spring Branch	MO0117331
McDaniel Lake			Little Sac River	MO0117340
Willard Elementary WWTF	Septic Tank		Tributary to Rainer Branch	MO0117455
Flemington WWTF	3 Cell Lagoons		Rule Creek	MO0118982

Facility[1]	Type Facility	Design PE[2]	Receiving Stream	NPDES Permit
Pleasant View Estate WWTF	Septic Tank		Stockton Lake	MO0119628
Good Samaritan Boys Ranch	Septic Tank		Tributary of North Dry Sac River	MO0123277
Cedar Ridge PUA*	1 Lagoon		Stockton Lake	MO0001742527
Fair Play South WWTF	1 Cell lagoon	376	Tributary of Barren Creek	31305
Fair Play West WWTF	1 Cell lagoon	159	Tributary of Bear Creek	43931
Humansville WWTF	1 Cell lagoon	2,650	Brush Creek	25739
Lockwood WWTF	Trickling Filter 2 Cell Lagoon	900	Horse Creek	30473
Stockton WWTF	3 Cell Lagoon	1,200	Stockton Branch	55280
Stockton Lake Powerhouse	Extended Aeration	5	Sac River	99244
Maple Hill Mobile Home Park	2 Cell Lagoon	172	Tributary of Bear Creek	45691
Old Mill PUA	1 Cell Lagoon		Sac River	60151
Greenfield North WWTF	1 Cell Lagoon	200	Tributary of Wetzel Creek	55638
Greenfield West WWTF	2 Cell Lagoon	2,560	Wetzel Creek	55590
Stockton PUA	1 Cell Lagoon		Stockton Lake	60071
Orleans Trail PUA	1 Cell Lagoon		Stockton Lake	59374
Orleans Trail PUA	Extended Aeration	100	Stockton Lake	30287
American Resorts	Extended Aeration	72	Tributary to Stockton Lake	93220
Hawker Point(N) PUA	1 Cell Lagoon		Stockton Lake	60135
Hawker Point(S) PUA	1 Cell Lagoon		Stockton Lake	60143
Ruark Bluff PUA	1 Cell Lagoon		Stockton Lake	60089
Mutton Creek(S) PUA	1 Cell Lagoon		Stockton Lake	60160
Mutton Creek(N) PUA	1 Cell Lagoon		Stockton Lake	60178

Facility[1]	Type Facility	Design PE[2]	Receiving Stream	NPDES Permit
Mutton Creek Marina	2 Cell Lagoon		Stockton Lake	59382
Stockton State Park	1 Cell Lagoon	80	Stockton Lake	95893
Mt. Carmel Estates	Extended Aeration	342	Stockton Lake	35530
Cedar Ridge PUA	1 Cell Lagoon		Stockton Lake	60101
Masters PUA	1 Cell Lagoon		Stockton Lake	60119
Crabtree Cove PUA	1 Cell Lagoon		Stockton Lake	60127
Ash Grove WWTF*			Sac River	MO0001750538
Litton Systems Inc.*				MOD007152903
MHTD I-44 Rest Area*	3 Cell Lagoon			MO0001744044
Springfield NW WWTF*	Extended Aeration		Little Sac River	MOD985770288
Republic WWTF			Dry Branch	MO0022098
Billings WWTF			Turnback Creek	MO0042480
Alpine Village MHP	Extended Aeration		Tributary to Pond Creek	MO0052281
Jump Oil & Propane	Septic Tank		Coon Creek	MO0098191
Collins Waste Treatment and Col	1 Lagoon		Coon Creek	MO0103756
Springfield Sanitary Landfill	1 Lagoon		North Dry Sac River	MO0106658
Walnut Grove WWTF			Sugar Creek	MO0107174
Git-N-Go Store #86	Septic Tank		Tributary to Little Sac	MO0113123
Roadway Express			Tributary to South Dry Sac	MO0113476
Kerr-Mcgee Chemical			Tributary to Spring Branch	MO0117331
McDaniel Lake			Little Sac River	MO0117340

Facility[1]	Type Facility	Design PE[2]	Receiving Stream	NPDES Permit
Willard Elementary WWTF	Septic Tank		Tributary to Rainer Branch	MO0117455
Flemington WWTF	3 Cell Lagoons		Rule Creek	MO0118982
Pleasant View Estate WWTF	Septic Tank		Stockton Lake	MO0119628
Good Samaritan Boys Ranch	Septic Tank		Tributary of North Dry Sac River	MO0123277
Cedar Ridge PUA*	1 Lagoon		Stockton Lake	MO0001742527

[1] - WWTF = Wastewater Treatment Facility, PUA = Public Use Area
[2]- Human Population Equivalent, blank cells indicate a 1 time per year seasonal discharge of less than 250,000 gallons
Source: MDNR (Vol 4)., *EPA PCS(water dischargers) listing (SYW 1999)

Table 10. Toxic release inventory facilities in the Sac River basin.

Facility	Facility ID	Address	City
Aarons Automotive Products	MOD981509268	2600 N. Westgate	Springfield
Acme Structural Inc.	MOD985775527	2101 N. Packer Rd.	Springfield
Conoco Inc. - Mt. Vernon Prods.	MO0002376564	15138 Hwy. 96	Mt Vernon
Explosives Energies Inc.	MOD985774611	Route BB	Greenfield
Hiland Dairy Co.	MOD981707573	1133 E. Kearney	Springfield
Kerr McGee Chemical Corp.	MOD007129406	2800 W. High Street	Springfield
Lajet Inc.	MOD981719370	1547 E. Florida	Springfield
Litton Systems Inc.	MOD007152903	4811 W. Kearney	Springfield
Lorren Cook Co.	MOD981120595	2015 E. Dale	Springfield
Master Builders Inc.	MOD048245500	3045 W. Atlantic St.	Springfield
Master Mix Feeds	MOD057902546	1300 W. Locust	Springfield
Ozark Circuits Inc.	MOD107100356	933 W. Chase	Springfield
Ozarks Coca-Cola Btlg. Co.	MOD985774868	1777 N. Packer Rd.	Springfield
Pepsi Cola General Bottlers Inc.	MOD985774900	2200 E. Turner	Springfield
Purina Mills	MOD049572449	2726 W. Davidson St.	Springfield
Rainbow Coatings Corp.	MOD007126154	2029 N. Golden	Springfield
Ridewell Corporation	MOD985768936	Hwy 65 & F.R. 94	Springfield
Royal Oak Ents. Inc	6747608	Off HW 23	Huntsville, AR
Springfield Railway Services	MOD175621044	1849 N. Park Ave.	Springfield
Stainless Fabrication Inc.	MO0000892166	4455 W. Kearney	Springfield
Superior Gearbox Co.	MOD081638314	W. Hwy 32	Stockton
Wilcorp Inds, Inc.	MOD175621044	304 S.W. Main	Billings
Zenith Electronics Corp.	MOD043941798	2500 E. Kearney	Springfield

Source: U.S. Environmental Protection Agency website (2000).

Table 11. Facilities that are involved with hazardous wastes in the Sac River basin.

Facility	Facility ID	Address	City
ABC Pictures Inc.	MOD981509268	1867 E. Florida	Springfield
Aarons Automotive Products	MOD981509268	2600 N. Westgate	Springfield
Ace Transmission Service & Supply	MO0000192823	2610 W. Kearney	Springfield
Acme Structural	MOD985775527	2101 N Packer Rd	Springfield
Advance Plating Inc.	MOD985797570	504 Hampton Street	Republic
Air Midwest Inc.	MOD063690234	5000 W. Kearney	Springfield
AT&T Long Lines	MOD980518492		Everton
Associated Wholesale	MOD006865935	3201 E. Division	Springfield
Barclay Enterprise Jiffy Lube	MOD985775899	850 E. Kearney	Springfield
Bass Pro Shops Inc.	MOD082130378	1935 S. Campbell	Springfield
Bathroom Magic of the Ozarks Inc	MOD067944983	1915 N. National	Springfield
Be Mac Transport Co. Inc.	MOD050719558	2854 E. Kearney Avenue	Springfield
Bristol Manufacturing	MOD985819374	2020 E. Dale	Springfield
C & P Truck Body Equipment Co	MOD030651962	1948 NW Bypass	Springfield
Catt	MOD981721004	2525 E. Kearney	Springfield
Central Soya of Springfield	MOD057902546	1300W. Locust	Springfield
City Utilities Material Yard	MOD000647198	1318 W. Division	Springfield
Classic Trailer Inc	MOD981724990	1625 NW Bypasss	Springfield
Commercial Plastics Co. Inc.	MO0000076000	3005 E. Hwy 60	Republic
Coose Trailers Manufacturing Inc.	MOD093807410	Route 2 Box 152 A	Lockwood
Dancey Collision Repair Inc.	MOD098271257	2615 E. Kearney	Springfield
Deer Lake Golf Course LLC	MO0000972216	5544 W. Chestnut	Springfield
Engines Plus Inc	MOD985770114	1824 NW Bypass	Springfield
Engines Plus Inc.	MOD981724222	3440 G W. Division	Republic
Family Dry Cleaners	MOD082138298	426 N. Hwy 60	Republic
Fulbright Water Treatment Plant	MOD985772623	4100 N. Stagecoach	Springfield
GM Finishing	MOD985771906	1851 E. Florida	Springfield
General Tire SVC	MOD050708668	1835 N. Glenstone	Springfield
Greene County Highway Dept	MOD985768837	2065 N. Clifton	Springfield
Griffin Casket Co.	MOD985818749	101 N. Tower	Ash Grove
Handcrafted Hardwood Inc	MO0001005602	1545 NW Bypass	Springfield
Heavy Duty Rebuild Supply	MOD131572794	1943 E. Blaine	Springfield
Kerr McGee Chemical Corp.	MOD007129406	2800 W. High Street	Springfield
Kodiak Trailer Manufacturing	MO0000486456	Route 2 Box 191	Lockwood
Legendary-Autoworks & Detail	MO0000139188	2051-A E. Kearney	Springfield
Litton Systems Inc.	MOD007152903	4811 W. Kearney	Springfield

Facility	Facility ID	Address	City
Lorren Cook Co.	MOD981120595	2015 E. Dale	Springfield
M D Pneumatics Inc.	MOD981715600	4840 W. Kearney	Springfield
Missouri Avcrad	MO7211829505	2501 Lester Jones	Springfield
Missouri Hwy & Transportation	MOD981726029	3025 E. Kearney	Springfield
Mono Manufacturing Co.	MOD007133945	Hwy 160 West	Springfield
National Oil Suppliers	MOD031141187	2345 W. Kearney	Springfield
Ole King Cole Dry Cleaners	MOD053705232	2901-I N. Glenstone	Springfield
Ozark Circuits	MOD107100356	933 W. Chase	Springfield
Ozark Kenworth	MOD053976221	3301 E. Kearney	Springfield
Ozarks Coca-Cola Btlg. Co.	MOD985774868	1777 N. Packer Rd.	Springfield
Palmerton & Parrish Inc	MOD985775550	2835 E. Division Unit K	Springfield
Peterbilt Body Shop	MOD985771831	2145 E. Kearney	Springfield
Peterbilt of Springfield Inc.	MOD981705734	2725 N. Eastgate	Springfield
Pinegar Chevrolet Inc.	MOD042860403	401 N. Hwy 60	Springfiel
Polar Custom Trailers	MO0001837368	4825 E. Kearney	Springfield
Preferred Truck Service	MOD981705718	1950 E. Kearney	Springfield
Prime Inc.	MOD059199497	2740 N. Mayfair	Springfield
Radium Petroleum	MOD058936493	1914 E .Blaine	Springfield
Reckitt & Coleman	MOD052308442	4455 Mustard Way	Springfield
Reckitt & Coleman	7614044	4443 Mustard Way	Springfield
Redi Strip of the Ozarks	MOD980686802	1828 Nias	Springfield
Republic Ford Inc.	MOD047941240	Hwy 60 South	Republic
Resource Services Inc.	MOD980850960	2457 E. Livingston	Springfield
Ridewell Corporation	MOD985768936	Hwy 65 & F.R. 94	Springfield
Sitton Motor Lines	MOD985822717	2320 N. Belcrest	Springfield
Sloan Body Shop	MOD985767979	Route 6	Springfield
South Central Container Inc	MO0001363217	1830 N. Nias	Springfield
Southwest Missouri Truck Center	MOD054085691	2527 N. Eastgate	Springfield
Sportsman Park Center	7513328	2500B E. Kearney	Springfield
Springfield Coach Builders	MO0000861039	1725 N. Packer Rd	Springfield
Springfield Drivetrain Specialists	MOD985806884	2230 N. Packer Road	Springfield
Springfield Freightliner Sales	MOD062887484	3164 N. Glenstone	Springfield
Springfield Freightliner Sales	MO0001837236	3020 E. Division	Springfield
Springfield Fulbright Landfill	MOD980631139	Green County Road	Springfield
Springfield Remanufacturing Center Corp.	MOD000610634	4860 W. Maple Street	Springfield
Springfield Truck Auto	MOD985798784	4005 Kearney	Springfield
Springfield Truck Auto	MOD985771583	1830 W. Division	Springfield
SRC Automotive	MOD007126154	2029 N. Golden	Springfield
Sunbelt Environmental Services	MOD985813211	1820 N. Nias	Springfield

Facility	Facility ID	Address	City
Sunbelt Industrial Services	MOD985768670	2701 N. National	Stockton
Sunbelt Industrial Services	MOD985792746	2032 E. Kearney	Springfield
Sunbelt Industrial Services	MOD985798966	1836 N. Barnes	Springfield
Superior Gearbox Co	MOD081638314	W. Hwy 32	Springfield
Superior Solvents and Chemicals	MOD981129075	2055 E. Blaine	Springfield
T&T Auto & Truck Cleanup	MOD058936493	1914 East Blaine	Springfield
T&T Auto & Truck Cleanup	MOD058936493	1914 East Blaine	Springfield
T&T Auto & Truck Cleanup	MO0000992552	1710 N. Barnes	Springfield
Thermoking of Springfield	MOD031145709	1353 NW Bypass	Springfield
Trailiner Corp	MO0000031443	2169 E. Blaine	Springfield
Trans State Airline	MOD985810688	5000 W. Kearney	Springfield
Trinity Rail Services PLT 387	MOD175621044	1849 N. Park Ave	Springfield
TSD Laboratories	MOD985796408	1612 N. Lexington	Springfield
Ulrich Marine Ctr	MOD985775121	1111 N. Hwy 60	Springfield
Vinyl Moldings Inc	MO0001363209	6302 W. Farm Rd 84	Springfield
Vinyl Moldings Inc	MOD055691018	1641 E. Florida St	Springfield
W K Missouri Associates LTD	MOD985819895	2610 N. Glenstone	Springfield
Walmart Stores Inc	MOD149962268	1923 E. Kearney	Springfield
Welches Overall Cleaning Co	MOD000639765	907 W. Chase St	Springfield
Western Lithotech	MOD030700678	2625 N. Neergard	Springfield
Whitener Trucking	MOD985799394	2160 E. Thoman	Springfield
Wilcorp Inds, Inc.	MOD175621044	304 S.W. Main	Billings
Yellow Freight Systems	MO0001837384	2121 E. Kearney St	Springfield
Zenith Electronics Corp	MOD043941798	2500 E. Kearney	Springfield

Source: U.S. Environmental Protection Agency website (2000).

Table 12. Facilities with airborne pollutant emissions in the Sac River basin.

Facility	Facility ID	Address	City
Aarons Automotive Products Inc	MOD981509268	2600 North Westgate	Springfield
Acme Structural Inc	MOD985775527	2101 North Packer	Springfield
Advanced Plating Co Inc	MOD985797570	504 S. Hampton	Springfield
Allen Quarries	MOD007448459	Allen Quarries Inc.	Lockwood
Allen Quarries	MOD007448459	5 mi. SE off Hwy 160	
Associated Wholesale Grocers	MOD006865935	3201 E. Davidson	Springfield
Bailey Quarries	MOD985812759	Hwy Z	Stockton
Bailey Quarries	MOD147983605	Chesapeake Quarry	Chesapeake
Bass Pro Sportsman's Park	MOD043941798	2500 E. Kearney	Springfield
Bristol Manufacturing	MOD985819374	2020 E. Dale	Springfield
Calvert Manufacturing Co.	MO0001563675	700 W. Chase	Springfield
Conco Quarry Co.	MOD98074228	2 Hwy 160	Willard
Consolidated Nutrition, LC	MOD057902546	1300 W. Locust	Springfield
Explosives Energies INC	MOD985774611	Route Bb	Greenfield
Greenfield Concrete Product Inc.	MOD985813922	Hwy 160	Greenfield
Griffon Casket CO	MOD985818749	105 N. Tower	Ash Grove
Hammons Products Co.	MOD985814961	217 Hammons Drive	Stockton
Holiday Inn Conoco	MO0001563741	2650 Colenstone	Springfield
Kerr McGee Chemical Corp.	MOD007129406	2800 W. High Street	Springfield
Killingsworth Mill	7210064		Willard
Koch Materials Company	MOT300011061	3156 E. Division	Springfield
Leo Journagan Const. Co. Inc.	MO0001478437	Kearney & Lecompte Roads	Springfield
Litton Systems Inc.	MOD007152903	4811 W. Kearney	Springfield
Master Tune Inc.	MO0001538826	2317 N. Glenstone	Springfield
Masters Jackson Asphalt	MOD134955392	Hwy 160	Willard
MFA Inc., Bulk Plant	MO0001562859	P.O. Box 334	Lockwood
Ozarks Circuits Inc	MOD107100356	933 W. Chase	Springfield
Pennington Seed Inc.	MO0001562594	Hwy 160	Greenfield
Phenix Rock	7209242	Phenix	Walnut Grove
R&R Quarry	7209948		Fairplay
Ralston Purina	MOD049572449	2726 W. Division	Springfield
Razorback Pipeline	MO0001564830	Hwy 96	Miller
Reckitt & Coleman	MOD052308442	4455 Mustard Way	Springfield
Rich Mix Products Inc	MOD048245500	3045 W. Atlantic	Springfield
Springfield Railway Services	MOD175621044	1849 N. Park	Springfield
Stewart-Nattinger	MOD007133606	1650 E. Atlantic	Springfield

Facility	Facility ID	Address	City
Superior Carbon Inc.	MO0001563634	Hwy 123 & F.R. 51	Walnut Grove
Taylor Quarries	MO0001562792	Route 3	Lockwood
Viles and Sons Paving	MOD985776657	Route 1 Box 103	Brighton
Willard Block Inc.	MO0001563667	P.O. Box 68	Willard
Williams Pipeline Co	MO0001478619	Springfield Terminal	Springfield

Source: U.S. Environmental Protection Agency website (2000).

Table 13. Inactive superfund sites found in the Sac River basin.

Name	Facility ID	Address	Town
Kerr McGee Chemical Corp.	MOD007129406	2800 W. High Street	Springfield
Resource Services Inc.	MOD980850960	2457 E. Livingston	Springfield
Shelton Property	MO0001276930	2243 W. Farm Road	Springfield
Zenith Electronics Corp.	MOD043941798	2500 E. Kearney	Springfield

Source: U.S. Environmental Protection Agency website (2000).

Table 14. Permitted concentrated animal feeding operations of the Sac River basin

Operator	Facility ID	County	Animal Type	Animal Units	Class	T R S
WILLIAM CURTSINGER	LA5104519	BARTON	HOGS	300-999	II	32 29 14
MURPHY FAMILY FARMS	MOG010134	BARTON	HOGS	1000-2999	IC	33 30 14
DAN PAYNE	LA5104321	BARTON	HOGS	<299	NP	33 29 26
BOBBY SELTZ	LA5103942	BARTON	AW1	300-999	II	33 29 3
JOANNA SMITH	LA5104194	BARTON	AW	300-999	II	
LARRY STEWART	LA5104291	BARTON	AW	<299	NP	32 29 2
GLENN AND MARY ARLINT	LA5104531	CEDAR	HOGS	<299	NP	33 28 6
ARCHIE BRACKENRIDGE	LA5104445	CEDAR	HOGS	<299	NP	35 28 1
SHEILA BRACKENRIDGE	LA5104575	CEDAR	HOGS	<299	NP	35 28 1
RICHARD & BETTY BRASHER	LA5104525	CEDAR	HOGS	<299	NP	34 29 25
DAVID JANES	LA5104334	CEDAR	AW	<299	NP	35 28 10
KEN KOENIG	LA5104523	CEDAR	HOGS	<299	NP	34 28 32
TIM MOORE	LA5104566	CEDAR	HOGS	<299	NP	33 28 21
RICELAND & CATTLE CO	LA5104211	CEDAR	AW	300-999	II	33 29 24
JAMES VINYARD	LA5104212	CEDAR	HOGS	<299	NP	
LESTER WEAVER	LA5104270	CEDAR	AW	<299	NP	35 27 3
BRUCE BARTLETT	LA5104333	DADE	AW	<299	NP	31 28 10

Operator	Facility ID	County	Animal Type	Animal Units	Class	T R S
MISSOURI SOW CENTER INC.	LA5104594	DADE	HOGS	300-999	II	33 28 34
TIM AND TRACY SMITH	LA5104495	DADE	TURKEY	<299	NP	30 25 33
DOROTHY & ED SPAIN	MOG010328	DADE	TURKEY	1000-2999	IC	30 27 18
DOROTHY & ED SPAIN	LA5103976	DADE	AW	300-999	II	
MELVIN BACKS	LA5104460	DADE	AW	<299	NP	30 28 13
TOM WILKINS	LA5103836	DADE	AW	<299	NP	30 26 2
	LA5103855	GREENE	AW	<299	NP	30 21 8
DENNIS ESCH	LA5103807	GREENE	AW	300-999	II	31 24 25
DESSA HUBACH	LA5103799	GREENE	AW	<299	NP	28 24 7
GARY LEWIS	LA5104134	GREENE	AW	<299	NP	30 21 11
BOB SIFFERMAN	LA5100705	GREENE	AW	<299	NP	
RICK BEARD	LA5104498	LAWRENCE	TURKEY	300-999	II	28 25 20
JEFFERY SCOTT DENNEY	LA5104405	LAWRENCE	TURKEY	300-999	II	28 25 25
JOHN LUNDY	LA5104403	LAWRENCE	AW	300-999	II	29 25 19
DONNA WEATHERLY	LA5103791	LAWRENCE	AW	<299	NP	28 25 25
FRANK ARTZ	LA5103714	POLK	AW	<299	NP	31 23 5
BERNARD FRANCKA	LA5104042	POLK	AW	300-999	II	
DARRELL FRANCKA	LA5104499	POLK	DAIRY	300-999	II	32 22 15
DARRELL FRANCKA	LA5103719	POLK	AW	<299	NP	32 22 15

Operator	Facility ID	County	Animal Type	Animal Units	Class	T R S
WILLIAM FRANCKA	LA5103990	POLK	AW	<299	NP	33 22 32
DOUG HOSMAN	LA5104198	POLK	AW	<299	NP	31 24 2
FRED LETTERMAN	LA5104411	POLK	DM2	<299	NP	32 23 14
MIKE PRESLEY	LA5104489	POLK	DAIRY	<299	NP	32 23 15
BILL TAYLOR	LA5104186	POLK	AW	<299	NP	33 23 33
TED ZEUGIN	LA5104044	POLK	AW	<299	NP	34 24 26
	MO0118729	VERNON	HOGS	> 7000	IA	34 29

Source: Dan East, MDNR, pers. com.
[1] - AW = Misc (Animal Waste)
[2] - DM = Dairy or Cattle

Table 15. Known information about non-point source pollution in the Sac River basin.

Name	Origin	Type of Pollution (primary)	County	Stream	Location T- R-Sec.
Turner Area	Mining	Acid Drainage	Barton	Patton Branch	33-29-26
Beydler Area	Mining	Acid Drainage	Cedar	Horse Creek Tributary	33-29-13
Jack Smith Area	Mining	Acid Drainage	Cedar	Cedar CreekTributary	33-27-6
Gilbert Crain Area	Mining	Sediment and Acid Drainage	Cedar	Bear Creek Tributary	33-28-9
Godfrey Drift Area	Mining	Gob	Cedar	Bear Creek Tributary	33-28-9
Taylor Area	Mining	Acid Drainage	Cedar	Patton Branch	33-29-24
Thomas Area	Mining	Coal Mining Spoil	Cedar	Cedar Creek Tributary	33-28-15
Chaney Branch Area	Mining	Acid Drainage	Dade	Chaney Branch	33-28-32 32-28-6
Hime Area	Mining	Acid Drainage	Dade	Patton Branch	33-29-25
Milford Area	Mining	Coal Mining Spoil and Acid Drainage	Dade	Painter Branch	32-29-6
Stump Area	Mining	Coal Mining Spoil and Acid Drainage	Dade	Big George Branch	32-28-17
Valley Area	Mining	Coal Mining Spoil and Acid Drainage	Dade	Horse Creek Tributary	32-28-29
Fulbright Landfill	Waste Disposal	Leachate	Greene	Pea Ridge Creek and South Dry Sac River	30-22-35/36
Murray Landfill	Waste Disposal	Leachate	Greene	Little Sac River	30-22-34

Habitat Conditions

Aquatic Community Classification

The Ozark Highlands are an area of very old, highly weathered, low plateaus. The time span over which the region evolved has created a very physiographically diverse area with many associated unique endemic species. The Osage Plains are an area of flat to rolling plains that was originally pure tallgrass prairie (MDC 1999). The Sac River is located at the southeastern edge of the Osage Plains and in the northwestern portion of the Ozark Highlands. A small part of the Sac River basin as delineated in this document is part of the Prairie-Osage Division Community, a small portion of the Prairie Faunal Region (Pflieger 1989). Streams in this portion of the Sac River basin tend to be intermittent and turbid with substrates consisting of sand/silt in pools and shale/sandstone in riffles. The fish fauna of this division lack diversity and there are no aquatic species endemic to the division. The majority of the Sac River basin is also part of the Ozark-Missouri Division Community, a small portion of the Ozark Faunal Region. (Pflieger 1989). Streams in this portion of the Sac River basin tend to be clear with extensive exposure to chert in their channels. Stream gradients are similar to those in the Ozark-Mississippi Division. The fish fauna of Ozark-Missouri Division includes several species that are found in no other area of Missouri including Niangua darter, Bluestripe darter, blacknose shiner, and mottled sculpin. There are no other endemic aquatic fauna in this division (Pflieger 1989).

Channel Alterations

Channelization has generally been small scale and widely scattered throughout the basin. Stream channels in the mid- and lower basin have been significantly altered due to impoundment and hydropower operations. Scouring of the channel bed and banks in the lower Sac River is apparent below Stockton Dam. Effects from the rapid high flow to low flow transition created by hydro-power peaking operation can be seen in the lower basin sub-watersheds in headcutting, steep eroding streambanks, and silt/mud deposition in stream channels. Floodwater retention in downstream Truman Reservoir inundates large sections of the lower Sac River and Coon Creek. These flood waters also inundate the mouths of Cedar Creek, Turkey Creek, and Brush Creek. Similarly, Stockton Reservoir inundates portions of several streams including Sac River, Little Sac River, Turnback Creek, and Sons Creek.

Unique Habitats

Cedar Creek has been listed on the Department of Interior's nationwide rivers inventory (Bachant, et al 1982). There are large numbers of caves and sinkholes in the Sac River basin. Several species of bats, salamanders, frogs, crayfish, and the Ozark cavefish are some of the organisms that depend on these habitats. Numbers of cave dependent organisms by county are: Barton, Cedar, Polk, Vernon (0-1); Dade, Hickory, St. Clair (2-3); Greene, Lawrence (6-8); and Christian (9-10). Several unique natural communities/natural features in the Sac River basin are listed on the Natural Heritage Database. These features/areas include: Ozark cave streams, caves, effluent caves, Ozark and prairie creeks and small rivers, Ozark headwater streams, prairie headwater streams, freshwater marshes, pond marshes, acid seeps, dolomite glades, limestone glades, sandstone glades, sandstone savannas, sandstone talus, dry limestone/dolomite cliffs, dry sandstone cliffs, dry mesic chert prairies, dry limestone/dolomite prairies, dry-mesic limestone/dolomite prairies, dry-mesic sandstone/shale prairies, hardpan prairies, dry-mesic

sandstone forests, mesic bottomland forests, and xeric sandstone forests (Kramer et al 1996). Walleye spawning riffles are located in the major tributaries to Stockton Lake, including the Little Sac River and Turnback Creek, and in the Sac River below Stockton Dam. Walleye also spawn on the main-lake points and along the face of the dam in Stockton Lake.

Improvement Projects

There are no stream improvement projects currently underway in the Sac River basin besides the previously mentioned SALT and EARTH projects. There are numerous existing and pending stream improvement projects located in the Sac River basin. These include two projects on MDC areas, Fiddler's Ford Access and Paris Springs Access, and several projects on private lands that are part of the previously mentioned SALT and EARTH projects. Included in these projects are cedar tree revetments, alternative watering sources, and riparian corridor improvements. Details concerning these projects are available through MDC and NRCS.

Stream Habitat Assessment

Streams in the basin all have problems with cattle access and non-existent or poor quality riparian corridors. Symptoms of cattle problems include bank erosion, poorly vegetated riparian corridors, and nutrient enrichment from cattle wastes in and along the stream. There are a few areas where good forested streamside corridors are present (notably upper Turkey Creek and middle Brush Creek). These good areas are affected by lack of upstream and/or downstream corridor which create a patchy and ineffective stream corridor. The headwaters of most streams in the basin are typically expansive pasture that is heavily grazed. Stream channels are (generally first, second, and up to third order) generally eroded and frequented by loafing cattle.

Stockton Dam operation has impacted the lower Sac River and lower basin tributaries. Impacts include bank erosion, siltation, instream flow problems, poor water quality, loss of riparian corridor, loss of invertebrate habitats (and concurrent reduction in productivity), and reduction of spawning habitat.

The following observations for individual streams are based on information recorded at specific locations during fish collections in 1998 and 1999. These descriptions may not be representative of the conditions along the entire stream.

Sons Creek

The reach sampled along Sons Creek had poor streambank stability. Streambank vegetation consisted of trees (30%), shrubs (20%), and herbaceous plants (35%). Fifteen percent of the bank had no vegetation. The stream had several eroded banks. The width of the wooded riparian corridor ranged from 10 to 50 feet. In certain locations, the top of the bank was 10-15 feet above the stream. There was groundwater influence in some of the pools, however, in other areas, the stream seemed to be losing. Land use of the area was dominated by forest. The substrate was mixture of all categories with coarse gravel and cobble dominating.

Turnback Creek

The reach sampled along Turnback Creek had excellent streambank stability. Only a small section (5%) of the streambank was not vegetated. Streambank vegetation consisted of shrubs (25%), herbaceous plants (40%), and (30%) trees. Land use consisted of both timber and residential use. The width of the wooded riparian corridor was generally over 100 feet. The substrate consisted of all categories except clay and bedrock, with gravel dominating.

Johnson Creek

The reach sampled along Johnson Creek had excellent streambank stability with heavily vegetated banks. Streambank vegetation consisted of herbaceous vegetation (50%), shrubs (20%), and trees (30%). The stream had a closed canopy throughout. Land use was 50% forest with a mixture of cropland and residential. Where present, the wooded riparian corridor ranged from 10 to 50 feet. The substrate consisted primarily of gravel and clay with small amounts of pebbles, silt, and sand.

Horse Creek

The reaches sampled on Horse Creek had poor bank stability with large areas of slumping bank. There were large amounts of woody debris in the stream indicating bank instability. Corridor vegetation consisted of trees (50%) and a mixture of shrubs (25%) and herbaceous vegetation (25%). Land use was almost entirely pasture with small pockets of forest. The substrate consisted of all categories except clay with gravel and sand being dominant. Upstream sections had a higher percentage of bedrock than downstream sections.

Cedar Creek

The reach sampled along Cedar Creek had good to poor bank stability. Streambank vegetation consisted primarily of herbaceous vegetation (60%) mixed with trees (20%) and shrubs (20%). Land use was mostly pasture (80%) and a small amount of forest (20%). The width of the wooded riparian corridor was less than 10 feet when present. The substrate consisted of all categories except clay with gravel and pebble being dominant.

Sac River

The reaches sampled along the Sac River had good to poor bank stability. Many reaches of the stream had steep eroded banks with little vegetation. Other areas that were heavily vegetated still had steep and scoured banks. The majority of the streambank vegetation consisted of trees with a mixture of shrubs and herbaceous plants. The width of the wooded riparian corridor varied from over 100 feet wide to less than 10 feet. The major land use varied from row crops and to completely forested. Substrate consisted of all categories with gravel and sand being dominant.

Coon Creek

The reach sampled along Coon Creek had poor bank stability. The area is periodically inundated by Truman Lake causing streambank vegetation to be weakened or killed. Streambank vegetation, when present, consisted of a mixture of herbaceous plants, shrubs, and trees. The width of the wooded riparian corridor was generally less than 10 feet. Land use was almost entirely row crops and pasture with a small (10%) amount of forest. The substrate consisted of gravel and pebbles covered with 1-6 inches of sand and silt.

Bear Creek

The reach sampled along Bear Creek had good to poor bank stability with areas of steep vertical cut banks. Streambank vegetation consisted of equal amounts of trees, shrubs, and herbaceous plants. Land use was primarily pasture (80%) and forest (20%). The width of the wooded riparian corridor was generally less than 25 feet. The substrate consisted mostly of slab rock with small amounts of boulders, cobble, pebble, gravel, sand, and silt.

Cedar Creek

The reach sampled along Cedar Creek had good to poor bank stability with fairly steep vegetated banks. Streambank vegetation was primarily trees (75%) with few shrubs (15%) and herbaceous plants (10%). Almost all the land in the area was pasture (90%) with a small amount of forest (10%). The width of the wooded riparian corridor was generally less than 25 feet. The substrate consisted of all forms except boulder and bedrock.

Little Sac River

The reaches sampled along the Little Sac River had good to poor bank stability with many steep banks devoid of vegetation. In some areas, cattle had free access to the river causing heavy localized erosion. The most dominant streambank vegetation was herbaceous plants with a small percentage of trees and shrubs. The width of the wooded riparian corridor was generally less than 25 feet, but some areas extended to 100 feet wide. The substrate consisted of all categories.

South Dry Sac River

The reach sampled along the South Dry Sac River had poor bank stability. The stream had areas of vertical and lateral erosion and a large area of gravel deposition. Streambank vegetation was mostly herbaceous plants (60%) with a mixture of trees (20%) and shrubs (10%). Land use in the region was 100% pasture. The width of the wooded riparian corridor was usually less than 25 feet. The dominant substrate was gravel with smaller amounts of sand, cobble, and pebbles.

Goose Creek

The reach sampled along Goose Creek had good to poor bank stability with a few vertical cut banks. Other banks were well vegetated. When present, herbaceous plants (55%) were the most dominant plant along the streambank. Trees (20%) and shrubs (20%) were also present. The width of the wooded riparian corridor was approximately 50-100 feet. The substrate consisted of all categories except boulder and bedrock.

Lynn Branch

The reach sampled along Lynn Branch had good bank stability with little erosion. Streambank vegetation consisted of trees and shrubs, but they were mostly dead from Stockton Lake inundation. Land use in the area consisted of 100% forest and the width of the wooded riparian corridor was more than 100 feet. The substrate consisted of all categories except bedrock.

Maze Creek

The reach sampled along Maze Creek had poor bank stability with many areas of unprotected vertical cut banks. Cattle had free access to the stream. When present, streambank vegetation consisted primarily of herbaceous plants (60%) with smaller amounts of trees (25%) and shrubs (10%). Land use in the region was 100% pasture. The width of the wooded riparian corridor ranged from 25-100 feet. The substrate was a mixture of categories.

Limestone Creek

The reach sampled along Limestone Creek had poor bank stability with several areas of unprotected vertical banks. Streambank vegetation consisted of herbaceous plants (40%), trees (25%), and shrubs (25%). Many of the gravel bars were in early stages of re-vegetation. Land use in the area consisted of 100% pasture. The width of the wooded riparian corridor, when present, was less than 10 feet. The substrate consisted of all categories.

Little Dry Sac River

The reach sampled along Little Dry Sac River had good bank stability with moderately vegetated banks. Streambank vegetation consisted of herbaceous plants (35%), trees (35%), and shrubs (20%). Land use in the region was 100% ungrazed pasture. The width of the wooded riparian corridor ranged from 25-50 feet. The dominant substrate consisted of gravel and pebbles with smaller amounts of silt, sand, cobble, and boulders.

Biotic Communities

Fish Community Data

Aquatic sampling in the Sac River has been ongoing since before the initial elements occurrence record (EOR) was written in 1982. For example, Pflieger collected fish samples in 1971. Table 16 lists all species of fish collected in the Sac River basin and is further divided by sub-basin. Collections of fish were also made by the Missouri Department of Conservation's Southwest Regional staff during 1995, 1996, 1998, and 1999. Figure 20 lists fish sampling sites in the Sac River basin. Appendix C has collections by site and date for the Sac River basin.

Eighty-nine species of fish have been identified from the Sac River basin. Of these, the chestnut and southern brook lampreys have not been collected in recent sampling efforts. Lampreys are often difficult to collect and have short adult life spans. Other fishes also absent in recent collections include: longnose gar, mooneye, gravel chub, spotted sucker, river redhorse, and Ozark bass. These larger fishes commonly avoid seine hauls or are located in habitats too deep or too brushy to seine. Seining was the primary method used in recent samples, and could be the reason for their absence. The suckermouth minnow has not been collected since 1976; it is abundant in the Prairie Faunal region of north and west Missouri and is not tolerant of higher gradient Ozark streams. The ghost shiner has never had a wide occurrence in the Sac River basin and has not been collected since 1964. It occurs in the Missouri and Mississippi rivers and in prairie streams, but populations have been on the decline in recent years. The Ozark cavefish has never been collected in the Sac River basin, but has been observed in caves within the basin boundaries. Ozark cavefish are not usually captured unless sought in caves, or near spring openings flowing from subterranean sources during high flow or pollution related events.

It is possible that some species are being lost from the watershed. The Niangua darter, a federally threatened species, has been found in the Little Sac River, Bear Creek, and Brush Creek watersheds. Within these three streams, the Niagua darter was last sampled in 1991 from Bear Creek. Since 1991, Niangua darters have been observed during snorkeling surveys at three different locations within one reach of Bear Creek. The Brush Creek population of Niangua darters was believed to be extirpated before sampling efforts were increased beginning in 1997. During 1997, a total of 18 Niangua darters, including six young of the year fish, were observed in Brush Creek (Boyer 1998). These findings suggest that the Brush Creek Niangua darter population is both viable and reproducing. According to Pflieger (1997), reservoir construction has been a significant factor leading to the decline of the Niangua darter.

Bluestripe and gilt darters are two other rare fishes that have been collected in the Sac River basin. The bluestripe darter may have had widespread occurrence in the Sac River system before the turn of the century. Within this basin, it has only been collected from the Sac River and has not been seen since 1966. The gilt darter has a wide occurrence in the eastern and southern Ozarks and is frequently one of the most abundant darters in its preferred habitat (Pflieger 1997). However, it has only been collected in one sample from the Sac River in 1966. The least darter has a wide occurrence in the northern and western Ozarks and is frequently the most abundant darter in its preferred habitat. However, the least darter has only been collected in one sample from the Little Sac River in 1977. The blacknose shiner has been sampled in Brush Creek and Cedar Creek, but has not been collected there since 1977. Once having a wide distribution, the blacknose shiner has been extirpated from many streams in the northern Ozarks. Population declines are thought to be the result of habitat loss (Pflieger 1997).

Amphibians and Reptiles

There is a diverse assemblage of amphibians and reptiles found in the Sac River basin. Table 17 lists the amphibians and Table 18 lists the reptiles. These tables also include the known range for each species in the basin.

Threatened and Endangered Species

The Sac River basin has a unique and diverse biotic community. There are forty-two species of plants and animals of conservation concern. Three federally endangered (Missouri bladder-pod, gray bat, and pink mucket) and five federally threatened species (bald eagle, Ozark cavefish, Niangua darter, Mead's milkweed, and geocarpon) are known to occur in the watershed (Table 19). Several other species in the basin are rare in Missouri.

Fish Stocking

With the exception of private impoundments, recorded fish stocking in the Sac River basin has been restricted to Stockton Lake and Fellows Lake. Hybrid striped bass stocked in Truman Lake can also be found in the Sac River below Stockton Dam. Table 20 lists the fish that have been stocked in public waters of the Sac River basin. Private ponds are regularly stocked by their owners with a variety of sportfishes. The most common private pond sportfish populations are a mix of largemouth bass, bluegill, and channel catfish.

Aquatic Invertebrates

Extensive monitoring of aquatic macroinvertebrates by the MDNR has been conducted in the Brush Creek sub-basin. Streams that have had aquatic invertebrate surveys conducted on them are Little Sac River, Turnback Creek, Clear Creek, Bear Creek, and Brush Creek. Table 21 lists the crayfish whose range includes the Sac River basin in Missouri. Table 22 summarizes aquatic macroinvertebrate collections by stream. Additional macroinvertebrate samples are being collected from Brush Creek and summarized by staff and students from the University of Missouri-Columbia as a part of the Brush Creek EARTH project. These data are not included here.

Live mussels were observed in the lower Sac River, Bear Creek, Cedar Creek, and Horse Creek in 1999 with a number of relic shells collected from these locations for identification. These collections can be found in Tables 23 and 24. These collections confirmed that several mussels in the Sac River watershed are present in the tributaries as well as the mainstream Sac River. Figure 21 shows the invertebrate sampling sites in the Sac River basin.

Angler Survey

There has been a creel survey conducted on Stockton Lake from 1971 through 2000 with the exception of the years 1993 through 1995. The two sportfish most commonly pursued by anglers have been crappie (black and white) and black bass (largemouth, smallmouth, and spotted). In the early years of impoundment crappie were the most fished for by anglers with black bass second in popularity. During the decade of the 1990s the trend has been increased pursuit of bass and a decrease in the pressure on crappie to the point that black bass have become the most sought after species of sportfish. Other fish sought by anglers in order of preference are walleye, white bass, catfish, and sunfish. More detailed analyses of these data are included in reports available from MDC's Southwest Fisheries Regional Office in Springfield.

Fishing Regulations

The Sac River basin streams are managed under Missouri's statewide regulations. Regulations for Stockton Lake are different than the stream regulations. Restrictions and rules can and do change, so it is best to consult the latest fishing regulations before fishing.

Figure 20. Fish sampling sites in the Sac River basin.

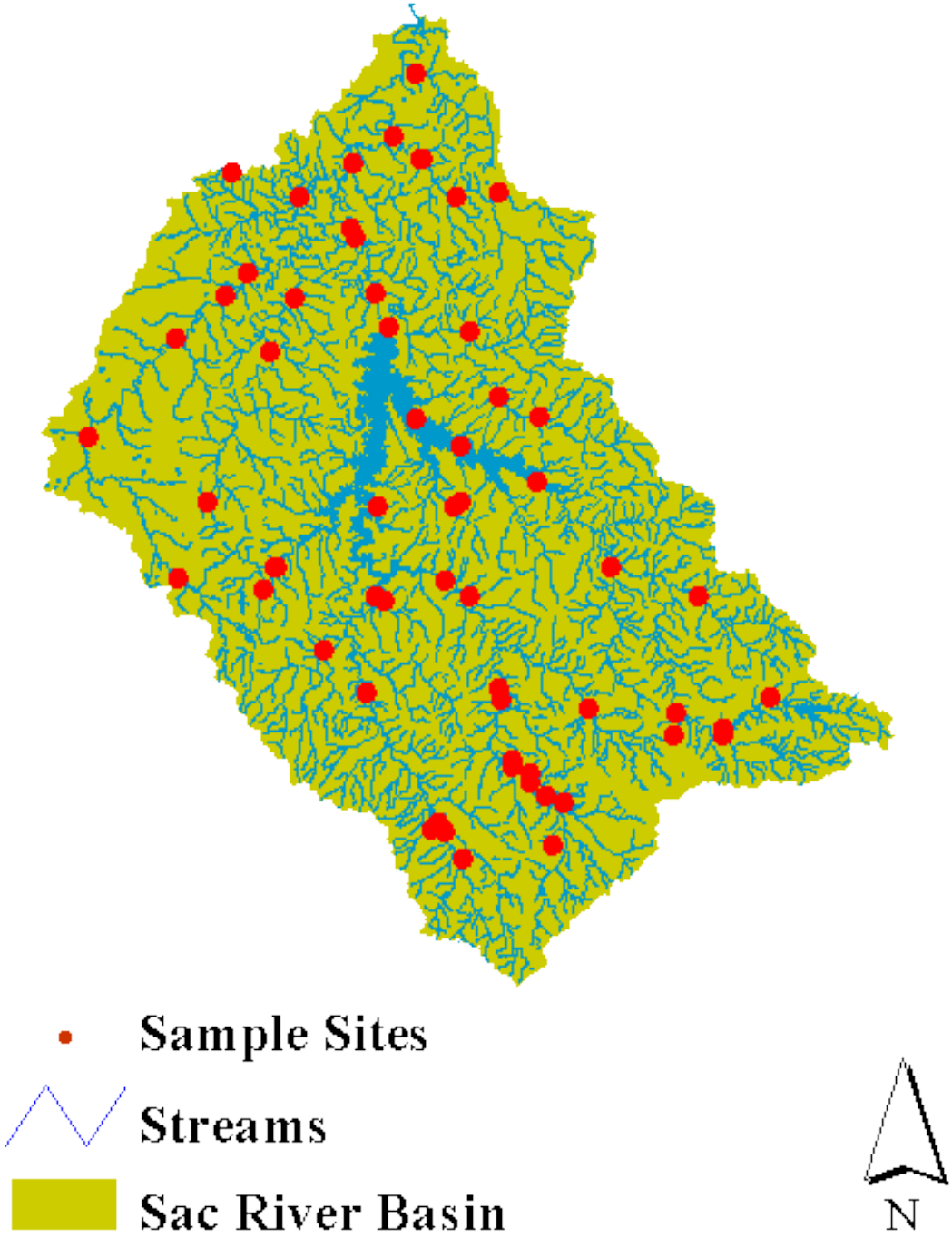


Table 16. Fish species collected in the Sac River watershed listed by sub-basin.

Common Name	Scientific Name	Sac River	L. Sac River	Bear Cr.	Brush Cr.	Coon Cr.	Turnback Cr.	Livingston Cr.	Songs Cr.	Cedar Cr.	Horse Cr.
Chestnut lamprey	*Ichthyomyzon castaneus*	X									
Southern brook lamprey	*Ichthyomyzon gagei*				X						
Paddlefish	*Polyodon spathula*	X			X						
Longnose gar	*Lepisosteus osseus*	X	X		X					X	
Shortnose gar	*Lepisosteus platostomus*	X									
Mooneye	*Hiodon tergisus*	X									
Gizzard shad	*Dorosoma cepedianum*	X	X				X				
Largescale stoneroller	*Campostoma oligolepis*	X	X	X	X	X	X	X		X	X
Central stoneroller	*Capostoma pullum*	X	X	X	X	X	X	X	X	X	X
Red shiner	*Cyprinella lutrensis*	X	X	X	X	X	X		X	X	X
Blacktail shiner	*Cyprinella venusta*						X				
Common carp	*Cyprinus carpio*	X	X			X	X				
Gravel chub	*Erimystax x-punctatus*	X	X			X					
Striped shiner	*Luxilus chrysocephalus*	X	X	X	X		X	X	X	X	X
Bleeding shiner	*Luxilus zonatus*	X	X	X	X	X	X	X	X	X	
Ghost shiner	*Notropis buchanani*	X	X								
Blacknose shiner	*Notropis heterolepis*				X					X	
Sand shiner	*Notropis ludibundus*	X	X	X	X	X	X			X	X
Ozark minnow	*Notropis nubilus*	X	X	X	X		X	X		X	
Rosyface shiner	*Notropis rubellus*	X	X	X	X	X	X	X		X	X
Suckermouth minnow	*Phenacobius mirabilis*										
Southern redbelly dace	*Phoxinus erythrogaster*	X	X		X	X					
Bluntnose minnow	*Pimephales notatus*	X	X	X	X	X	X	X	X	X	X
Fathead minnow	*Pimephales promelas*	X	X								
Gravel Chub	*Erimystax x-punctatus*		X								
Creek chub	*Semotilus atromaculatus*	X	X		X	X	X	X			X
White sucker	*Catostomus commersoni*	X	X	X	X	X	X	X			
Northern hogsucker	*Hypentelium nigricans*	X	X	X	X	X	X	X	X	X	
Largemouth buffalo	*Ictiobus cyprinellus*					X					
Black buffalo	*Ictiobus niger*	X									
Spotted sucker	*Minytrema melanops*									X	
Silver redhorse	*Moxostoma anisurum*	X	X					X		X	

Common Name	Scientific Name	Sac River	L. Sac River	Bear Cr.	Brush Cr.	Coon Cr.	Turnback Cr.	Livingston Cr.	Songs Cr.	Cedar Cr.	Horse Cr.
River redhorse	*Moxostoma carinatum*	X					X				
Black redhorse	*Moxostoma duquesnei*	X	X	X		X	X		X	X	
Golden redhorse	*Moxostoma erythrurum*	X	X	X	X	X	X	X	X	X	X
Yellow bullhead	*Ameiurus natalis*	X	X	X	X		X			X	X
Channel catfish	*Ictalurus punctatus*	X	X			X	X			X	
Freckled madtom	*Noturus nocturnus*	X								X	
Flathead catfish	*Pylodictus olivaris*	X								X	
Northern pike*	*Esox lucius*	X	X								
Muskellunge*	*Esox masquinongy*		X								
Ozark cavefish	*Ambyopsis rosae*										
Northern studfish	*Fundulus catenatus*	X	X		X		X				
Blackstripe topminnow	*Fundulus notatus*									X	X
Blackspotted topminnow	*Fundulus olivaceus*	X	X	X	X	X	X	X	X	X	
Brook silverside	*Labidesthes sicculus*	X	X	X	X	X	X	X	X	X	X
Inland silverside	*Menidia beryllina*										
Mottled sculpin	*Cottus bairdi*	X					X	X			
Banded sculpin	*Cottus carolinae*	X	X	X	X	X	X	X	X	X	X
Ozark sculpin	*Cottus hypselurus*	X			X	X					
White bass	*Morone chrysops*						X				
Ozark bass	*Ambloplites constellatus*		X		X			X			
Green sunfish	*Lepomis cyanellus*	X	X	X	X	X	X	X	X	X	X
Warmouth	*Lepomis gulosus*				X						
Orangespotted sunfish	*Lepomis humilis*	X	X	X		X	X			X	X
Bluegill	*Lepomis macrochirus*	X	X	X	X	X	X	X	X	X	X
Longear sunfish	*Lepomis megalotis*	X	X	X	X	X	X	X	X	X	X
Smallmouth bass	*Micropterus dolomieu*	X	X	X	X	X	X	X		X	
Spotted bass	*Micropterus punctulatus*	X	X	X	X	X	X			X	X
Largemouth bass	*Micropterus salmoides*	X	X	X		X	X	X	X	X	X
White crappie	*Pomoxis annularis*	X	X			X		X			
Black Crappie	*Pomoxis nigromaculatus*	X	X								
Greenside darter	*Etheostoma blennioides*	X	X	X	X	X	X	X	X	X	X
Rainbow darter	*Etheostoma caeruleum*	X	X	X	X	X	X	X	X	X	

Common Name	Scientific Name	Sac River	L. Sac River	Bear Cr.	Brush Cr.	Coon Cr.	Turnback Cr.	Livingston Cr.	Songs Cr.	Cedar Cr.	Horse Cr.
Fantail darter	*Etheostoma flabellare*	X	X	X	X	X	X	X	X	X	X
Least Darter	*Etheostoma microperca*		X								
Niangua darter	*Etheostoma nianguae*		X	X	X						
Johnny darter	*Etheostoma nigrum*	X	X	X	X	X	X				X
Stippled darter	*Etheostoma punctulatum*	X	X	X	X				X	X	
Orangethroat darter	*Etheostoma spectabile*	X	X	X	X	X	X	X	X	X	X
Missouri saddled darter	*Etheostoma tetrazonum*	X	X	X			X			X	
Banded darter cymatotaenia	*Etheostoma zonale*	X	X	X	X		X		X		
Logperch	*Percina caprodes*	X	X	X	X	X	X	X	X	X	X
Bluestripe darter	*Percina cymatotaenia*	X									
Gilt Darter	*Percina evides*	X									
Slenderhead darter	*Percina phoxocephala*	X	X				X			X	X
Walleye	*Stizostedion vitreum*						X				
Freshwater drum	*Aplodinotus grunniens*	X				X	X			X	X

* - Northern pike were stocked in Stockton Lake in the 1970s and muskellunge were stocked in Fellows Lake in 1996 and 1999

Table 17. Amphibians found in the Sac River basin.

Common Name	Scientific Name	Range (Counties)
Hellbender	*Cryptobranchus alleganiensis*	Polk, Greene
Ringed salamander	*Ambystoma annulatum*	Polk, Greene
Spotted salamander	*Ambystoma maculatum*	Basin-wide
Marbled salamander	*Ambystoma opacum*	St. Clair
Eastern tiger salamander	*Ambystoma tigrinum tigrinum*	Basin-wide
Central newt	*Notophthalmus viridescens louisianensis*	Basin-wide
Longtail salamander	*Eurycea longicauda*	Basin-wide
Cave salamander	*Eurycea lucifuga*	Basin-wide
Slimy salamander	*Plethodon glutinosus glutinosus*	Polk, Dade, Greene
Grotto salamander	*Typhlotriton spelaeus*	Polk, Dade, Greene
Mudpuppy	*Necturus maculosis maculosis*	Basin-wide
Dwarf American toad	*Bufo americanus charlesmithi*	Basin-wide
Eastern American toad	*Bufo americanus americanus*	St. Clair
Fowler's toad	*Bufo woodhousei fowleri*	Greene
Woodhouse's toad	*Bufo woodhousei woodhousei*	Basin-wide
Blanchard's cricket frog	*Acris crepitans blanchardi*	Basin-wide
Northern spring peeper	*Hyla crucifer crucifer*	Basin-wide
Eastern gray treefrog	*Hyla versicolor*	Greene
Cope's gray treefrog	*Hyla chrysoscelis*	Basin-wide
Western chorus frog	*Pseudacris triseriata*	Basin-wide
Eastern narrowmouth toad	*Gastrophryne carolinensis*	Basin-wide
Northern crawfish frog	*Rana areolata circulosa*	Polk, Dade, Cedar, St. Clair, Barton, Vernon
Plains leopard frog	*Rana blairi*	Dade, Cedar, St. Clair, Barton
Bullfrog	*Rana catesbeiana*	Basin-wide
Green frog	*Rana clamitans*	Basin-wide
Pickerel frog	*Rana palustris*	Basin-wide
Southern leopard frog	*Rana sphenocephala*	Basin-wide

Table 18. Reptiles found in the Sac River basin.

Common Name	Scientific Name	Range
Common snapping turtle	*Chelydra serpentina serpentina*	Basin-wide
Stinkpot	*Sternotherus odoratus*	Basin-wide
Western painted turtle	*Chrysemys picta bellii*	Basin-wide
Map turtle	*Graptemys geographica*	Basin-wide
Mississippi map turtle	*Graptemys kohnii*	Basin-wide
Ouachita map turtle	*Graptemys pseudogeographica ouachitensis*	Basin-wide
Missouri River cooter	*Pseudemys concinna metteri*	Hickory, Polk, Greene, Lawrence, Dade, Cedar, Barton, Christian
Three-toed box turtle	*Terrapene carolina triunguis*	Basin-wide
Ornate box turtle	*Terrapene ornata ornata*	Basin-wide
Red-eared slider	*Trachemys scripta elegans*	Basin-wide
Midland smooth softshell	*Trionyx muticus muticus*	Basin-wide
Western spiny softshell	*Trionyx spinifer hartwegi*	Basin-wide
Eastern collared lizard	*Crotaphytus collaris collaris*	Basin-wide
Northern fence lizard	*Sceloporus undulatus hyacinthinus*	Basin-wide
Southern coal skink	*Eumeces anthracinus pluvialis*	Basin-wide
Five-lined skink	*Eumeces fasciatus*	Basin-wide
Broadhead skink	*Eumeces laticeps*	Basin-wide
Great Plains skink	*Eumeces obsoletus*	Barton, Vernon
Ground skink	*Scincella lateralis*	Basin-wide
Prairie-lined racerunner	*Cnemidophorus sexlineatus viridus*	Basin-wide
Western slender glass lizard	*Ophisaurus attenuatus attenuatus*	Basin-wide
Western worm snake	*Carphophis amoenus vermis*	Basin-wide
Easstern yellowbelly racer	*Coluber constrictor flaviventris*	Basin-wide
Prairie ringneck snake	*Diadophis punctatus arnyi*	Basin-wide
Great Plains rat snake	*Elaphe guttata emoryi*	Basin-wide
Black rat snake	*Elaphe obsoleta obsoleta*	Basin-wide
Eastern hognose snake	*Heterodon platyrhinos*	Basin-wide
Prairie kingsnake	*Lampropeltis calligaster calligaster*	Basin-wide
Speckled kingsnake	*Lampropeltis getulus holbrooki*	Basin-wide
Red milk snake	*Lampropeltis triangulum syspila*	Basin-wide
Eastern coachwhip	*Masticophis flagellum flagellum*	Basin-wide
Blotched water snake	*Nerodia erythrogaster transversa*	Lawrence, Barton, Vernon, Cedar, Dade, St. Clair, Polk, Hickory
Diamondback water snake	*Nerodia rhombifer rhombifer*	Lawrence, Barton, Vernon, Cedar, Dade, St. Clair, Polk, Hickory

Common Name	Scientific Name	Range
Midland water snake	*Nerodia sipedon pleuralis*	Greene, Lawrence, Dade
Northern water snake	*Nerodia sipedon sipedon*	Basin-wide
Rough green snake	*Opheodrys aestivus*	Basin-wide
Bullsnake	*Pituophis melanoleucas sayi*	Basin-wide
Graham's crayfish snake	*Regina grahamii*	Barton, Vernon, Cedar, Dade, St. Clair, Polk
Ground snake	*Sonora semiannulata*	Basin-wide
Midland brown snake	*Storeria dekayi wrightorum*	Dade, Polk, Greene, Lawrence, Christian
Texas brown snake	*Storeria dekayi texana*	Basin-wide
Northern redbelly snake	*Storeria occipitomaculata occipitomaculata*	Basin-wide
Flathead snake	*Tantilla gracilis*	Basin-wide
Western ribbon snake	*Thamnophis proximus proximus*	Basin-wide
Eastern garter snake	*Thamnophis sirtalis sirtalis*	Christian, Greene, Lawrence
Red-sided garter snake	*Thamnophis sirtalis parietalis*	Basin-wide
Central lined snake	*Tropidoclonion lineatum annectens*	Barton, Vernon, Cedar, Dade, St. Clair, Polk, Hickory
Rough earth snake	*Virginia striatula*	Basin-wide
Western earth snake	*Virginia valeriae elegans*	Basin-wide
Osage copperhead	*Agkistrodon contortrix phaeogaster*	Basin-wide
Southern copperhead	*Agkistrodon contortrix contortrix*	Greene, Christian,
Western cottonmouth	*Agkistrodon piscivorus leucostoma*	Cedar, Hickory, Dade, St. Clair, Polk, Greene, Christian, Lawrence
Timber rattlesnake	*Crotalus horridus*	Basin-wide

Source: Johnson (1987).

Table 19. Species of conservation concern in the Sac River basin.

Name	Species	State Rank	State Status	Federal Status
Northern crawfish frog	*Rana areolata circulosa*	S3		
Sharp-shinned hawk	*Accipiter striatus*	S2	S2	
Upland sandpiper	*Bartramia longicauda*	S3		
Great blue heron	*Ardea herodias*	S5		
Henslow's sparrow	*Ammodramus henslowii*			
Northern harrier	*Circus cyaneus*	S1-S2	Endangered	
Bald eagle	*Haliaeetus leucocephalus*	S2	Endangered	Threatened
Greater prairie-chicken	*Tympanuchus cupido*	S1	Endangered	
Bristly cave crayfish	*Cambarus setosus*	S3		
Ozark cavefish	*Amblyopsis rosae*	S2	Endangered Threatened	
Least darter	*Etheostoma microperca*	S2		
Niangua darter	*Etheostoma nianguae*	S2	Endangered Threatened	
Southern brook lamprey	*Icthyomyzon gagei*	S2-S3		
Blacknose shiner	*Notropis heterolepis*		S2	
Auriculate false foxglove	*Agalinis auriculata*	S2		
Pale gerardia	*Agalinis skinneriana*	S3		
Mead's milkweed	*Asclepias meadii*	S2	Endangered	Threatened
A sedge	*Carex arkansana*	S3		
Common least daisy	*Chaetopappa asteroides*	S2-S3		
Geocarpon	*Geocarpon minimum*	S2	Endangered	Threatened
Missouri bladder-pod	*Lesquerella filiformis*	S3	Endangered	Endangered
Harvey's beak-rush	*Rhynchospora harveyi*	S1		
Soapberry	*Sapindus drummondi*	S2		

Name	Species	State Rank	State Status	Federal Status
Thelesperma	*Thelesperma filifolium var. filifolium*	S2		
A Noseburn	*Tragia ramosa*	S2		
A liverwort	*Marsupella sphacelata*	S1		
A hornwort	*Notothylus orbicularis*	S1		
Prairie mole cricket	*Gryllotalpa major*	S3		
Regal fritillary	*Speyeria idalia*	S3		
Black-tailed jackrabbit	*Lepus californicus*	S1	Endangered	
Gray bat	*Myotis grisecens*	S3	Endangered	Endangered
Rock-pocketbook	*Arcidens confragosus*	S3		
Spectaclecase	*Cumberlandia monodonta*	S1		
Elephant-ear	*Elliptio crassidens*	S1	Endangered	
Pink mucket	*Lampsilis abrupta*	S1	Endangered	Endangered
A moss	*Anomobryum filiforme*	S1		
A moss	*Archidium alternifolium*	S1		
Sword moss	*Bryoxiphium novegicum*	S1		
A moss	*Helodium paludosum*	S1		
A moss	*Neckera besseri*	S1		
A hair cap moss	*Polytrichum piliferum*	S1		
Sphagnum	*Sphagnum fallax*	S1		

Source: MDC (1999b)

Table 20. Sac River basin fish stocking history.

Location	Species	Date	Size	Number
Stockton Lake	Northern Pike	Apr-70	Fry	2,000,000
Stockton Lake	Northern Pike	Apr-70	1 - 2"	10,000
Stockton Lake	Walleye	Apr-70	Fry	4,220,000
Stockton Lake	Inland Silversides	Apr-71	Adult	11,000
Stockton Lake	Northern Pike	Apr-71	Fry	675,000
Stockton Lake	Threadfin Shad	Apr-71	Adults & Egg Matts	6,000
Stockton Lake	Walleye	Apr-71	Fry	5,000,000
Stockton Lake	Walleye	May-72	1 - 2"	35,000
Stockton Lake	Hybrid Muskellunge	Sep-75	10"	2,000
Stockton Lake	Hybrid Muskellunge	Oct-76	8"	10,000
Stockton Lake	Hybrid Muskellunge	Oct-76	10"	2,600
Stockton Lake	Channel Catfish	May-90	Adult	23
Fellows Lake	Walleye	Aug-91	4 - 6"	12,402
Fellows Lake	Channel Catfish	Sep-91	8 - 10"	8,200
Fellows Lake	Channel Catfish	Mar-92	4 - 6"	5,101
Fellows Lake	Channel Catfish	Sep-92	8 - 10"	4,200
Fellows Lake	Walleye	Sep-92	4 - 6"	12,473
Stockton Lake	Walleye	Apr-93	Fry	682,017
Stockton Lake	Walleye	May-93	2"	327,409
Fellows Lake	Channel Catfish	Oct-93	10 -12"	8,202
Stockton Lake	Walleye	May-94	2"	354,576
Fellows Lake	Channel Catfish	Oct-94	8 - 10"	8,214
Fellows Lake	Channel Catfish	Oct-95	8 - 10"	8,200
Stockton Lake	Walleye	Apr-96	Fry	278,207
Stockton Lake	Walleye	May-96	13.3"	42
Fellows Lake	Channel Catfish	Oct-96	8 - 10"	9,570
Fellows Lake	Muskellunge	Oct-96	11 - 14"	820
Fellows Lake	Channel Catfish	Oct-97	8 - 10"	8,196
Stockton Lake	Walleye	May-98	1.3 - 1.8"	481,089
Stockton Lake	Walleye	Jun-98	1.1 -1.6"	196,131
Stockton Lake	Walleye	Jun-98	1.5"	52,320
Fellows Lake	Channel Catfish	Oct-98	8 - 10"	12,304
Fellows Lake	Channel Catfish	Oct-99	8 - 10"	########
Fellows Lake	Muskellunge	Oct-99	10 - 12"	2,460
Fellows Lake	Channel Catfish	Oct-00	8 - 10"	11,956
Stockton Lake	Bluegill	Oct-00	2 - 4"	20,163
Stockton Lake	Channel Catfish	Apr-00	Adults	168
Stockton Lake	Walleye	May-00	1 - 2"	746,165

Table 21. Crayfish whose range includes the Sac River basin in Missouri (Pflieger 1996).

Common Name	Scientific Name	Collected
Bristly cave crayfish	*Cambarus setosus*	between 1971-1992
Golden crayfish	*Orconectes luteus*	between 1971-1992
Northern crayfish	*Orconectes virilis*	between 1971-1992
Grassland crayfish	*Procambaris gracilis*	between 1971-1992

Table 22. Macroinvertebrate information from streams in the Sac River basin.

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
Arthropoda	Insecta	Ephemeroptera	Baetidae	*Acentrella sp.*			X	X	
				Acerpenna sp.	X			X	
				Acerpenna pygmaea					
				Baetis sp.	X	X	X	X	X
				Baetis flavistriga					
				Callibaetis sp.	X	X		X	
				Diphetor sp.		X	X		
				Diphetor hageni					
				Labiobaetis sp.		X	X		
				Procloeon sp.	X	X	X	X	X
				Caenis anceps		X	X	X	
			Caenidae	*Caenis latipennis*	X	X	X	X	X
				Caenis punctata					
				Ephemera sp.	X	X	X		
			Ephemeridae	*Ephemera simulans*				X	X
				Hexagenia sp.		X	X	X	
				Hexagenia limbata				X	X
				Ephemerella sp.			X	X	
			Ephemerellidae	*Ephemerella invaria*		X			
				Ephemerella needhami		X	X		
				Eurylophella sp.				X	
				Eurylophella bicolor			X		
				Eurylophella temporalis				X	
					X	X	X		
			Heptageniidae	*Leucrocuta sp.*	X	X	X	X	X
				Stenacron sp.	X	X	X	X	X
			Stenonema pulchellum	*Stenonema bednariki*					
				Stenonema femoratum	X	X	X	X	X
				Stenonema mediopunctatum	X	X	X		
				Stenonema modestum			X		

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
			Paraleptophlebia sp.	*Stenonema pulchellum*	X	X	X	X	X
				Stenonema terminatum		X	X	X	X
				Isonychia bicolor	X	X	X	X	X
			Isonychiidae	*Tricorythodes sp.*	X	X	X	X	X
			Leptohyphidae	*Choroterpes sp.*		X	X	X	X
			Leptophlebiidae	*Leptophlebia sp.*		X	X		
				Leptophlebia cupida				X	
				Paraleptophlebia sp.		X	X	X	X
				Anthopotamus sp.		X	X	X	
			Potamanthidae	*Anthopotamus myops*				X	
				Siphlonurus sp.		X	X	X	
			Siphlonuridae	*Siphlonurus minnoi*					
				Aeshna sp.			X	X	
		Odonata	Aeshnidae	*Basiaeschna sp.*					
				Basiaeschna janata				X	
				Boyeria sp.	X		X	X	
				Hagenius sp.				X	
				Hagenius brevistylus	X			X	X
				Nasiaeschna sp.				X	
				Nasiaeschna pentacantha	X	X		X	X
				Calopteryx sp.	X	X	X	X	X
			Calopterygidae	*Calopteryx maculata*					
				Hetaerina sp.	X	X	X	X	
								X	X
			Coenagrionidae	*Enallagma sp.*	X	X	X	X	X
				Epithica sp.		X		X	
			Corduliidae	*Neurocordulia sp.*			X	X	
				Somatochlora sp.				X	
						X	X		
			Gomphidae	*Argia sp.*	X	X	X	X	X
				Dromogomphus sp.		X			
				Gomphus sp.				X	X
				Ophiogomphus sp.					

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Stylogomphus sp.					
Perlodidae				*Stylogomphus albistylus*			X	X	
				Libellula sp.				X	
			Libellulidae	*Perithemis sp.*				X	
				Macromia sp.		X		X	X
			Macromiidae	*Amphinemura sp.*		X	X	X	
		Plecoptera	Nemouridae	*Prostoia completa*					
				Strophopteryx sp.		X			
			Taeniopterygidae	*Taeniopteryx sp.*			X		
			Leuctridae	*Zealeuctra sp.*		X	X		
				Leuctra sp.		X	X		
						X	X	X	X
			Perlidae/Perlodidae			X			
			Perlidae	*Acroneuria sp.*		X		X	X
				Acroneuria frisoni		X	X	X	
				Agnetina capitata					
				Agnetina flavescens		X	X	X	
				Neoperla sp.					
				Neoperla harpi				X	
				Perlesta sp.		X	X		
				Perlesta decipiens				X	
				Perlinella drymo		X		X	
				Perlinella ephrye					
			Perlodidae	*Clioperla clio*			X	X	
				Helopicus natalus			X		
				Hydroperla crosbyi				X	
				Isoperla sp.		X	X		
				Isoperla decepta				X	
				Isoperla namata					
				Isoperla ouachita				X	
				Isoperla signata					

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Alloperla sp.		X	X		
			Chloroperlidae	*Alloperla caudauta*				X	
				Belostoma sp.			X	X	
		Heteroptera	Belostomatidae		X	X	X	X	
			Corixidae	*Palmocorixa buenoi*					
				Trichocorixa sp.	X		X		
				Gerris sp.		X			
			Gerridae	*Rheumatobates sp.*	X	X	X	X	X
				Trepobates sp.	X		X	X	X
				Hebrus sp.			X	X	
			Hebridae	*Mesovelia sp.*	X				
			Mesoveliidae	*Ranatra fusca*	X				
			Nepidae	*Ranatra nigra*	X	X		X	
				Neoplea sp.		X		X	X
			Pleidae	*Microvelia sp.*	X	X	X	X	X
			Veliidae	*Rhagovelia sp.*				X	
				Sialis sp.	X	X	X	X	X
		Megaloptera	Sialidae	*Corydalis sp.*	X	X	X	X	X
			Corydalidae	*Nigronia sp.*	X	X	X		
				Nigronia serricornus					
		Neuroptera		*Helichus sp.*			X	X	
		Coleoptera	Dryopidae	*Helichus basalis*				X	
				Helichus lithophilus		X		X	X
				Hydrochus sp.				X	
				Lutrochus sp.		X			
				Agabus sp.	X	X	X	X	
			Dytiscidae	*Cybister sp.*					
				Hydroporus sp.		X	X	X	
				Ancyronyx sp.				X	
			Elmidae	*Ancyronyx variegata*		X	X	X	X
				Disonycha sp.			X		
				Dubiraphia sp.	X	X	X	X	X
				Macronychus sp.				X	

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Macronychus glabratus	X	X	X	X	X
				Microcylloepus pusillus			X		
				Optioservus sp.					
				Optioservus sandersoni		X	X		
				Stenelmis sp.	X	X	X	X	X
				Stenelmis beameri		X	X	X	X
				Stenelmis cheryl			X		
				Stenelmis crenata	X	X			
				Stenelmis sexlineata		X		X	X
				Dineutus sp.				X	
			Gyrinidae	*Gyretes sp.*				X	
				Gyrinus sp.					
				Peltodytes sp.	X			X	
			Haliplidae	*Hydraena sp.*					
			Hydraenidae	*Berosus sp.*				X	
			Hydrophilidae	*Chaetarthria sp.*					
				Hydrobius sp.				X	
				Laccobius sp.				X	
				Paracymus sp.				X	
				Sperchopsis sp.			X		
				Tropisternus sp.	X		X		
				Ectopria nervosa	X				
			Psephenidae	*Psephenus sp.*				X	
				Psephenus herricki				X	
					X	X	X	X	X
			Salpingidae	*Scirtes sp.*					
			Scirtidae	*Micrasema sp.*	X	X	X	X	X
		Trichoptera	Brachycentridae	*Agapetus sp.*		X	X	X	X
			Glossosomatidae	*Helicopsyche sp.*		X	X	X	X
			Helicopsychidae	*Ceratopsyche sp.*				X	
				Ceratopsyche bronta/morosa		X	X		
				Ceratopsyche slossonae			X		
				Cheumatopsyche sp.	X	X	X	X	X

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
						X			
			Hydropsychidae	*Hydropsyche sp.*			X		
				Hydroptila sp.	X	X	X	X	X
			Hydroptilidae	*Oxyethira sp.*			X	X	
				Ceraclea sp.				X	
			Leptoceridae	*Mystacides sp.*		X	X	X	
				Nectopsyche sp.		X	X	X	
				Nectopsyche albida				X	
				Nectopsyche exquisita				X	
				Oecetis sp.		X	X	X	X
				Triaenodes sp.		X	X	X	X
				Ironoquia sp.				X	
			Limnephilidae	*Neophylax sp.*		X	X		
				Platycentropus sp.				X	
				Pycnopsyche sp.			X	X	
				Marilia flexousa					
			Odontoceridae			X	X	X	X
			Philopotamidae	*Ptilostomis sp.*		X		X	
			Phryganeidae			X			
			Polycentropidae	*Cernotina sp.*	X	X	X	X	X
			Polycentropodidae	*Neureclipsis sp.*			X	X	
				Polycentropus sp.			X	X	
				Lype diversa		X	X		
			Psychomyiidae	*Psychomyia sp.*			X		
				Rhyacophila sp.		X		X	
			Rhyacophilidae					X	
		Lepidoptera	Noctuidae	*Petrophila sp.*				X	
			Pyralidae						
		Diptera		*Atherix sp.*					
			Athericidae					X	
			Ceratopogonidae	*Dasyheleinae/Ceratopogoninae*				X	X
				Ceratopogoninae sp.	X	X	X		
				Forcipomyiinae sp.			X	X	
				Chaoborus sp.				X	X

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
			Chaoboridae	*Ablabesmyia sp.*	X	X	X	X	X
			Chironomidae	*Brillia sp.*	X				
				Chironomus sp.	X	X	X	X	X
				Cladopelma sp.	X				
				Cladotanytarsus sp.		X	X	X	X
				Clinotanypus sp.					
				Coelotanypus sp.				X	X
				Constempellina sp.		X			
				Corynoneura sp.	X	X	X	X	X
				Cricotopus/Orthocladius	X	X	X	X	X
				Pagastiella sp.		X			
				Cryptochironomus sp.	X	X	X	X	X
				Cryptotendipes sp.		X	X	X	X
				Diamesa sp.				X	
				Dicrotendipes sp.	X	X	X	X	X
				Endochironomus sp.				X	X
				Eukiefferiella sp.	X	X	X	X	
				Euorthocladius		X	X		
				Glyptotendipes sp.	X		X	X	
				Hydrobaenus sp.	X	X	X	X	
				Labrudinia sp.	X	X	X	X	X
				Larsia sp.				X	X
				Micropsectra sp.		X			
				Microtendipes sp.	X	X	X	X	X
				Monodiamesa sp.					X
				Nanocladius sp.	X	X	X	X	X
				Nilotanypus sp.	X		X	X	X
				Parachironomus sp.					
				Paracladopelma sp.		X		X	
				Parakiefferiella sp.		X	X	X	
				Paralauterborniella sp.		X	X		
				Paramerina sp.	X	X	X		
				Parametriocnemus sp.	X	X	X	X	
				Paratanytarsus sp.	X	X	X	X	X

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Paratendipes sp.	X	X	X	X	X
				Phaenopsectra sp.	X	X	X	X	X
				Polypedilum sp.	X	X	X		
				Polypedilum convictum	X	X	X	X	X
				Polypedilum fallax	X	X	X	X	
				Polypedilum halterale					
				Polypedilum illinoense		X	X	X	X
				Polypedilum scalaenum	X	X	X	X	X
				Potthastia sp.				X	
				Procladius sp.	X	X	X	X	X
				Pseudochironomus sp.		X	X	X	X
				Rheocricotopus sp.	X	X	X	X	
				Rheotanytarsus sp.	X	X	X	X	X
				Smittia sp.					
				Stelechomyia sp.					
				Stempellina sp.		X	X		
				Stempellinella sp.	X	X	X	X	X
				Stictochironomus sp.		X		X	
				Symposiocladius sp.		X			
				Sympotthastia sp.				X	
				Synorthocladius sp.					
				Tanypus sp.				X	
				Tanytarsus sp.	X	X	X	X	X
				Thienemanniella sp.	X	X	X	X	X
				Thienemannimyia grp.	X	X	X	X	X
				Tribelos sp.		X		X	
				Tventenia sp.					
				Tventenia bavarica		X	X		
				Xylotopus sp.		X	X	X	
				Zavrelimyia sp.					
				Aedes sp.		X			
			Culicidae	*Anopheles sp.*		X	X	X	X
				Culex sp.				X	

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Culiseta sp.				X	
				Dixa sp.					
			Dixidae	*Dixella sp.*				X	X
			Dolichopodidae				X	X	
			Empididae	*Chelifera sp.*			X		
				Clinocera sp.		X	X	X	
				Hemerodromia sp.	X	X	X	X	X
								X	
			Ephydridae	*Axarus sp.*		X		X	X
			Orthocladiinae	*Pagastiella sp.*					
				Prosimulium sp.				X	
			Simuliidae	*Simulium sp.*	X		X	X	
				Alognosta sp.					
			Stratiomyidae	*Myxosargus sp.*		X			
				Nemotelus sp.					
				Chrysops sp.		X		X	X
			Tabanidae	*Tabanus sp.*		X		X	X
				Antocha sp.			X		
			Tipulidae	*Dicranota sp.*					
				Hexatoma sp.		X	X	X	X
				Ormosia sp.					
				Pseudolimnophila sp.				X	
				Tipula sp.		X	X	X	X
				Hyallela azteca	X	X	X	X	X
	Crustacea	Amphipoda	Talitridae	*Orconectes sp.*					
		Decapoda	Astacidae	*Orconectes macrus*					
				Orconectes neglectus					
				Orconectes luteus	X	X	X	X	X
				Orconectes virilis	X	X	X	X	X
				Palaemonetes kadiakensis				X	
			Palaemonidae	*Caecidotea sp.*				X	X
	Malacostraca	Isopoda	Asellidae	*Lirceus sp.*				X	
				Lirceus hoppinae		X			

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
				Crangonyx sp.	X	X			
		Amphipoda	Crangonyctidae	*Gammarus sp.*			X	X	
			Gammaridae	*Stygobromus sp.*			X		X
					X	X	X	X	X
	Arachnida	Acari							
Annelida	Oligochaeta				X	X	X	X	X
		Lumbriculida	Lumbriculidae		X	X	X	X	
		Tubificida	Enchytraeidae						
			Lumbricidae	*Sparganophilus/Eiseniella*					
			Sparganophilidae		X	X	X	X	X
			Tubificidae	*Aulodrilus sp.*					
				Branchiura sowerbyi	X		X	X	X
				Ilyodrilus templetoni		X		X	
				Limnodrilus sp.	X	X	X		
				Limnodrilus augustipennis					
				Limnodrilus cervix			X	X	
				Limnodrilus hoffmeisteri	X	X	X	X	X
				Quistadrilus multisetosus					
					X	X	X		
		Branchiobdellida			X			X	
		Rhynchobdellida	Glossiphoniidae		X			X	
		Pharyngobdellida	Erpobdellidae	*Dina/Mooreobdella sp*				X	
			Piscicolidae	*Ferrissia sp.*	X	X	X	X	X
Mollusca	Gastropoda	Basommatophora	Ancylidae		X		X		
			Lymnaeidae	*Fossaria sp.*					X
				Physa sp.					
			Physidae	*Physella sp.*	X	X	X	X	X
				Helisoma sp.					
			Planorbidae	*Menetus sp.*	X	X	X	X	X
							X		

Phylum	Class	Order	Family	Scientific Name	Site[1]				
					1	2	3	4	5
		Mesogastropoda	Hydrobiidae	*Elimia sp.*	X	X	X	X	X
			Pleuroceridae	*Corbicula sp.*	X	X		X	X
	Bivalvia	Pelecypoda	Corbiculidae	*Musculium sp.*	X				
		Veneroida	Pisidiidae	*Sphaerium sp.*	X	X	X	X	X
					X	X	X	X	X
Platyhelminthes	Turbellaria	Tricladida	Planariidae					X	
Nematomorpha	Gordioida	Gordea	Gordiidae						

1 = Little Sac River samples collected from two sites on April 2-3, 1996 and September 19, 1996.
2 = Clear Creek samples collected from two sites on April 3, 1996 and September 18, 1996.
3 = Turnback Creek samples collected from two sites on April 4, 1996 and September 18, 1996.
4 = Brush Creek samples collected from four sites on March 30-31, 1995, and six sites on September 18-20, 1995. 5 = Bear Creek samples collected from three sites on September 20-21, 1995.
All sample data provided by Randy Sarver of the MDNR. For a more detailed site by site breakdown contact Randy Sarver at MDNR

Table 23. Mussels found in the Sac River basin.

Common Name	Scientific Name	Collection[1]
Paper pondshell	*Utterbackis imbecilis*	1965-1999
Giant floater	*Anodonta grandis*	1965-1999
Creeper	*Strophitus undulatus*	1999
Elk toe	*Alasmidonta marginata*	1965-1999
Slippershell	*Alasmidonta viridis*	1965-1999
White heel splitter	*Lasmigonia complanata*	1999
Fluted shell	*Lasmigonia costata*	1965-1999
Washboard	*Megalonaias nervosa*	1965-1999
Pistolgrip	*Tritogonia verrucosa*	1999
Mapleleaf	*Quadrula quadrula*	1999
Pimpleback	*Quadrula pustulosa*	1965-1999
Monkeyface	*Quadrula metanevra*	1999
Threeridge	*Amblema plicata*	1999
Wabash pigtoe	*Fusconaia flava*	1965-1999
Purple wartyback	*Cyclonaias tuberculata*	1999
Round pigtoe	*Pleurobema sintoxia*	1965-1999
Spike	*Elliptio dilatata*	1999
Ouachita kidney-shell	*Ptychobranchus occidentalis*	1965-1999
Threehorn wartyback	*Obliquaria reflexa*	1999
Mucket	*Actinonaias ligamentina carinata*	1965-1999
Ellipse	*Venustaconcha ellipsiformis ellipsiformis*	1965-1999
Butterfly	*Ellipsaria lineolata*	1999
Fawnsfoot	*Truncilla donaciformis*	1999
Deertoe	*Truncilla truncata*	1978 - 1999
Fragile papershell	*Leptodea fragilis*	1978 - 1999
Pink heelsplitter	*Potamilus alatus*	1999
Pink papershell	*Potamilus ohioensis*	1965-1999
Lilliput	*Toxolasma parvus*	1965-1999
Black sandshell	*Ligumia recta*	1965-1999
Pondmussel	*Ligumia subrostrata*	1965-1999
Yellow sandshell	*Lampsilis teres*	1965-1999
Fat mucket	*Lampsilis siliquodiea*	1965-1999
Pink mucket	*Lampsilis abrupta*	1965-1999
Plain pocketbook	*Lampsilis cardium*	1999
Northern brokenray	*Lampsilis reeviana brittsi*	1965-1999
Asian clam	*Corbicula fulminea*	1999

[1] - Sources of collection information: MDC Naiad Database (1978), Cummings and Mayer (1982), Oesch (1984), and 1999 samples collected from the lower Sac River by Dr. Chris Barnhart (SMSU) and Horse Creek by Sue Bruenderman, Scott Faiman, Rick Horton, and Tim Banek of MDC.

Table 24. Mussels identified from shells collected in the Sac River basin.

Common Name	Species	Shell condition	Location
Asian clam	*Corbicula fluminea*	Weathered dead	Horse Creek, Highway CC
Fragile papershell	*Leptodea fragilis*	Weathered dead	Horse Creek, Highway CC
Pink heelsplitter	*Potamilus alatus*	Weathered dead	Horse Creek, Highway CC
Giant floater	*Pyganodon grandis*	Shell fragments	Horse Creek, Highway CC
Mapleleaf	*Quadrula quadrula*	Shell fragments	Horse Creek, Highway CC
Squawfoot	*Strophitus undulatus*	Weathered dead	Horse Creek, Highway CC
Pistolgrip	*Tritagonia verrucosa*	Weathered dead	Horse Creek, Highway CC
Deertoe	*Truncilla truncata*	Weathered dead	Horse Creek, Highway CC
Threeridge	*Amblema plicata*	Weathered dead	Horse Creek, Highway 32
Plain pocketbook	*Lampsilis cardium*	Weathered dead	Horse Creek, Highway 32
Fragile papershell	*Leptodea fragilis*	Weathered dead	Horse Creek, Highway 32
Giant floater	*Pyganodon grandis*	Shell fragments	Horse Creek, Highway 32
Pimpleback	*Quadrula pustulosa*	Weathered dead	Horse Creek, Highway 32
Pistolgrip	*Tritagonia verrucosa*	Weathered dead	Horse Creek, Highway 32
Spike	*Elliptio dilatata*	Shell fragments	Horse Creek, Highway 32
Wabash pigtoe	*Fusconaia flava*	Weathered dead	Horse Creek, Highway 32
Fat mucket	*Lampsilis siliquoidea*	Shell fragments	Bear Creek, Highway A
White heelsplitter	*Lasmigonia complanata*	Weathered dead	Cedar Creek, Highway 39
Fragile papershell	*Leptodea fragilis*	Weathered dead	Cedar Creek, Highway 39
Three-horned wartyback	*Obliquaria reflexa*	Weathered dead	Cedar Creek, Highway 39
Squawfoot	*Strophitus undulatus*	Weathered dead	Cedar Creek, Highway 39
Deertoe	*Truncilla truncata*	Weathered dead	Cedar Creek, Highway 39
Spectaclecase	*Cumberlandia monodonta*	Weathered dead	Sac River, Stream Mile 30.1
Squawfoot	*Strophitus undulatus*	Weathered dead	Sac River, Stream Mile 30.1
Pistolgrip	*Tritagonia verrucosa*	Weathered dead	Sac River, Stream Mile 30.1
Monkeyface	*Quadrula metanevra*	Weathered dead	Sac River, Stream Mile 30.1
Pimpleback	*Quadrula pustulosa*	Weathered dead	Sac River, Stream Mile 30.1
Threeridge	*Amblema plicata*	Weathered dead	Sac River, Stream Mile 30.1
Wabash pigtoe	*Fusconaia flava*	Weathered dead	Sac River, Stream Mile 30.1
Purple wartyback	*Cyclonaias tuberculata*	Weathered dead	Sac River, Stream Mile 30.1
Round pigtoe	*Pleurobema sintoxia*	Weathered dead	Sac River, Stream Mile 30.1

Common Name	Species	Shell condition	Location
Spike	*Elliptio dilatata*	Weathered dead	Sac River, Stream Mile 30.1
Threehorn wartyback	*Obliquaria reflexa*	Weathered dead	Sac River, Stream Mile 30.1
Mucket	*Actinonaias ligamentina*	Weathered dead	Sac River, Stream Mile 30.1
Ellipse	*Ventusticoncha ellipsiformis*	Weathered dead	Sac River, Stream Mile 30.1
Butterfly	*Ellipsaria lineolata*	Weathered dead	Sac River, Stream Mile 30.1
Deertoe	*Truncilla trucata*	Weathered dead	Sac River, Stream Mile 30.1
Fawnsfoot	*Truncilla donaciformis*	Weathered dead	Sac River, Stream Mile 30.1
Fragile papershell	*Leptodea fragilis*	Weathered dead	Sac River, Stream Mile 30.1
Pink heelsplitter	*Potamilis alatus*	Weathered dead	Sac River, Stream Mile 30.1
Black sanshell	*Ligumia recta*	Weathered dead	Sac River, Stream Mile 30.1
Yellow sandshell	*Lampsilis teres*	Weathered dead	Sac River, Stream Mile 30.1
Pocketbook	*Lampsilis cardium*	Weathered dead	Sac River, Stream Mile 30.1
Pink mucket	*Lampsilis abrupta*	Weathered dead	Sac River, Stream Mile 30.1
Squawfoot	*Strophitus undulatus*	Weathered dead	Sac River, Stream Mile 34.3
Rock pocketbook	*Arcidens confragosus*	Weathered dead	Sac River, Stream Mile 30.1
Round Pigtoe	*Pleurobema sintoxia*	Weathered dead	Sac River, Stream Mile 34.3
Threehorn wartyback	*Obliquaria reflexa*	Weathered dead	Sac River, Stream Mile 34.3
Mucket	*Actinonaias ligamentina*	Weathered dead	Sac River, Stream Mile 34.3
Ellipse	*Ventusticoncha ellipsiformis*	Weathered dead	Sac River, Stream Mile 34.3
Butterfly	*Ellipsaria lineolata*	Weathered dead	Sac River, Stream Mile 34.3
Fawnsfoot	*Truncilla donaciformis*	Weathered dead	Sac River, Stream Mile 34.3
Pink papershell	*Potamilis ohiensis*	Weathered dead	Sac River, Stream Mile 34.3

Common Name	Species	Shell condition	Location
Pink heelsplitter	*Potamilus alatus*	Weathered dead	Sac River, Stream Mile 34.3
Black sandshell	*Ligumia recta*	Weathered dead	Sac River, Stream Mile 34.3
Yellow sandshell	*Lampsilis teres*	Weathered dead	Sac River, Stream Mile 30.1
Fatmucket	*Lamsilis siliquoidia*	Weathered dead	Sac River, Stream Mile 34.3
Pocketbook	*Lampsilis cardium*	Weathered dead	Sac River, Stream Mile 34.3
Pink mucket	*Lampsilis abrupta*	Shell fragments	Sac River, Stream Mile 34.3

Management Problems and Opportunities

The Missouri Department of Conservation (MDC) is charged with the '…control, management, restoration, conservation and regulation of the bird, fish, game, forestry and all wildlife resources of the state…' As stated in MDC's recent Regional Management Guideline documents (1999a), 'The Conservation vision is to have healthy, sustainable plant and animal communities throughout the state of Missouri for future generations to use and enjoy, and that fish, forest, and wildlife resources are in appreciably better condition tomorrow than they are today.' In order to achieve this vision, efforts to better manage streams and their watersheds will be a continuing priority in the Sac River watershed. This section includes strategic guidelines to provide MDC Fisheries Division staff working in the watershed with management direction to address the issues detailed in earlier sections. These issues include point and non-point source pollution, increasing urbanization, loss of riparian vegetation, the effects of concentrated animal operations, mining influences, dam and hydropower influences, instream flow issues, increasing demands for recreation, and threats to aquatic life within the watershed. The guidelines will be used to address future stream management, public awareness, and public access issues and needs.

Goal I: Improve water quality and maintain or improve water quantity in the Sac River watershed so all streams are capable of supporting high quality aquatic communities.

Objective I.1: Streams within the watershed will meet state standards for water quality.

Guidelines

- Enhance people's awareness of 1) water quality problems (i.e., point source pollution, animal waste runoff, etc.) affecting aquatic biota, 2) viable solutions to these problems, and 3) their role in implementing these solutions.
- Review NPDES, Section 404, and other permits and either recommend denial or appropriate mitigation for those which are harmful to aquatic resources, and investigate pollution events and fish and mussel kills.
- Work with the Missouri Department of Health and MDNR to monitor and reduce contaminant levels in fish.
- Work with MDNR to monitor water quality, improve water quality, and ensure compliance with discharge permits. With training, volunteer groups, such as Stream Teams, can assist with water quality monitoring. Related efforts, such as MDC's Resource Assessment and Monitoring (RAM) program, which will track aquatic biota and habitat trends statewide, should also be implemented in the basin.
- Serve in an advisory role to citizen organizations and local governments on water resource issues.

Objective I.2: Maintain base flows in streams within the watershed at or above current levels within the constraints imposed by natural seasonal variations and precipitation.

Guidelines

- Establish flow regimes that protect or enhance fish and other aquatic life.
- Cooperate in efforts to develop and implement a comprehensive water management plan for the Osage River basin impoundments, including Stockton Lake, that addresses both instream flows and reservoir elevation issues.
- Working with MDNR and USCOE, protect or enhance stream flows through oversight and enforcement of existing water withdrawal permits and other related permits.
- Support development of water law and an interstate compact/agreement that will address the quantity of water in Missouri's streams.
- Increase public awareness of and concern for water quantity problems, the affected aquatic biota, and potential solutions.

Goal II: Improve riparian and aquatic habitat conditions in the Sac River watershed to meet the needs of aquatic species while accommodating demands for water and agricultural production.

Objective II.1: Riparian landowners will understand the importance of good stream stewardship and where to obtain technical assistance for sound stream habitat improvement.

Guidelines

- Work with MDC's Outreach and Education and Private Lands divisions to develop and distribute stream management related materials and present related courses for elementary and secondary school teachers.
- Establish and maintain stream management demonstration sites.
- Promote good stream stewardship through landowner workshops and stream demonstration site tours.

Objective II.2: Maintain, expand, and restore riparian corridors; enhance watershed management; improve instream habitat; and reduce streambank erosion throughout the watershed.

Guidelines

- Periodically monitor and assess habitat and riparian area conditions on selected streams in the watershed.
- Ensure that all MDC areas are examples of good stream and watershed management. Utilize Stream Team volunteers to implement selected projects.
- Provide technical recommendations to all landowners that request assistance.
- Improve riparian corridor and watershed conditions by actively cooperating with other agencies on watershed-based projects.
- landowner stewardship of streams by promoting and implementing cost share programs, including MDC's watershed-based programs, that include streambank stabilization,

alternative watering provisions, and establishment and maintenance of quality riparian corridors.
- Identify gravel removal sites throughout the watershed and work with permitting agencies to implement appropriate conditions on these operations to minimize impacts on aquatic life.

Objective II.3: Critical and unique aquatic habitats will be identified and protected from degradation.

Guidelines

- Conduct additional fish and aquatic invertebrate population samplings to further define and delineate unique and critical habitats.
- Collect additional background information from the public and resource professionals to better define critical and unique aquatic habitats.
- Acquire, protect, and enhance critical and unique aquatic habitats.

Goal III: Maintain diverse and abundant populations of aquatic organisms while accommodating angler for quality fishing.

Objective III.1: Evaluate and maintain sportfish populations and maintain sufficient quality and condition of these populations to satisfy the angling public.

Guidelines

- Develop and implement a monitoring program to obtain trend data on sportfish populations and angler use of these populations in selected stream reaches.
- Identify critical habitat areas for sportfish species and maintain or enhance these areas as needed to improve habitat.
- Using regulations, habitat improvement, and other methods, continue implementation of population improvement programs for sportfish species.
- Increase angler awareness of the recreational potential of fishes such as catfish, buffalo, carp, drum, and gar.

Objective III.2: Maintain populations of native non-game fishes, including the Niangua darter, and aquatic invertebrates at or above present levels throughout the watershed.

Guidelines

- Develop standard sampling techniques for assessing fish and invertebrate communities, including the use of indicator species. Implement a monitoring program to track trends in species diversity and abundance.
- Maintain or enhance aquatic biodiversity and abundance using regulations, stocking, habitat improvement, and related techniques.
- Continue public awareness and habitat management efforts related to aquatic species of special concern. Consider additional possibilities for non-MDC funding for additional inventory work, continued public awareness efforts, and habitat management efforts.
- Protect and improve habitats that support populations of aquatic species of special concern by implementing MDC cost share programs and encouraging cost share practices

that protect and enhance streams, riparian areas, sinkholes, caves, and springs to be included on NRCS/SWCD dockets.
- Participate in species recovery efforts including interstate conferences and recovery team meetings.
- Conduct surveys in streams where there is a lack of data. In particular, Turkey Creek should be surveyed.

Goal IV: Improve the public's appreciation for stream resources and increase recreational use of streams in the Sac River watershed.

Objective IV.1: Access sites, bank fishing areas, and trails will be developed and maintained in sufficient numbers to accommodate public use.

Guidelines

- Conduct a recreational use survey within the watershed in conjunction with an angler survey to determine existing levels of use and satisfaction with recreational opportunities in the watershed.
- Acquire and develop appropriate public access and frontage sites.
- Improve bank fishing and other aquatic wildlife-based recreational opportunities on public lands.

Objective IV.2: Increase the general public's awareness of stream recreational opportunities, local stream resources, and good watershed and stream management practices.

Guidelines

- Working with MDC's Outreach and Education Division staff, highlight streams in aquatic education programs. Identify and develop stream locations appropriate for educational field trips near participating schools.
- Maintain a stream emphasis at public events such as the Ozark Empire Fair, Springfield Boat Show, etc.
- Assist in the development of articles, videos, etc. that highlight Sac River watershed recreational opportunities.
- Prepare an annual fishing prospectus for selected streams.
- Promote the formation of Stream Teams and Stream Team associations within the watershed.
- Distribute information through Stream Teams and related organizations, including the Watershed Committee of the Ozarks.

Angler Guide

Sac River Basin

Streams in the Sac River basin provide numerous fishing opportunities. All three species of black bass are present. Smallmouth bass can be found in most streams in the eastern 2/3 of the basin where good cover (rootwads and boulders) and current meet. Some of the better smallmouth bass habitat can be found in Turnback Creek, Little Sac River, and the Sac River above Stockton Lake. Largemouth bass are found throughout basin streams usually near rootwads and logjams and in backwater areas away from strong currents. Spotted (Kentucky) bass are also widely distributed in the basin, but tend to become more abundant near Stockton Lake. Soft plastic baits, spinnerbaits, crankbaits, live crayfish, and minnows are all effective on black bass.

Excellent opportunities are also available to catch rock bass (goggle-eye). Fishing small, floating crayfish colored crankbaits, plastic jigs, or live bait (crayfish and worms) around woody cover or large boulders in flowing water should provide the best results.

Catfish are common in the streams and rivers of the Sac River basin. They are more concentrated in the mainstem Sac River than elsewhere in the basin. To catch channel catfish, fish around snags in deeper holes using a variety of natural or prepared baits.

As a result of the construction of major impoundments, the basin supports several fish species not commonly found in most small streams. Carp, buffalo, white bass, drum, flathead catfish, and other species can be found in streams near Stockton Lake and Harry S. Truman Reservoir and provide excellent, seasonal fishing opportunities.

Numerous public access sites are available throughout the basin on both streams and impoundments.

Stockton Lake

Stockton Lake black bass surveys indicate that the black bass populations are thriving. Conditions favoring bass reproduction, bass angling success and good shad production suggest that black bass fishing will continue to be good. Largemouth bass is the dominant black bass species and is the species most often caught and harvested by anglers. Recent surveys have shown that good percentages of legal (> 15") largemouth bass are available to anglers. Spotted bass and smallmouth bass are also present, but comprise smaller percentages of the black bass population, and provide fewer legal-sized fish.

Angler survey information indicates that walleye angling has improved greatly since stockings began and after the reduction of the minimum length limit to 15" on March 1, 2000. Fall electrofishing surveys provide evidence that walleye stockings that began in 1998 have been successful. Walleye stockings are scheduled in even numbered years at a rate of 25 to 30 small fingerlings per acre. Jigging with natural bait in 15-25' of water during mid-summer is one of the preferred techniques for catching walleye.

Trolling bottom bouncers with natural bait and casting or trolling deep-running crankbaits can sometimes also be successful methods.

Crappie fishing is very popular on Stockton Lake. Both black and white crappie are present in the lake. Adequate crappie recruitment is a key to good crappie fishing in reservoirs, and Stockton is no exception. Limited recruitment in the late 1990s and early 2000s has resulted in a period of only fair crappie fishing.

As a general rule of thumb, a year of good recruitment is needed to provide crappie anglers with excellent fishing three years later. Best times to fish for crappie are during the spawning season in April and over brushpiles in late fall and winter. Jigs and minnows are the preferred baits.
The best white bass fishing occurs near, or in, Stockton's tributary streams from mid-March to the end of April. Anglers fishing the windy lake points in the fall can also expect successful white bass fishing trips. Crankbaits, spinner baits, buzz baits, and white jigs are good choices for catching white bass.
Both flathead catfish and channel catfish are present in the lake and, at times, provide good fishing, usually during the spawning season in June.
Bluegill should not be overlooked by Stockton anglers that enjoy pan fishing. Fishing pressure is light with good numbers of large fish available. Bluegill fishing is usually best during summer months using nightcrawlers or crickets in 12-20' of water.
Fifty fish habitat structures were constructed from shoreline trees and installed in 1994 and 1995. Trees have been added to some of these structures and additional structures have been constructed by Missouri Department of Conservation (MDC) personnel. The structures continue to provide good areas to catch fish. A map with locations can be accessed on MDC's Website.

Fellows Lake

Largemouth bass fishing should continue to be good. Data collected during recent spring sampling seasons indicate a good portion of the bass population is >15". Numbers of bass in the 12-15" protected slot length limit should remain good and will continue to provide excellent catch-and-release fishing.
Walleye can be caught fishing gravel points in the spring, the backs of coves in the summer using crappie jigs, nightcrawlers or minnows, and trolling deep-diving crankbaits across main lake points. The legal size limit for walleye is 15". Care taken during release will increase survival of sub-legal walleye.
Muskie fishing should be good. Most of the muskie fingerlings stocked during the fall of 1996 reached the legal length of 36" during 2000. Additional muskie fingerlings were stocked in 1999. Recent sampling revealed good muskie survival and growth. Muskie angling is best on cloudy days during the fall when cold fronts move through the area. Deep trolling may be effective during summer months. Fish bucktails or large plugs near structure and standing timber or aquatic vegetation. Muskie are occasionally caught as angler's fish for largemouth bass. Releasing muskie, both sub-legal and legal, at the water's edge will increase their chances for survival. Use needle-nose pliers to remove tackle from hooked muskie.
The channel catfish population has improved with increased numbers from 10-12". Preferred baits include chicken livers, nightcrawlers, and prepared baits.
Crappie anglers should expect fair fishing success. Although fishing success will be fair, most of the crappie caught will range from 7-9". Anglers still have an opportunity to catch quality (10-13") crappie, especially during the spring. Minnows and tube jigs are the preferred baits. During the summer, try crappie fishing around the coontail (aquatic vegetation) beds. Both white and black crappie are present.
Redear sunfish, a species often overlooked, commonly reach 10". Try earthworms or grubs over spawning beds during May or June.
Bluegill fishing is typically fair. Small pieces of worm and a bobber will still provide considerable fun for both young and old anglers alike.

Fish attractors, constructed from deciduous trees and installed in 1993, continue to provide good areas to catch fish. For a detailed map of their locations, contact the Missouri Department of Conservation in Springfield (417/895-6880).

Springfield City Utilities owns Fellows Lake and requires an annual boat permit. Boat motors are limited to 40 horsepower or less. A disabled accessible fishing dock is located on the northeast arm of the lake.

Information concerning fishing regulations is available in the Wildlife Code of Missouri or on MDC's

Table A-1. Stream information for third order and larger streams from the Sac River basin.

Stream	Max. Order	Receiving Stream	Total Miles
Bear Creek sub-basin			
Bear Creek	5	Sac River	37
Crabtree Branch	3	Bear Creek	5.7
Unnamed #053	3	Crabtree Branch	2.1
Unnamed #054	3	Bear Creek	2.3
Unnamed #055	3	Bear Creek	3.2
Spring Creek	4	Bear Creek	11.4
Jump Off Creek	3	Spring Creek	8
Campbell Branch	3	Spring Creek	4.4
Barren Creek	3	Bear Creek	8.7
Unnamed #056	3	Bear Creek	2
Brush Creek sub-basin			
Brush Creek	5	Sac River	23.3
Purcett Branch	3	Brush Creek	3.7
Price Branch	3	Brush Creek	5.2
Green Spring Branch	3	Brush Creek	5.3
Panther Creek	4	Brush Creek	11.6
Unnamed #032	3	Cannon Branch	1.8
Unnamed #033	3	Panther Creek	4.2
Rule Creek	3	Panther Creek	5.5
Unnamed #034	3	Brush Creek	3.2
Sadler Branch	3	Brush Creek	4.6
Unnamed #035	3	Brush Creek	2.3
South Fork	4	Brush Creek	7.4
Unnamed #036	3	South Fork	1
Unnamed #037	3	SouthFork	3.8
Unnamed #038	3	South Fork	1.6
Unnamed #039	3	Brush Creek	2.6
Cannon Branch	4	Brush Creek	3.6
Bishop Branch	3	Cannon Branch	2.6
Coon Creek sub-basin			
Coon Creek	5	Sac River	17.2
Buckhart Branch	4	Coon Creek	3
Unnamed #027	3	Buckhart Branch	1.9
Unnamed #028	3	Coon Creek	5.1
Unnamed #029	3	Coon Creek	2.6
Unnamed #030	3	Coon Creek	3.2
Unnamed #031	3	Coon Creek	3.3
Unnamed #014	3	Coon Creek	2.2
Cedar Creek sub-basin			
Cedar Creek	5	Sac River	51.3
Cave Branch	3	Cedar Creek	4

Stream	Max. Order	Receiving Stream	Total Miles
Camp Creek	3	Cedar Creek	5.6
Aves Creek	4	Cedar Creek	5.2
Unnamed #040	3	Aves Creek	1.3
Alder Creek	4	Cedar Creek	14.8
Little Alder Creek	3	Alder Creek	6.9
Unnamed #041	3	Alder Creek	1.6
Unnamed #042	3	Alder Creek	3.9
Unnamed #043	3	Alder Creek	2.1
Unnamed #044	3	Alder Creek	3.7
Unnamed #045	3	Cedar Creek	1.9
Unnamed #046	3	Cedar Creek	1.8
Unnamed #047	3	Cedar Creek	3.7
Horse Creek	5	Cedar Creek	72.4
Unnamed #048	3	Horse Creek	2.1
Cherry Branch	3	Horse Creek	4.5
Stinking Branch	3	Horse Creek	11.4
Unnamed #049	3	Horse Creek	3.3
Bear Creek #2	4	Horse Creek	9.8
Hall Branch	3	Bear Creek #2	2.5
Wilkey Creek	3	Horse Creek	6.8
Cynthia Creek	3	Horse Creek	6.3
Lacey Branch	3	Horse Creek	5.1
Unnamed #050	3	Horse Creek	2.9
Patton Branch	3	Horse Creek	9.5
Ring Branch	3	Horse Creek	4.8
Painter Branch	3	Horse Creek	3.4
Cold Branch	3	Horse Creek	4
Big George Branch	3	Horse Creek	5.7
Unnamed #016	3	Horse Creek	5.1
Unnamed #051	3	Horse Creek	2.1
Flood Branch	3	Cedar Creek	3.1
Polecat Creek	3	Cedar Creek	6.6
Snag Branch	3	Cedar Creek	10.2
English Branch	3	Cedar Creek	6.2
Teague Branch	3	Cedar Creek	6
Conner Branch	3	Cedar Creek	5.6
Goose Creek	3	Cedar Creek	6.2
Maybee Branch	3	Cedar Creek	4.3
Keller Branch	3	Cedar Creek	5
Chaney Branch	3	Horse Creek	6.25
Little Sac River sub-basin			
Little Sac River	5	Sac River	76.7
Price Branch	3	Little Sac River	7.5
Maze Creek	4	Little Sac Rver	14.3

Stream	Max. Order	Receiving Stream	Total Miles
Unnamed #057	3	Maze Creek	2.4
Carmack Branch	3	Maze Creek	4.1
Unnamed #058	3	Little Sac River	3.9
Big Branch	3	Little Sac River	4
Unnamed #059	3	Little Sac River	3
Turkey Creek	3	Little Sac River	14.4
Coffman Branch	3	Little Sac River	3.8
Walnut Creek	3	Little Sac River	7.7
Coates Branch	3	Little Sac River	6.1
Slagle Creek	3	Little Sac River	11.8
Unnamed #060	3	Slagle Creek	5.8
Unnamed #061	3	Little Sac River	5
Asher Creek	4	Little Sac River	14.9
Unnamed #062	4	Asher Creek	5
Unnamed #063	3	Unnamed #062	3.1
North Dry Sac River	4	Little Sac River	11.5
King Branch	3	North Dry Sac	6.6
Sims Branch	3	North Dry Sac	7.2
Flint Hill Branch	3	Little Sac River	7.7
Spring Branch	3	Little Sac River	4.8
South Dry Sac River	4	Little Sac River	12.4
Pea Ridge Creek	3	South Dry Sac	4.3
Unnamed #064	3	South Dry Sac	3.6
Sons Creek sub-basin			
Sons Creek	4	Sac River	28.8
Unnamed #065	3	Sons Creek	3
Greaser Creek	3	Sons Creek	6.7
Unnamed #066	3	Sons Creek	3.4
Wetzel Branch	3	Sons Creek	7
Gentry Branch	3	Cedar Creek	2.9
Lack Branch	3	Sons Creek	5.4
West Prong	3	Sons Creek	6
Lousy Branch	3	Sons Creek	4.9
Unnamed #067	3	Sons Creek	2.9
Turnback Creek sub-basin			
Turnback Creek	5	Sac River	46.4
Lynn Branch	3	Turnback Creek	6.7
Boggy Branch	3	Turnback Creek	4.5
Unnamed #068	3	Turnback Creek	2.9
Limestone Creek	4	Turnback Creek	16.1
Honey Creek	3	Limestone Creek	8.2
West Fork Limestone Creek	4	Limestone Creek	8.8
Glass Hollow Branch	3	West Limestone Creek	7.6
Unnamed #069	3	West Limestone Creek	1.9

Stream	Max. Order	Receiving Stream	Total Miles
Sinking Branch	4	Turnback Creek	14.5
Jordan Creek	3	Sinking Branch	5.5
Itson Branch	3	Turnback Creek	5.5
Cracker Neck Branch	3	Turnback Creek	7
Unnamed #070	3	Cracker Neck Branch	2.6
Sycamore Branch	4	Turnback Creek	7.5
Unnamed #071	3	Sycamore Branch	3.5
Eddington Branch	3	Turnback Creek	5.8
Unnamed #072	3	Turnback Creek	4.7
Billie's Creek	3	Turnback Creek	9.1
Johnson Creek	3	Turnback Creek	4.9
Goose Creek	4	Turnback Creek	11.5
Unnamed #073	3	Goose Creek	5.3
Chesapeake Branch	3	Goose Creek	6.9
Turkey Creek sub-basin			
Turkey Creek	4	Sac River	19.7
Little Turkey Creek	3	Turkey Creek	3.4
South Fork Turkey Creek	3	Turkey Creek	8.8
Sac River sub-basin			
Sac River	6	Osage River	130.8
Broyles Branch	4	Sac River	4.9
Unnamed #013	3	Broyles Branch	2.3
Unnamed #001	3	Sac River	4.4
Unnamed #002	3	Sac River	4.7
Happy Hollow	3	Sac River	3.3
Rattlesnake Branch	3	Sac River	4.9
Haynie Branch	3	Sac River	5.3
Moore / Allen	3	Sac River	5.7
Unnamed #003	3	Sac River	0.97
Unnamed #004	3	Sac River	2
Unnamed #005	3	Sac River	1.7
Unnamed #006	3	Sac River	3.3
Unnamed #007	3	Sac River	3.3
Unnamed #008	3	Sac River	2.1
Silver Creek	3	Sac River	5.2
Unnamed #052	3	Silver Creek	3
Alder Branch	3	Sac River	5
Stockton Branch	3	Sac River	7.9
Hawker Branch	3	Sac River	7
Googer Branch	3	Sac River	6.5
Mutton Creek	3	Sac River	5.1
Birch Branch	3	Sac River	4.2
Unnamed #009	3	Sac River	5.2
Cory Branch	3	Sac River	4.2

Stream	Max. Order	Receiving Stream	Total Miles
Cave Spring Branch	3	Sac River	8.1
Unnamed #010	3	Sac River	2.5
Lumley Branch	3	Sac River	6.6
Burney Branch	3	Sac River	5.7
Clear Creek	4	Sac River	20.9
Kelly Branch	3	Clear Creek	5.2
Unnamed #015	3	Clear Creek	4.7
Rainer Branch	3	Clear Creek	6.7
Unnamed #0 11	3	Sac River	3.7
Dry Branch	3	Sac River	7.9
Province Branch	4	Sac River	3.7
Unnamed #025	3	Province Branch	2.1
Sycamore Creek	3	Sac River	7.9
Unnamed #012	3	Sac River	2.7
Pickerel Branch	4	Sac River	13.2
Dry Branch	3	Pickerel Branch	7.5
Unnamed #074	3	Pickerel Branch	4.3
Pond Creek	3	Sac River	6.8

Table B-1. Known information on mines from the Sac River basin.

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
CONCO QUARRY & MILL	LIMESTONE CB	SURFACE	ACTIVE	40	0	30N 22W 31
GRAYSTONE QUARRY & MILL	LIMESTONE CB	SURFACE	ACTIVE	65	0	30N 22W 30
PLANT #1 MILL	LIMESTONE CB	SURF-UNDERG	ACTIVE	15	0	29N 21W 10
BADGER MINE	ZINC	UNDERGROUND	INACTIVE	1	230	29N 27W 27
BAYLISS LAND	IRON	PROSPECT	INACTIVE	0	0	28N 23W 16
BROWN QUARRY	LIMESTONE CB	SURFACE	INACTIVE	4	0	29N 22W 28
BULLWINKLE MINE; BASS MINE	LEAD	SURFACE	INACTIVE	0	0	31N 21W 35
CHOTEAU SHAFT	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35
CLARK SHAFT	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35
CLUTTER MINE	IRON - OXIDE	SURFACE	INACTIVE	0	0	30N 23W 23
DAISEY SHAFT	ZINC	UNDERGROUND	INACTIVE	0	112	29N 21W 35
DENTON QUARRY	LIMESTONE CB	SURFACE	INACTIVE	3	0	29N 22W 23
DIEMER SHAFT	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35
DOLING PARK QUARRY	LIMESTONE CB	SURFACE	INACTIVE	12	0	29N 22W 1
DUNCAN MINE	LEAD	SURFACE	INACTIVE	0	0	30N 24W 32
EDWARDS QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	29N 21W 6
ESLINGER MINE	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 27
EVERSOL SHAFT	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
GETTY MINE	LEAD	SURFACE	INACTIVE	0	0	30N 24W 33
HELM MINE	IRON	SURFACE	INACTIVE	0.13	0	29N 24W 26
HOLMAN QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0.5	0	30N 22W 34
JACKSON BANK	IRON	SURFACE	INACTIVE	8	0	28N 24W 11
JENNINGS BANK	IRON - LIM	SURFACE	INACTIVE	0	0	30N 23W 9
JOHN JACKSON MINE	IRON	SURFACE	INACTIVE	0	0	28N 24W 12
KELSO SHAFT	CLAY	UNDERGROUND	INACTIVE	0	0	30N 23W 20
LEWIS & BENZ SHAFT	ZINC	UNDERGROUND	EXP PROSPECT1	0	0	29N 21W 35
LEWIS & BENZ SHAFT	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
LOVETTE QUARRY	LIMESTONE CB	UNDERGROUND	INACTIVE	0	0	28N 24W 22
MARBLEHEAD QUARRY	LIMESTONE CB	SURF-UNDERG	INACTIVE	7	100	29N 22W 13
MEYERS SHAFT	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
MILL SHAFT; WOLVERINE MINE #5	ZINC	UNDERGROUND	INACTIVE	0.5	62	29N 21W 35
MISSING LINK MINE	ZINC			0.5	0	29N 21W 27
MUGEN QUARRY	LIMESTONE CB	SURFACE	INACTIVE	2	0	31N 24W 26
MURRAY MTNES	LEAD	SURFACE	INACTIVE	0	0	30N 24W 32
NINETEEN-FOURTEEN SHAFT; 1914 SHAFT	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35
NINETEEN-TWELVE SHAFT; 1912 SHAFT		UNDERGROUND	INACTIVE	0.5	110	29N 21W 35
NOBLE MINE	IRON - LIME	SURFACE	INACTIVE	0	0	29N 24W 1
PENNSYLVANIA COMPANY SHAFT	LEAD	UNDERGROUND	INACTIVE	0	0	30N 24W 28
PICKEREL DIGGINGS; PICKEREL MINE; PICKEREL CREEK	LEAD	SURFACE	INACTIVE	0	0	29N 24W 33
POLLACK MINE	IRON - LIME	SURFACE	INACTIVE	0	0	30N 23W 4
SANTA CLAUS SHAFT	ZINC	UNDERGROUND	INACTIVE	0	110	29N 21W 35
SNOWBALL SHAFT	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
STUDLEY MINE PIT #1	IRON	SURFACE	INACTIVE	0.13	0	28N 23W 4
STUDLEY MINE PIT #2	IRON	SURFACE	INACTIVE	0.13	0	28N 23W 4
THOMSON QUARRY		SURFACE	INACTIVE	0	0	29N 21W 2
TINDELL QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1	0	29N 22W 1
WELSH MINE	IRON	SURFACE	INACTIVE	0.02	15	29N 23W 6
WOLVERINE MINE; WOLVERINE MINE #4	ZINC	UNDERGROUND	INACTIVE	0.13	0	29N 21W 35
WOLVERINE SHAFT #1	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
WOLVERINE SHAFT #3	LEAD	UNDERGROUND	INACTIVE	0	0	29N 21W 26
WOLVERINE SHAFT #2	ZINC	UNDERGROUND	INACTIVE	0.13	0	29N 21W 35
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	28N 23W 5
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	28N 23W 8
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	28N 23W 9
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 23W 23
NOBLE MINE	IRON	SURFACE	INACTIVE	0	0	28N 24W 1
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	28N 24W 2
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	28N 24W 11
UNKNOWN	SANDSTONE CB	SURFACE	INACTIVE	0	0	28N 24W 23
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	28N 24W 24
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	16	0	29N 21W 29
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0.5	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0.13	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	EXP PROSPECT1	0.13	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	EXP PROSPECT1	0	0	29N 21W 35
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	SURF-UNDERG	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0.25	78	29N 21W 36
GARRETT QUARRY	LIMESTONE	SURFACE	INACTIVE	1	0	29N 22W 1
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	1	0	29N 22W 2
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	2	0	29N 22W 8
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	0	0	29N 22W 13
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	0	0	29N 22W 26
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	3	0	29N 22W 27
HORTON QUARRY	LIMESTONE	SURFACE	INACTIVE	3	0	29N 22W 27
WILLIAMS-SCHNEIDER QUARRY	LIMESTONE	SURFACE	INACTIVE	3	0	29N 22W 27
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	29N 23W 6
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	29N 23W 7
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	1	0	29N 23W 19
KIEWIT QUARRY #1	LIMESTONE CB	SURFACE	INACTIVE	2	0	29N 23W 20
KIEWIT QUARRY #2	LIMESTONE CB	SURFACE	INACTIVE	1.5	0	29N 23W 20
UNKNOWN	COPPER	SURFACE	INACTIVE	0	0	29N 24W 2
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	29N 24W 4
UNKNOWN	COPPER	SURFACE	INACTIVE	0	0	29N 24W 12
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	29N 24W 24
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	29N 24W 25
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	3	0	30N 22W 18
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	30N 22W 25
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	2.5	0	30N 22W 33
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	18	0	30N 22W 34
ARROW QUARRY	LIMESTONE CB	SURFACE	INACTIVE	18	0	30N 22W 35
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.5	0	30N 22W 35
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	30N 23W 4
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	30N 23W 5
UNKNOWN	LIMESTONE CB			2	0	30N 23W 21
ASH GROVE QUARRY #4	LIMESTONE CB	SURFACE	INACTIVE	7	0	30N 24W 3
BAKER QUARRY	LIMESTONE CB	SURFACE	INACTIVE			
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	1	0	30N 24W 17
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	31N 21W 35
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	46	0	30N 24W 20

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	30N 24W 21
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	30N 24W 29
UNKNOWN	LEAD	SURFACE	INACTIVE	0	0	31N 21W 32
UNKNOWN	LIMESTONE DM	SURFACE	INACTIVE	2	0	31N 24W 35
PLANT #1 MINE	LIMESTONE CB	SURF-UNDERG	ACTIVE	56	0	29N 21W 10
ASH GROVE QUARRY #3				0	0	30N 24W 19
GRIESEMER QUARRY #1; CHESAPEAKE QUARRY	LIMESTONE CB	SURFACE	INACTIVE	35	0	28N 25W 22
GRIESEMER PLANT #3	LIMESTONE CB	PROC PLANT	INACTIVE	0	0	28N 25W 22
NOYER PIT	SAND & GRAVEL	SURFACE	INACTIVE	0	0	28N 25W 4
UNKNOWN	SANDSTONE CB	SURFACE	INACTIVE	0	0	28N 26W 9
UNKNOWN	SANDSTONE CB	SURFACE	INACTIVE	0	0	29N 27W 13
UNKNOWN	SANDSTONE CB	SURFACE	INACTIVE	0.5	0	29N 27W 14
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	40	27N 25W 1
UNKNOWN	ZINC	SURFACE	INACTIVE	0	0	29N 25W 25
UNKNOWN	ZINC	UNDERGROUND	INACTIVE	0	0	28N 26W 8
UNKNOWN	LEAD	UNDERGROUND	INACTIVE	0	40	29N 26W 15
FINE QUARRY	LIMESTONE CB	SURFACE	INACTIVE	11	0	29N 25W 33
TRAGER QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 26W 30
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 26W 1
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 26W 1
MENEFEE QUARRY #1	LIMESTONE CB			0	0	28N 25W 34
GRIESEMER QUARRY #2	LIMESTONE CB	SURFACE	INACTIVE	4	0	28N 25W 33
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.5	0	
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	3	0	28N 25W 21
ROSE QUARRY #5	LIMESTONE CB	SURFACE	INACTIVE	1	0	28N 25W 16
ROSE QUARRY #4	LIMESTONE CB	SURFACE	INACTIVE	10	0	28N 25W 16
ROSE QUARRY #3	LIMESTONE CB	SURFACE	INACTIVE	13	0	28N 25W 12
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.38	0	28N 25W 2
ROSE QUARRY #2	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 25W 1
MASON QUARRY #2	LIMESTONE	SURFACE	INACTIVE	0.75	0	27N 25W 22
UNKNOWN	LIMESTONE	SURFACE	INACTIVE	0.5	0	27N 25W 3
UNKNOWN	LEAD	UNDERGROUND	INACTIVE	0.06	0	27N 25W 23
UNKNOWN	LEAD	UNDERGROUND	INACTIVE	0	0	27N 25W 6
SCOTT & PHELPS SHAFT; RED WASP MINE	LEAD	UNDERGROUND	INACTIVE	0.06	251	27N 25W 31
SIFFERMAN QUARRY	LIMESTONE CB	SURFACE	OTHER2	11.5	0	29N 25W 34
SULLIVAN QUARRY	LIMESTONE CB	SURFACE INACTIVE	INACTIVE	0.19	0	29N 26W 25

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
WILLIAMS MINE	COPPER	SURFACE	INACTIVE	0	0	29N 25W 2
UNKNOWN	BARIUM	UNDERGROUND	INACTIVE	0	40	28N 26W 28
UNKNOWN	CLAY - KAOLIN	UNDERGROUND	INACTIVE	0.13	35	28N 26W 21
UNKNOWN	CLAY	UNDERGROUND	INACTIVE	0	35	28N 26W 29
UNKNOWN	IRON	SURFACE	INACTIVE	0.13	0	28N 26W 5
SAMUEL PROSPECT	IRON	SURFACE EXP	EXP PROSPECT1	0	5	27N 25W 1
UNKNOWN	IRON	UNDERGROUND	EXP	0	40	27N 25W 1
UNKNOWN	IRON	LIM SURFACE	INACTIVE	0	7	27N 25W 7
UNKNOWN	IRON	UNDERGROUND	INACTIVE	0	40	27N 25W 1
UNKNOWN	LEAD	UNDERGROUND INACTIVE	INACTIVE	0	0	29N 25W 3
UNKNOWN	LEAD	UNDERGROUND EXP	INACTIVE	0	0	29N 26W 24
UNKNOWN	LEAD	SURFACE INACTIVE	EXP PROSPECT1	0	0	29N 25W 3
UNKNOWN	LEAD	UNDERGROUND	INACTIVE	0	30	28N 25W 33
UNKNOWN	LEAD	UNDERGROUND INACTIVE		0.06	90	28N 25W 32
ARROW MINE; SCOTT & PHELPS SHAFT	LEAD	UNDERGROUND INACTIVE		0.31	280	27N 25W 31
BRUMBACK QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0.25	0	28N 26W 30
GIBBS QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 26W 30
LAWRENCEB URG MINE	LEAD	UNDERGROUND	INACTIVE	0	120	29N 25W 3
MASON QUARRY #1	LIMESTONE CB	SURFACE	INACTIVE	0.75	0	27N 25W 22
NICHOLAS QUARRY	LIMESTONE CB	SURFACE INACTIVE	EXP	12	0	29N 26W 24
RED WASP MINE; ARROW MINE	LEAD	UNDERGROUND	INACTIVE	0.13	168	27N 25W 31
ROSE & SON QUARRY; ROSE QUARRY #1	LIMESTONE CB	SURFACE	INACTIVE	26	0	28N 25W 1
TAYLOR QUARRY & MILL	LIMESTONE CB	SURFACE	ACTIVE	23	0	32N 29W 23
UNKNOWN	COAL	SURFACE	INACTIVE	0	0	33N 29W 27
UNKNOWN	COAL	SURFACE	INACTIVE	10	0	33N 29W 26
UNKNOWN	COAL	SURFACE	INACTIVE	6	0	33N 29W 26
UNKNOWN	COAL	SURFACE	OTHER2	6	0	32N 29W 15
UNKNOWN	COAL	SURFACE	INACTIVE	1	0	32N 29W 14
VAN CRAW QUARRY	LIMESTONE CB	SURFACE	ACTIVE	17	0	34N 27W 25
BRASHER QUARRY	LIMESTONE CB	SURFACE	INACTIVE	5	0	34N 29W 25
C M SCHRODER STRIPPINGS	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	36N 27W 19
C A SCHRODER STRIPPINGS	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	36N 27W 19
CLEVELAND QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0.5	0	35N 27W 6
COX PIERCE & THOMAS DIGGINGS	LEAD	SURFACE	INACTIVE	0	0	33N 27W 12
DAVISSON STRIPPINGS	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	36N 27W 20

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
DON LLOYD QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1	0	34N 29W 25
GEORGE ANSON DRIFT	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	0	0	36N 28W 29
J R RILEY QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1	0	34N 26W 20
JEFFERSON TOWNSHIP QUARRY	LIMESTONE CB	SURFACE	INACTIVE	4	0	34N 26W 6
JOHNSON QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1	0	33N 28W 12
L GODFREY DRIFT	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	0	0	33N 29W 9
P M EDGE QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1	0	34N 26W 34
PRESTON QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	34N 26W 15
R T TAYLOR STRIP MINE	COAL - BITUMINOUS	SURFACE	INACTIVE	25	0	33N 29W 24
REYNOLDS STRIPPINGS	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	36N 27W 20
SELBY STRIPPINGS	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	36N 27W 20
WILLIAM GLUIT STRIP MINE	COAL - BITUMINOUS	SURFACE	INACTIVE	4	0	33N 29W 13
WILLIAM SMITH STRIP PIT	COAL - BITUMINOUS	SURF-UNDERG	INACTIVE	0	0	36N 27W 27
UNKNOWN	BARIUM	UNDERGROUND	INACTIVE	0	0	34N 27W 16
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	36N 27W 22
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	36N 27W 29
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0.5	0	36N 27W 22
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	36N 27W 22
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0.5	0	36N 27W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0.5	0	36N 27W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	5	0	36N 27W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	3	0	36N 27W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0.5	0	36N 27W 19
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	13	0	36N 27W 19
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	8	0	36N 27W 17
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0.5	0	36N 27W 16
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	36N 27W 16
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	6	0	36N 27W 16
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	35N 26W 24
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	35N 26W 14
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	40	0	35N 26W 13
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	35N 26W 13

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	35N 26W 13
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	7	0	33N 29W 13
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	3	0	33N 28W 15
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	8	0	33N 28W 9
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	33N 27W 17
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	4.5	0	33N 27W 6
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	33N 26W 2
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	1	0	33N 28W 8
UNKNOWN	MANGANESE	SURFACE	INACTIVE	0	0	33N 28W 20
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	1	0	34N 26W 10
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	12	0	34N 26W 22
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	27	0	34N 26W 23
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	35N 25W 17
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.25	0	35N 27W 6
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	11	0	35N 27W 13
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	35N 27W 13
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.5	0	36N 28W 16
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	1	0	36N 28W 19
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.25	0	36N 28W 19
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	36N 28W 29
ARNT MINE	IRON	SURFACE	INACTIVE	0	0	27N 24W 24
FRISCO MINE	IRON	SURFACE	INACTIVE	0	0	27N 24W 4
SMARTS DIGGINGS; ARNT DIGGINGS	IRON	SURFACE	INACTIVE	0	0	27N 24W 24
UPTEGRAF SHALE PIT	CLAY	SURFACE	INACTIVE	0	0	27N 24W 17
UNKNOWN	CLAY	SURFACE	INACTIVE	0	0	27N 24W 10
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	27N 24W 23
UNKNOWN	IRON	SURFACE	INACTIVE	0	0	27N 24W 15
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	28N 23W 32
ALLEN QUARRY #1	LIMESTONE CB	SURFACE	ACTIVE	12	0	30N 27W 3
ROSE LOCKWOOD QUARRY	LIMESTONE CB	SURFACE	ACTIVE	20	0	30N 27W 21
ALLEN PLANT	LIMESTONE CB	PROC PLANT	ACTIVE	0	0	30N 27W 3
ALLEN QUARRY #2 & MILL	LIMESTONE CB	SURFACE	INACTIVE	30	0	31N 27W 32
BROWNING SHAFT	LEAD	UNDERGROUND	INACTIVE	0	20	31N 25W 17
COMPTON MINE	IRON	SURFACE	INACTIVE	1	10	30N 25W 35

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
CORRY MINES	LEAD	SURF-UNDERG	INACTIVE	3	0	32N 25W 30
DEIGHTONS COAL BANK	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	32N 28W 5
EDMONDSON QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0.25	0	31N 25W 13
EPPERSONS BANK	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	32N 28W 28
FRED EVANS STRIP MINE	COAL - BITUMINOUS	SURFACE	INACTIVE	4	0	32N 28W 17
HOWARD SHAFT; NEW MINES	LEAD	UNDERGROUND	INACTIVE	0	0	31N 25W 17
LOGAN QUARRY; CARTHAGE STONE COMPANY QUARRY	LIMESTONE CB	SURFACE	INACTIVE	2	0	30N 27W 1
LONGWELL SHAFT	LEAD	UNDERGROUND	INACTIVE	0	0	31N 25W 17
MAMMEN QUARRY	LIMESTONE CB	SURFACE	INACTIVE	1.5	0	31N 28W 6
MCCLUCYS BANK	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	32N 28W 29
OLD MINES	LEAD	SURFACE	INACTIVE	0	0	32N 26W 25
PARKS QUARRY	LIMESTONE CB	SURFACE	INACTIVE	6	0	30N 25W 8
PEMBERTON MINES	LEAD	SURFACE	INACTIVE	0	0	32N 26W 36
ROWE COAL MINES #1	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	10	0	32N 28W 16
ROWE COAL MINE #2	COAL - BITUMINOUS	SURFACE	INACTIVE	36	0	32N 28W 17
ROWE COAL MINE #3	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	32N 28W 17
ROWE COAL MINE #4	COAL - BITUMINOUS	SURFACE	INACTIVE	15	0	32N 28W 21
ROWE COAL MINE #5	COAL - BITUMINOUS	SURFACE	INACTIVE	12	0	32N 28W 20
SHANNONS BANK	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	0	0	32N 28W 16
SONS CREEK QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	31N 27W 29
TYLER PIT #1	COAL - BITUMINOUS	SURFACE	INACTIVE	9	0	33N 28W 32
TYLER PIT #2	COAL - BITUMINOUS	SURFACE	INACTIVE	76	0	33N 28W 32
TYLER PIT #3	COAL - BITUMINOUS	SURFACE	INACTIVE	24	0	33N 28W 32
TYLER PIT #4	COAL - BITUMINOUS	SURFACE	INACTIVE	12	0	32N 28W 6
TYLER PIT #5	COAL - BITUMINOUS	SURFACE	INACTIVE	8	0	32N 28W 6
TYLER PIT #6	COAL - BITUMINOUS	SURFACE	INACTIVE	14	0	32N 28W 32
WALKER COAL BANK; WALKER PROSPECT	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	30N 25W 17
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	4	0	32N 28W 19
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	14	0	32N 28W 20

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	32N 28W 21
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	32N 28W 21
UNKNOWN	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	0.5	0	32N 28W 21
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	3	0	32N 28W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	8	0	32N 28W 20
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	7	0	32N 28W 22
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	2	0	32N 28W 28
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 28
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 28
UNKNOWN	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	2	3	32N 28W 28
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	18	0	32N 28W 28
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 29
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 29
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	1	0	32N 28W 29
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	6	0	32N 28W 29
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	4	0	31N 28W 7
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	5	0	31N 28W 17
UNKNOWN	COAL - BITUMINOUS	UNDERGROUND	INACTIVE	0.13	0	30N 25W 22
UNKNOWN	COAL - BITUMINOUS	SURFACE	INACTIVE	0	0	30N 25W 21
UNKNOWN	IRON - LIM	SURFACE	INACTIVE	0	0	30N 25W 11
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0.13	0	32N 26W 17
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	1	0	32N 27W 26
SOUTH GREENFIELD QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	30N 27W 1
BOLIVAR QUARRY		SURFACE	ACTIVE	13	0	34N 23W 29
FLETCHER QUARRY; FAIR PLAY QUARRY; MAAS QUARRY & MILL	LIMESTONE CB	SURFACE	ACTIVE	27	0	33N 24W 4
BOLIVAR QUARRY	LIMESTONE CB	PROC PLANT	ACTIVE	0	0	34N 23W 29
AKARD LAND	IRON	SURFACE	INACTIVE	0	0	33N 24W 5
BEAR CREEK QUARRY	LIMESTONE CB	SURFACE	INACTIVE	7	0	33N 24W 11
HENNEY MINE; HENNEY LAND	IRON	SURFACE	INACTIVE	0	0	32N 24W 35

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
VILAS QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	85	33N 23W 12
WISHART QUARRY	LIMESTONE CB	SURFACE	INACTIVE	0	0	32N 23W 14
UNKNOWN	CLAY	SURFACE	INACTIVE	0	0	32N 22W 8
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	4	0	34N 23W 5
MORGAN QUARRY	LIMESTONE CB	SURFACE	INACTIVE	12	0	32N 22W 21
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	34N 23W 16
WELTON QUARRY	LIMESTONE CB	SURFACE	INACTIVE	4	0	34N 23W 25
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	5	0	34N 24W 1
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	34N 24W 1
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	33N 23W 14
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	0	0	33N 24W 10
UNKNOWN		SURFACE	INACTIVE	0.13	0	32N 22W 16
UNKNOWN	COAL	SURFACE	INACTIVE	0	0	36N 27W 3
UNKNOWN	COAL	SURFACE	INACTIVE	0	0	36N 27W 9
UNKNOWN	COAL	SURFACE	INACTIVE	0	0	36N 27W 10
UNKNOWN	COAL	UNDERGROUND	INACTIVE	1.5	0	36N 28W 11
UNKNOWN	COAL	UNDERGROUND	INACTIVE	0.5	0	36N 28W 10
UNKNOWN	COAL	UNDERGROUND	INACTIVE	0.5	0	36N 28W 10
UNKNOWN	COAL	UNDERGROUND	INACTIVE	1.5	0	36N 28W 10
UNKNOWN	COAL	UNDERGROUND	INACTIVE	0.5	0	36N 28W 9
UNKNOWN	COAL	SURFACE	INACTIVE	2	0	36N 26W 4
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	3	0	36N 28W 8
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	13	0	36N 26W 12
UNKNOWN	LIMESTONE CB	SURFACE	INACTIVE	10	0	36N 28W 7
MONTEVALLO QUARRY #8	LIMESTONE CB	SURFACE	ACTIVE	32	0	34N 29W 6
MONTEVALLO LIMESTONE MILL #8	LIMESTONE CB	PROC PLANT	ACTIVE	0	0	34N 29W 6
UNKNOWN	COAL	SURFACE	INACTIVE	2	0	34N 29W 31
UNKNOWN	COAL	SURFACE	INACTIVE	0.5	0	34N 29W 7
UNKNOWN	COAL	SURFACE	INACTIVE	0.5	0	34N 29W 6
UNKNOWN	SAND & GRAVEL	SURFACE	INACTIVE	1	0	34N 29W 18
UNKNOWN	SAND & GRAVEL	SURFACE	INACTIVE	9	0	34N 29W 7
UNKNOWN	COAL	SURFACE	INACTIVE	0	0	34N 29W 9
UNKNOWN	MANGANESE		OCCURRENCE3	0	0	33N 28W 20
UNKNOWN	IRON - LIM		OCCURRENCE3	0	0	36N 28W 30
			INACTIVE	0	0	32N 29W 8
	COAL	SURFACE	INACTIVE	1	0	32N 29W 15
	LIMESTONE	SURFACE	INACTIVE	1	0	35N 27W 13
		SURFACE	INACTIVE	0	0	32N 26W 25
R T TAYLOR STRIP MINES	COAL	SURFACE	INACTIVE	25	0	33N 29W 25
	SAND & GRAVEL		ACTIVE	0	0	29N 22W 24
PHENIX QUARRY	LIMESTONE	SURFACE	ACTIVE	33	0	31N 24W 36

PROPERTY NAME	COMMODITY	TYPE OF MINE	STATUS	ACRES	DEPTH (ft)	TRS
BROOKLINE CAMP; POTTER SHAFT	ZINC - SULFIDE			0	0	28N 23W 2
	ZINC	UNDERGROUND	INACTIVE	0	0	29N 21W 36
SUFFOLK SHAFT	ZINC	UNDERGROUND	INACTIVE	0.13	0	29N 21W 36
ASH GROVE MINES TAYLOR SHAFT	LEAD	UNDERGROUND	INACTIVE	0	75	29N 24W 6
PICKERAL CREEK DIGGINGS	LEAD		INACTIVE	0	0	29N 24W 34
PA CO SHAFT; CORAM DIGGINGS	LEAD		INACTIVE	0	0	30N 24W 28
CHESAPEAKE QUARRY	LIMESTONE		ACTIVE	0	0	28N 25W 22
	SAND & GRAVEL		ACTIVE	0	0	28N 26W 30
ASH GROVE MINES DUNLOP SHAFT	LEAD	UNDERGROUND	INACTIVE	0	135	29N 24W 6
J K P DUNCAN'S LAND	LEAD		INACTIVE	0	0	30N 24W 32
MURRAY MINE	LEAD		INACTIVE	0	0	30N 24W 32
GETTY DIGGINGS	LEAD		INACTIVE	0	0	30N 24W 33
OLD SILICATE & DEPUTER DIGGINGS	ZINC - SULFIDE			0	0	28N 23W 2+A1:G360

1 = EXP PROSPECT means the site was never anything more than an exploration prospect.
2 = OCCURRENCE means a known mineral occurrence was probably never mined.
3 = OTHER means mining activity went on at the site, but it is unknown if it was a mine, mill, etc.
Source: MDNR, personal communication.

Table C-1. Fish sample sites and dates from the Sac River basin.

Loc.	1998-1999	Stream Name	Location	Years Sampled
180	RAH 99-3	Coon Creek	37N 25W 18	40, 75, 76, 99
186		Brush Creek	36N 25W 17	75, 76, 83, 95
179		Brush Creek	36N 25W 34	76, 95
1984		Cannon Branch	36N 25W 17	82, 95
219		Panther Creek	36N 24W 31	40, 95
172	RAH 99-2	Bear Creek	34N 25W 10	75, 76, 99
1892		Bear Creek	34N 25W 36	79
53		Bear Creek	33N 24W 09	40, 66, 75, 76, 96
????		Bear Creek	34N 25W 36	91
????		Bear Creek	34N 25N 22	91
????		Bear Creek	34N 25W 10	91
177	RAH 99-9	Cedar Creek	35N 27W 02	76, 99
178	(dry ditch)	Unnamed	36N 28W 25	76
216	RAH 99-1	Cedar Creek	34N 27W 03	40, 99
176		Cedar Creek	34N 27W 20	75, 76, 96
249		Cedar Creek	32N 28W 15	77, 96
217	RAH 99-11	Horse Creek	35N 27W 32	40, 99
51	RAH 99-10	Horse Creek	34N 28W 02	66, 99
175		Horse Creek	34N 28W 17	75, 96
174		Horse Creek	33N 29W 29	75
248		Horse Creek	31N 28W 09	77
218	RAH 99-7	Sac River	36N 26W 12	42, 99
173	RAH 99-8	Sac River	36N 26W 21	76, 99
52	RAH 99-6	Sac River	35N 26W 16	64, 76, 99
57	RAH 99-5	Sac River	34N 26W 04	42, 47, 51, 99
215	RAH 99-4	Sac River	34N 26W 11	40, 99
207		Sac River	32N 26W 10	42
206		Sac River	31Z 25W 09	40
1956		Sac River	31N 25W 14	81
211		Sac River	30N 24W 18	42
1955	SAC 0498	Sac River	30N 24W 19	81, 98
166		Sac River	29N 24W 06	75, 76, 77
208	SAC 0398	Sac River	29N 24W 08	40, 98
165	SAC 0298	Sac River	29N 24W 14	40, 76, 98
54		Little Sac River	33N 25W 07	66
214		Little Sac River	33N 25W 22	40, 42
212		Little Sac River	33N 24W 33	40
1957	SAC 0898	Little Sac River	32N 23W 33	81, 98
209	SAC 1498	Little Sac River	30N 22W 26	40, 98
210	SAC 0598	Little Sac River	30N 22W 19	42, 98
169		Little Sac River	30N 21W 16	75-77, 95
171	SAC 1798	Maze Creek	32N 25W 09	76, 98

Loc.	1998-1999	Stream Name	Location	Years Sampled
????		Maze Creek	32N 25W 05	91
170	SAC 0798	North Dry Sac River	31N 22W 09	40, 75, 98
163		Sons Creek	31N 27W 04	75, 96, 98
162	SAC 1098	Sons Creek	31N 27W 16	75, 98
56	SAC 1598	Turnback Creek	31N 26W 15	40, 42, 60,98
160		Turnback Creek	30N 26W 22	75,77,96
159	SAC 1298	Turnback Creek	29N 25W 29	37, 76, 98
161	SAC 0998	Limestone Creek	30N 26W 06	40, 75, 76, 98
205	SAC 1398	Johnson Creek	29N 25W 29	30, 98
168		Clear Creek	30N 23W 19	40, 75, 77
167		Sycamore Creek	29N 24W 06	75, 76, 77
164		Pickerel Creek	29N 24W 16	75, 76
55	SAC 1698	Lynn Branch	31N 26W 14	60,98
250	SAC 0198	Unnamed 2nd order	28N 24W 03	76, 98
2980	SAC 0698	South Dry Sac River	30N 22W 35	98
157	SAC 1198	Goose Creek	28N 25W 10	75, 76, 98
158		Goose Creek	29N 25W 32	76

*Location are impounded by Stockton Lake

Table C-100. Fish sampled in Sycamore Creek 1 mile upstream of its confluence with the Sac River by kick and drag seining, June 28, 1995. Location: 0167, UTM X - 447200 UTM Y - 4122700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semoltilus atromaculatus*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-101. Fish sampled in Pickerel Creek 1 mile upstream of its confluence with Sac River by drag seining (October 23, 1975) and kick seining (April 9, 1976). Location:0164, UTM X - 451100 UTM Y - 4119400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semoltilus atromaculatus*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-102. Fish sampled in Lynn Branch 1 mile upstream of its confluence with Turnback Creek by kick and drag seining, June 4, 1960. Location: 0055, UTM X - 432900 UTM Y - 4141800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Ozark Minnow	*Notropis nubilis*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-103. Fish sampled in Lynn Branch 1 mile upstream of its confluence with Turnback Creek by drag and kick seining, August 11, 1998. Location: 0055, UTM X - 432900 UTM Y - 4141800 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Bleeding Shiner	*Luxilus zonatus*
Creek Chub	*Semotilus atromaculatus*
Golden Redhorse	*Moxostoma erythrurum*
Yellow Bullhead	*Ameiurus natalis*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus carolinae*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare*
Orangethroat Darter	*Etheostoma spectabile*
Logperch	*Percina caprodes*

Table C-104. Fish sampled in unnamed tributary of Pickerling Creek, by drag and kick seining, February 23, 1977. Location:0250, UTM X - 451800 UTM Y - 4113700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Fathead Minnow	*Pimephales promelas*
Creek Chub	*Semotilus atromaculatus*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-105. Fish sampled in an unnamed tributary of Pickerling Creek, by drag and kick seining, July 8, 1998. Location: 0250, UTM X - 451800 UTM Y - 4113700 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Creek Chub	*Semotilus atromaculatus*
Orangethroat Darter	*Etheostoma spectabile*

Table C-106. Fish sampled in Unnamed Creek 1 miles upstream of its confluence with the Sac River by kick and drag seining, June 28, 1995. Location: 0250, UTM X - 451800 UTM Y - 4113700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Black Bullhead	*Ameirus melas*
Green Sunfish	*Lepomis cyanellus*
Orangethroat Darter	*Etheostoma spectabile*

Table C-107. Fish sampled in the South Dry Sac/Little Sac River near their confluence by drag and kick seining, July 16, 1998. Location: 2980, UTM X - 471220 UTM Y - 4126380 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-108. Fish sampled in Goose Creek 1 mile upstream of its confluence with the Turnback Creek by visual observation, April 15, 1976. Location: 0158, UTM X - 439400 UTM Y - 4115300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-109. Fish sampled in Goose Creek 3 miles upstream of its confluence with the Turnback Creek by visual observation, April 16, 1976. Location: 0157, UTM X - 441500 UTM Y - 4112300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Common Carp	*Cyprinus carpio*
Northern Hogsucker	*Hypentelium nigricans*

Table C-110. Fish sampled in Goose Creek 3 miles upstream of its confluence with Turnback Creek by drag and kick seining, July 29, 1998. Location: 0157, UTM X - 441500 UTM Y - 4112300 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceus*
Mottled Sculpin	*Cottus bairdi*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

[1] - A = collected prior to 1943,
B = collected between 1943 to 1966,
C = collected between 1967 and 1983,
D = collected 1984 and 2000.

Table C-2 Fish collected in the Sac River basin by time period.

Common Name	Scientific Name	Period[1]
Chestnut lamprey	*Ichthyomyzon castaneus*	B
Southern brook lamprey	*Ichthyomyzon gagei*	C
Paddlefish	*Polyodon spathula*	D
Longnose gar	*Lepisosteus osseus*	A, B, C
Shortnose gar	*Lepisosteus platostomus*	B, D
Mooneye	*Hiodon tergisus*	B
Gizzard shad	*Dorosoma cepedianum*	B, C, D
Largescale stoneroller	*Campostoma oligolepis*	A, B, C, D
Central stoneroller	*Campostoma pullum*	A, B, C, D
Stoneroller sp.	*Campostoma sp.*	D
Red shiner	*Cyprinella lutrensis*	A, B, C, D
Blacktail shiner	*Cyprinella venusta*	D
Common carp	*Cyprinus carpio*	B, C, D
Gravel chub	*Erimystax x-punctatus*	A, B, C
Striped shiner	*Luxilus chrysocephalus*	A, B, C, D
Bleeding shiner	*Luxilus zonatus*	A, B, C, D
Redfin shiner	*Lythrurus umbratilis*	A, B, C, D
Hornyhead chub	*Nocomis biguttatus*	A, B, C, D
Golden shiner	*Notemigonus crysoleucas*	C, D
Emerald shiner	*Notropis athernoides*	C, D
Ghost shiner	*Notropis buchanani*	A, B
Blacknose shiner	*Notropis heterolepis*	C
Sand shiner	*Notropis ludibundus*	A, B, C, D
Ozark minnow	*Notropis nubilus*	A, B, C, D
Roseyface shiner	*Notropis rubellus*	A, B, C, D
Suckermouth minnow	*Phenacobius mirabilis*	A, B, C
Southern redbelly dace	*Phoxinus erythrogaster*	A, B, C, D
Bluntnose minnow	*Pimephales notatus*	A, B, C, D
Fathead minnow	*Pimephales promelas*	B, D
Creek chub	*Semotilus atromaculatus*	A, C, D
River carpsucker	*Carpiodes carpio*	B, D
Quillback	*Crapiodes cyprinus*	D
White sucker	*Catostomus commersoni*	A, B, C, D
Northern hogsucker	*Hypentelium nigricans*	A, B, C, D
Smallmouth buffalo	*Ictiobus bubalus*	B, D
Black buffalo	*Ictiobus niger*	B, D
Spotted sucker	*Minytrema melanops*	C
Silver redhorse	*Moxostoma anisurum*	A, B, C, D
River redhorse	*Moxostoma carinatum*	A, B, C
Black redhorse	*Moxostoma duquesnei*	A, B, C, D
Golden redhorse	*Moxostoma erythrurum*	A, B, C, D
Shorthead redhorse	*Moxostoma macrolepidotum*	B, C, D

Common Name	Scientific Name	Period[1]
Redhorse sp.	*Moxostoma sp.*	D
Black bullhead	*Ameiurus melas*	A, B, C, D
Yellow bullhead	*Ameiurus natalis*	A, B, C, D
Channel catfish	*Ictalurus punctatus*	A, B, D
Flathead Catfish	*Pylodictis olivaris*	A, B, D
Slender madtom	*Noturus exilis*	A, B, C, D
Stonecat	*Noturus flavus*	A, B, C, D
Freckled madtom	*Noturus nocturnus*	A, C, D
Northern studfish	*Fundulus catenatus*	C, D
Blackstripe topminnow	*Fundulus notatus*	C, D
Blackspotted topminnow	*Fundulus olivaceus*	A, B, C, D
Western mosquitofish	*Gambusia affinis*	C, D
Brook silverside	*Labidesthes sicculus*	A, B, C, D
Mottled sculpin	*Cottus bairdi*	D
Banded sculpin	*Cottus carolinae*	A, B, C, D
Ozark sculpin	*Cottus hypselurus*	A, B, C, D
White bass	*Morone chrysops*	D
Ozark bass	*Ambloplites constellatus*	A, C
Green sunfish	*Lepomis cyanellus*	A, B, C, D
Warmouth	*Lepomis gulosus*	C, D
Orangespotted sunfish	*Lepomis humilis*	A, B, C
Bluegill	*Lepomis macrochirus*	A, B, C, D
Longear sunfish	*Lepomis megalotis*	A, B, C, D
Smallmouth bass	*Micropterus dolomieu*	A, B, C, D
Spotted bass	*Micropterus punctulatus*	A, B, C, D
Largemouth bass	*Micropterus salmoides*	A, B, C, D
White crappie	*Pomoxis annularis*	A, B, C, D
Black Crappie	*Pomoxis nigromaculatus*	A, B, C, D
Greenside darter	*Etheostoma blennioides*	A, B, C, D
Rainbow darter	*Etheostoma caeruleum*	A, B, C, D
Fantail darter	*Etheostoma flabellare*	A, B, C, D
Least Darter	*Etheostoma microperca*	C
Niangua darter	*Etheostoma nianguae*	C, D
Johnny darter	*Etheostoma nigrum*	A, B, C, D
Stippled darter	*Etheostoma punctulatum*	A, C, D
Orangethroat darter	*Etheostoma spectabile*	A, B, C, D
Missouri saddled darter	*Etheostoma tetrazonum*	A, B, C, D
Banded darter	*Etheostoma zonale*	A, B, C, D
Logperch	*Percina caprodes*	A, B, C, D
Bluestripe darter	*Percina cymatotaenia*	B
Gilt Darter	*Percina evides*	B
Slenderhead darter	*Percina phoxocephala*	A, B, C, D
Walleye	*Stizostedion vitreum*	D
Freshwater Drum	*Aplodinotus grunniens*	B, D

[1] - A = collected prior to 1943,
B = collected between 1943 to 1966,
C = collected between 1967 and 1983,
D = collected 1984 and 2000.

Table C-3. Fish sampled in Coon Creek 1 mile upstream of its confluence with the Sac River, June 30, 1940. Location: 0180, UTM X - 436500 UTM Y - 4201800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus u. umbratilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Johnny Darter	*Etheostoma nigrum*
Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-4. Fish sampled in Coon Creek 1 miles upstream of its confluence with the Sac River by fall drag seining (October 20, 1975) and spring kick seining (April 14, 1976). Location: 0180, UTM X - 436500 UTM Y - 4201800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-5. Fish sampled in Coon Creek 1 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, June 16, 1999. Location: 0180, UTM X - 436500 UTM Y - 4202000 (MDC Fisheries database, Columbia, MO).

Common Name	Scientific Name
Paddlefish	*Polyodon spathula*
Shortnose Gar	*Lepisosteus platostomus*
Gizzard Shad	*Dorosoma cepedianum*
River Carpsucker	*Carpoides carpio*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Sand Shiner	*Notropis ludibundus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Creek Chub	*Semotilus atromaculatus*
Common Carp	*Cyprinus Carpio*
Smallmouth Buffalo	*Ictiobus bubalus*
Bigmouth Buffalo	*Ictiobus cyprinellus*
White Sucker	*Catostomus commersoni*
Silver Redhorse	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Channel Catfish	*Ictalurus punctatus*
Slender madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
White Bass	*Morone Chrysops*
Green Sunfish	*Lepomis cyanellus*
Warmouth	*Lepomis gulosus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Freshwater Drum	*Aplodinotus Grunniens*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-6. Fish sampled in Brush Creek 3 miles upstream of its confluence with the Sac River by drag seining (October 21, 1975), kick seining (July 1, 1975 and April 15, 1976), and electrofishing (January 13, 1983). Location: 0186, UTM X - 436900 UTM Y - 4192000 (MDC Fisheries database, Columbia, MO).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Sand Shiner	*Notropis ludibundus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Black Bullhead	*Amieurus melas*
Yellow Bullhead	*Amieurus natalis*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Ozark Bass	*Ambloplites constellatus*
Green Sunfish	*Lepomis cyanellus*
Warmouth	*Lepomis gulosus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Niangua Darter	*Etheostoma nianguae*

Common Name	Scientific Name
Johnny Darter	Etheostoma nigrum
Stippled Darter	Etheostoma punctulatum
Northern Orangethroat Darter	Etheostoma spectabile spectabile
Banded Darter	Etheostoma zonale
Ozark Logperch	Percina caprodes fulvitaenia

Table C-7. Fish sampled in Brush Creek 8 miles upstream of its confluence with the Sac River by drag seining (June 3, 1976) and kick seining (April 15, 1976). Location: 0179, UTM X - 440700 UTM Y - 4187500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Southern Brook Lamprey	*Ichthyomyzon gagei*
Longnose Gar	*Lepisosteus osseus*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Blacknose Shiner	*Notropis heterolepis*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Minnow Hybrid	*Notropis hybrid*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Niangua Darter	*Etheostoma nianguae*
Johnny Darter	*Etheostoma nigrum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-8. Fish sampled in Cannon Branch, 1 mile upstream of its confluence with Brush Creek on August 2, 1982 by kick and drag seining. Location: 1984, UTM X - 437100 UTM Y - 4191900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Golden Shiner	*Notemigonus chrysoleucas*
Ozark Minnow	*Notropis nubilis*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Black Bullhead	*Amieurus melas*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-9. Fish sampled in Panther Creek 1 mile upstream of its confluence with the Sac River on June 30, 1940 by seining. Location: 0219, UTM X - 445600 UTM Y - 4188200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-10. Fish sampled in Bear Creek 9 miles upstream of its confluence with the Sac River by drag seining (October 21, 1975) and kick seining (October 14, 1976). Location: 0172, UTM X - 442400 UTM Y - 4172200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis buguttatus*
Sand Shiner	*Notropis ludibundus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Slender Madtom	*Noturus exilis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-12. Fish sampled in Bear Creek 9 miles upstream of its confluence with the Sac River by kick and drag seining on July 14, 1999. Location: 0172, UTM X - 442400 UTM Y - 4172400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Stoneroller	*Campostoma sp.*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Ozark Minnow	*Notropis nubilus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hog Sucker	*Hypentelium Nigracans*
White Sucker	*Catostomus commersoni*
Black Redhorse	*Moxostoma duquesnei*
Redhorse sp.	*Moxostoma sp.*
Slender madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Blackspotted Topminnow	*Fundulus olivaceous*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Johnny Darter	*Etheostoma nigrum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-13. Fish sampled in Bear Creek 17 miles upstream of its confluence with the Sac River by seining, July 10, 1979. Location: 1892, UTM X - 445600 UTM Y - 4164800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Niangua Darter	*Etheostoma nianguae*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-14. Fish sampled in Bear Creek 20 miles upstream of its confluence with the Sac River by seining, July 1, 1940. Location: 0053, UTM X - 450300 UTM Y - 4162400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Minnow Hybrid	*Notropis hybrid*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Yellow Bullhead	*Ameiurus natalis*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Stippled Darter	*Etheostoma punctulatum*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-15. Fish sampled in Bear Creek 20 miles upstream of its confluence with the Sac River by kick and drag seining, April 3, 1966. Location: 0053, UTM X - 450300 UTM Y - 4162400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
White Sucker	*Catostomus commersoni*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-16. Fish sampled in Bear Creek 20 miles upstream of its confluence with the Sac River by kick seining (June 26, 1975) and drag seining (October 7, 1976). Location: 0053, UTM X - 450300 UTM Y - 4162400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Golden Shiner	*Notemigonus chrysoleucas*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-17. Fish sampled in Bear Creek 20 miles upstream of its confluence with the Sac River by kick and drag seining, July 30, 1996. Location: 0053, UTM X - 450300 UTM Y - 4162400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Bluntnose Minnow	*Pimephales notatus*
Ozark Minnow	*Notropis nubilus*
Creek Chub	*Semoltilus atromaculatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
White Sucker	*Catostomus commersoni*
Northern Hog Sucker	*Hypentelium Nigracans*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Banded Sculpin	*Cottus Carolinae*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-18. Fish sampled in Bear Creek 17 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, September 12, 1991. Location: 1892, UTM X - 445600 UTM Y - 4164800.

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Bluntnose Minnow	*Pimephales notatus*
Ozark Minnow	*Notropis nubilus*
Northern Hog Sucker	*Hypentelium Nigracans*
Black Redhorse	*Moxostoma duquesnei*
Western Mosquitofish	*Gambusia affiinis*
Brook Silverside	*Labidesthes sicculus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Bluegill	*Lepomis macrochirus*
Slender Madtom	*Moturus exilis*
Greenside Darter	*Etheostoma blennoides*
Niangua Darter	*Etheostoma nianguae*
Orangethroat Darter	*Etheostoma spectabile*

Table C-19. Fish sampled in Bear Creek 12.5 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, September 11, 1991. Location: ????, UTM X - 442700 UTM Y - 4168960.

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Bleeding Shiner	*Luxilus zonatus*
Bluntnose Minnow	*Pimephales notatus*
Ozark Minnow	*Notropis nubilus*
Creek Chub	*Semoltilus atromaculatus*
Northern Hog Sucker	*Hypentelium Nigracans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erthrurum*
Western Mosquitofish	*Gambusia affiinis*
Brook Silverside	*Labidesthes sicculus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Green Sunfish	*Lepomis cyanellus*
Smallmouth Bass	*Micropterus dolomieui*
Longear Sunfish	*Lepomis megalotis*
Bluegill	*Lepomis macrochirus*
Greenside Darter	*Etheostoma blennoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-20. Fish sampled in Bear Creek 9 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, September 11, 1991. Location: 0172, UTM X - 442400 UTM Y - 4172200.

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Bleeding Shiner	*Luxilus zonatus*
Bluntnose Minnow	*Pimephales notatus*
Ozark Minnow	*Notropis nubilus*
Creek Chub	*Semoltilus atromaculatus*
Northern Hog Sucker	*Hypentelium Nigracans*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affiinis*
Brook Silverside	*Labidesthes sicculus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Smallmouth Bass	*Micropterus dolomieui*
Longear Sunfish	*Lepomis megalotis*
Bluegill	*Lepomis macrochirus*
Banded Sculpin	*Cottus Carolinae*
Greenside Darter	*Etheostoma blennoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

Table C-21. Fish sampled in an Unnamed Creek in Cedar County that is part of the Sac River basin by kick and drag seining, September 10, 1976. Location: 0178, UTM X - 415400 UTM Y - 4190500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Green Sunfish	*Lepomis cyanellus*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-22. Fish sampled in Cedar Creek 6 miles upstream of its confluence with the Sac River by kick and drag seining (September 23, 1976), and kick seining (October 13, 1976). Location: 0177, UTM X - 423000 UTM Y - 4187600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Longnose Gar	*Lepisosteus osseus*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Golden Shiner	*Notemigonus chrysoleucas*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
River Redhorse	*Moxostoma carinatum*
Yellow Bullhead	*Amieurus natalis*
Slender Madtom	*Noturus exilis*
Freckled Madtom	*Noturus nocturnus*
Blackstripe Topminnow	*Fundulus notatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-23. Fish sampled in Cedar Creek 6 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, August 27, 1999. Location: 0177, UTM X - 423000 UTM Y - 4187800 (MDC Fisheries database, Columbia, Mo).11

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedanum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Bleeding Shiner	*Luxilus zonatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Quiailback	*Carpoides cyprinus*
Northern Hog Sucker	*Hypentelium Nigracans*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Redhorse so.	*Moxostoma sp.*
Channel Catfish	*Ictalurus punctatus*
Flathead Catfish	*Pylodictis olivaris*
Stonecat	*Noturus flavus*
Freckled Madtom	*Noturus nocturnus*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Freshwater Drum	*Aplodinotus grunniens*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Etheostoma Blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Dater	*Etheostoma zonale*
Slenderhead Darter	*Percina Phoxocephala*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-25. Fish sampled in Cedar Creek 23 miles upstream of its confluence with the Sac River by kick and drag seining, July 14, 1999. Location: 0216, UTM X - 422500 UTM Y - 4176200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Stoneroller	*Campostoma sp.*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chryspcephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Silver Redhorse	*Moxostoma anisurum*
Slender Madtom	*Noturus exilis*
Ozark Sculpin	*Cottus carolinae*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-26. Fish sampled in Cedar Creek 30 miles upstream of its confluence with the Sac River by drag seining (October 22, 1975) and kick seining (October 13, 1976). Location: 0176, UTM X - 419900 UTM Y - 4169900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Minnow Hybrid	*Notropis hybrid*
Northern Hogsucker	*Hypentelium nigricans*
Spotted Sucker	*Minytrema melanops*
Silver Redhorse	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Slender Madtom	*Noturus exilis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-27. Fish sampled in Cedar Creek 30 miles upstream of its confluence with the Sac River by kick and drag seining, August 13, 1996. Location: 0176, UTM X - 419900 UTM Y - 4169900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Freshwater Drum	*Aplodinotus grunniens*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Redfin Shiner	*Lythrurus umbratilus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semoltilus atromaculatus*
Spotted Sucker	*Minytrema melanops*
Silver Redhorse	*Moxostoma anisurum*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus Salmoides*
Greenside Darter	*Etheostoma blennoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Orangethroat Darter	*Etheostoma spectabile*
Ozark Logperch	*Percina caprodes*
Slenderhead Darter	*Percina Phoxocephala*

Table C-28. Fish sampled in Cedar Creek 47 miles upstream of its confluence with the Sac River by kick and drag seining, March 15, 1977. Location: 0249, UTM X - 412600 UTM Y - 4153000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Golden Shiner	*Notemigonus chrysoleucas*
Blacknose Shiner	*Notropis heterolepis*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-29. Fish sampled in Cedar Creek 47 miles upstream of its confluence with the Sac River by kick and drag seining, August 14, 1996. Location: 0249, UTM X - 412600 UTM Y - 4153000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Redfin Shiner	*Lythrurus umbratilus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semoltilus atromaculatus*
White Sucker	*Catostomus commersoni*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Orangethroat Darter	*Etheostoma spectabile*
Ozark Logperch	*Percina caprodes*

Table C-30. Fish sampled in Horse Creek 9 miles upstream of its confluence with Cedar Creek by seining, July 2, 1940. Location: 0217, UTM X - 417300 UTM Y - 4178800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Golden Redhorse	*Moxostoma erythrurum*
Stonecat	*Noturus flavus*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

Table C-31. Fish sampled in Horse Creek 9 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, August 31, 1999. Location: 0217, UTM X - 417300 UTM Y - 4179000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedanum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Striped Shiner	*Luxilus chrysopcephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Shiner	*Nocomis biguttatus*
Ozark Shiner	*Notropis nubilus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Golden Redhorse	*Moxostoma erythrurum*
Redhorse sp.	*Moxostoma sp.*
Yellow Bullhead	*Amerius natalis*
Slender Madtom	*Noturus exilis*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Freshwater Drum	*Aplodinotus grunniens*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma Blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Banded Dater	*Etheostoma zonale*

Table C-32. Fish sampled in Horse Creek 13 miles upstream of its confluence with Cedar Creek by kick and drag seining, April 3, 1966. Location: 0051, UTM X - 414600 UTM Y - 4176200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Brook Silverside	*Labidesthes sicculus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-33. Fish sampled in Horse Creek 13 miles upstream of its confluence with the Sac River by kick and drag seining and electrofishing, August 27, 1999. Location: 0051, UTM X - 414600 UTM Y - 4176400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedanum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Quiailback	*Carpoides cyprinus*
Northern Hog Sucker	*Hypentelium Nigracans*
Yellow Bullhead	*Amerius natilus*

Table C-34. Fish sampled in Horse Creek 21 miles upstream of its confluence with Cedar Creek by kick seining (June 27, 1975) and drag seining (October 21, 1975). Location: 0175, UTM X - 409000 UTM Y - 4171400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Golden Shiner	*Notemigonus chrysoleucas*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Slender Madtom	*Noturus exilis*
Blackstripe Topminnow	*Fundulus notatus*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-35. Fish sampled in Horse Creek 21 miles upstream of its confluence with the Sac River by kick and drag seining, August 13, 1996. Location: 0175, UTM X - 409000 UTM Y - 4171400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Redfin Shiner	*Lythrurus umbratilus*
Bluntnose Minnow	*Pimephales notatus*
Golden Shiner	*Notemigonus crysoleucas*
Sand Shiner	*Notropis ludibundus*
Horneyhead Chub	*Nocomis biguttatus*
Creek Chub	*Semoltilus atromaculatus*
White Sucker	*Catostomus commersoni*
Slender Madtom	*Noturus exilis*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus Salmoides*
Greenside Darter	*Etheostoma blennoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-36. Fish sampled in Horse Creek 38 miles upstream of its confluence with Cedar Creek by kick seining (July 2, 1975) and drag seining (October 22, 1975). Location: 0174, UTM X - 399000 UTM Y - 4160100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Slender Madtom	*Noturus exilis*
Blackstripe Topminnow	*Fundulus notatus*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-37. Fish sampled in Horse Creek 60 miles upstream of its confluence with Cedar Creek by kick and drag seining, March 15, 1977. Location: 0248, UTM X - 409400 UTM Y - 4144300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Yellow Bullhead	*Ameiurus natalis*
Blackstripe Topminnow	*Fundulus notatus*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-38. Fish sampled in the Sac River at river mile 20, by seining, August 5, 1942. Location: 0218, UTM X - 433900 UTM Y - 4194400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
River Redhorse	*Moxostoma carinatum*
Freckled Madtom	*Noturus nocturnus*
Blackspotted Topminnow	*Fundulus olivaceous*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*

Table C-39. Fish sampled in Sac River at river mile 20, by kick and drag seining and electrofishing, August 20, 1999. Location: 0218, UTM X - 433900 UTM Y - 4194600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Blacktail Shiner	*Cyprinella venusta*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Common Carp	*Cyprinus Carpio*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Channel Catfish	*Ictalurus punctatus*
Flathead Catfish	*Pylodictis olivaris*
Stonecat	*Noturus fglavus*
Brook Silverside	*Labidesthes sicculus*
Freshwater Drum	*Aplodinotus grunniens*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Slenderhead Darter	*Percina Phoxocephala*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-40. Fish sampled in the Sac River at river mile 27, October 13, 1976, by kick seining. Location: 0173, UTM X - 429300 UTM Y - 4191500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Emerald Shiner	*Notropis atherinoides*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Stonecat	*Noturus flavus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*

Table C-41. Fish sampled in Sac River at river mile 27, by kick and drag seining and electrofishing, August 27, 1999. Location: 0173, UTM X - 429300 UTM Y - 4191700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedanum*
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Bleeding Shiner	*Luxilus zonatus*
Emerald Shiner	*Notropis atherinoides*
Ozark Minnow	*Notropis nubilus*
Rosyface Minnow	*Notropis rubellus*
Sand Shiner	*Notropis ludibundus*
Quiailback	*Carpoides cyprinus*
Northern Hog Sucker	*Hypentelium Nigracans*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Freshwater Drum	*Aplodinotus grunniens*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-42. Fish sampled in the Sac River at river mile 35, July 23, 1964, by drag and kick seining. Location: 0052, UTM X - 429500 UTM Y - 4183100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Chestnut Lamprey	*Ichthyomyzon castaneus*
Mooneye	*Hiodon tergisus*
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ghost Shiner	*Notropis buchanani*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Silver Redhorse	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Channel Catfish	*Ictalurus punctatus*
Stonecat	*Noturus flavus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Gilt Darter	*Percina evides*
Slenderhead Darter	*Percina phoxocephala*

Table C-43. Fish sampled in the Sac River at river mile 35, September 23, 1976, by drag and kick seining. Location: 0052, UTM X - 429500 UTM Y - 4183100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Brook Silverside	*Labidesthes sicculus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctulatus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Slenderhead Darter	*Percina phoxocephala*

Table C-44. Fish sampled in Sac River at river mile 35, by kick and drag seining and electrofishing, August 20, 1999. Location: 0052, UTM X - 429500 UTM Y - 4183300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Common Carp	*Cyprinus carpio*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Freshwater Drum	*Aplodinotus grunniens*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-45. Fish sampled in the Sac River at river mile 44, July 30, 1942, by seining. Location: 0057, UTM X - 431800 UTM Y - 4176600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Longnose Gar	*Lepisosteus osseus*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Golden Redhorse	*Moxostoma erythrurum*
Channel Catfish	*Ictalurus punctatus*
Freckled Madtom	*Noturus nocturnus*
Flathead Catfish	*Pylodictus olivaris*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*

Table C-46. Fish sampled in the Sac River at river mile 44, in the years from 1947 to 1951, by drag seining, kick seining, and electrofishing. Location: 0057, UTM X - 431800 UTM Y - 4176600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Chestnut Lamprey	*Icthyomyzon castaneus*
Longnose Gar	*Lepisosteus osseus*
Shortnose gar	*Lepisosteus platostomus*
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Common Carp	*Cyprinus carpio*
Gravel Chub	*Erimystax x-punctatus*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ghost Shiner	*Notropis buchanani*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
River Carpsucker	*Carpiodes carpio*
White Sucker	*Catostomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Smallmouth Buffalo	*Ictiobus bubalus*
Black Buffalo	*Ictiobus niger*
Silver Redhorse	*Moxostoma anisurum*
River Redhorse	*Moxostoma carinatum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Black Bullhead	*Ameiurus melas*
Yellow Bullhead	*Ameiurus natalis*
Channel Catfish	*Ictalurus punctatus*
Slender Madtom	*Noturus exilis*
Stonecat	*Noturus flavus*
Flathead Catfish	*Pylodictus olivaris*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Ozark Sculpin	*Cottus Hypselurus*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*

Common Name	Scientific Name
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Black Crappie	*Pomoxis nigromaculatus*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Bluestripe Darter	*Percina cymatotaenia*
Slenderhead Darter	*Percina phoxocephala*
Freshwater Drum	*Aplodinotus grunniens*

Table C-47. Fish sampled in Sac River at river mile 44, by kick and drag seining and electrofishing, August 19, 1999. Location: 0057, UTM X - 431800 UTM Y - 4176800 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Blacktail Shiner	*Cyprinella venusta*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Northern Hog Sucker	*Hypentelium Nigracans*
White Sucker	*Catostomus commersoni*
Black Redhorse	*Moxostoma duquesnei*
Redhorse sp.	*Moxostoma sp.*
Channel Catfish	*Ictalurus punctatus*
Stonecat	*Noturus fglavus*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctalatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-48. Fish sampled in the Sac River at river mile 50, July 1, 1940, by seining. Location: 0215, UTM X - 433300 UTM Y - 4172700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Ghost Shiner	*Notropis buchanani*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis stramineus*
Suckermouth Minnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Yellow Bullhead	*Ameiurus natalis*
Channel Catfish	*Ictalurus punctatus*
Stonecat	*Noturus flavus*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Slenderhead Darter	*Percina phoxocephala*

Table C-49. Fish sampled in Sac River at river mile 50, by kick and drag seining and electrofishing, July 19, 1999. Location: 0215, UTM X - 433300 UTM Y - 4172900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Bluntnose Minnow	*Pimephales notatus*
Northern Hog Sucker	*Hypentelium Nigracans*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Banded Darter	*Etheostoma zonale*

Table C-50. Fish sampled in the Sac River at river mile 68, by seining, July 28, 1942. Location: 0207, UTM X - 432000 UTM Y - 4152600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Rosyface Shiner	*Notropis rubellus*
Creek Chub	*Semotilus atromaculatus*
Suckermouth Mnnow	*Phenacobius mirabilis*
Slender Madtom	*Noturus exilis*
Stonecat	*Noturus flavus*
Flathead Catfish	*Pylodictus olivaris*
Blackspotted Topminnow	*Fundulus olivaceous*
Orangespotted Sunfish	*Lepomis humilis*
Smallmouth Bass	*Micropterus dolomieu*
Black Crappie	*Pomoxis nigromaculatus*
Greenside Darter	*Etheostoma blennioides*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Slenderhead Darter	*Percina phoxocephala*

Table C-51. Fish sampled in the Sac River at river mile 86 by seining, August 14, 1940. Location: 0206, UTM X - 439400 UTM Y - 4144000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Slenderhead Darter	*Percina phoxocephala*

Table C-52. Fish sampled in Sac River at river mile 90, by kick and drag seining, March 25, 1981. Location: 1956, UTM X - 442200 UTM Y - 4142300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma anomalum*
Red Shiner	*Cyprinella lutrensis*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Common Carp	*Cyprinus Carpio*
Northern Hog Sucker	*Hypentelium Nigracans*
Golden Redhorse	*Moxostoma erythrurum*
Banded Sculpin	*Cottus carolinae*
Studfish	*Fundulus catennutus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-53. Fish sampled in the Sac River at river mile 102, by seining, June 27, 1942. Location:0211, UTM X - 439400 UTM Y - 4144000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Smallmouth Bass	*Micropterus dolomieu*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-54. Fish sampled in the Sac River at river mile 103, by kick and drag seining, March 25, 1981. Location:1955, UTM X - 445800 UTM Y - 4130500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-55. Fish sampled in the Sac River at river mile 103, by drag and kick seining, July 15, 1998. Location: 1955, UTM X - 445800 UTM Y - 4130500 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-56. Fish sampled in the Sac River at river mile 111, by drag seining (October 22, 1975 and October 6, 1976) and kick seining (February 23, 1977). Location:0166, UTM X - 447200 UTM Y - 4123500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Green Sunfish	*Lepomis cyanellus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*

Table C-57. Fish sampled in the Sac River at river mile 114, by seining, July 31, 1940. Location: 0208, UTM X - 449200 UTM Y - 4121000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*

Table C-58. Fish sampled in the Sac River at river mile 114, by drag and kick seining, July 15, 1998. Location: 0208, UTM X - 449200 UTM Y - 4121000 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Stoneroller sp.	*Campostoma sp.*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Logperch	*Percina caprodes*
Drum	*Aplodinotus grunniens*

Table C-59. Fish sampled in the Sac River at river mile 121, by seining, July 31, 1940. Location: 0165, UTM X - 453100 UTM Y - 4118600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Ozark Sculpin	*Cottus hypselurus*
Green Sunfish	*Lepomis cyanellus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-60. Fish sampled in the Sac River at river mile 121, by kick seining, April 9, 1976. Location:0165, UTM X - 452500 UTM Y - 4119400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-61. Fish sampled in the Sac River at river mile 121, by drag and kick seining, July 8, 1998. Location: 0165, UTM X - 453100 UTM Y - 4118600 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Redfin Shiner	*Lythrurus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Slender Madtom	*Noturus Exilis*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Ethostoma blennoides*
Rainbow Darter	*Ethostoma caeruleum*
Orangethroat Darter	*Ethostoma spectabile*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

Table C-62. Fish sampled in Little Sac River 6 miles upstream of its confluence with the Sac River by kick and drag seining, April 3, 1966. Location: 0054, UTM X - 436500 UTM Y - 4162300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*

Table C-63. Fish sampled in Little Sac River 12 miles upstream of its confluence with the Sac River by seining, August 14, 1940 and July 28, 1942. Location: 0214, UTM X - 441400 UTM Y - 4159200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Longnose Gar	*Lepisosteus osseus*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Mnnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Silver Redhorse	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Channel Catfish	*Ictalurus punctatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-64. Fish sampled in Little Sac River 22 miles upstream of its confluence with the Sac River by seining, July 1, 1940. Location: 0212, UTM X - 441400 UTM Y - 4159200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ghost Shiner	*Notropis buchanani*
Ozark Minnow	*Notropis nubilis*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Suckermouth Mnnow	*Phenacobius mirabilis*
Bluntnose Minnow	*Pimephales notatus*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Yellow Bullhead	*Ameiurus natalis*
Channel Catfish	*Ictalurus punctatus*
Slender Madtom	*Noturus exilis*
Stonecat	*Noturus flavus*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-65. Fish sampled in Little Sac River 34 miles upstream of its confluence with the Sac River by kick and drag seining, March 25, 1981. Location: 1957, UTM X - 458400 UTM Y - 4145700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Sand Shiner	*Notropis ludibundus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-66. Fish sampled in Little Sac River 34 miles upstream of its confluence with Sac River by drag and kick seining, July 21, 1998. Location: 1957, UTM X - 458400 UTM Y - 4145700 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Redfin Shiner	*Lythrurus umbratilus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Silver Redhorse	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Redhorse sp.	*Moxostoma sp.*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Sunfish Sp.	*Lepomis sp.*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Logperch	*Percina caprodes*
Slenderhead Darter	*Percina phoxocephala*

Table C-67. Fish sampled in Little Sac River 53 miles upstream of its confluence with the Sac River by seining, July 27, 1942. Location: 0210, UTM X - 466000 UTM Y - 4129000 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Golden Redhorse	*Moxostoma erythrurum*
Yellow Bullhead	*Ameiurus natalis*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Ozark Bass	*Ambloplites constellatus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Rainbow Darter	*Etheostoma caeruleum*

Table C-68. Fish sampled in Little Sac River 53 miles upstream of its confluence with the Sac River by kick and drag seining, July 16, 1998. Location: 0210, UTM X - 466000 UTM Y - 4129200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller	*Campostoma sp.*
Red Shiner	*Cyprinella lutrensis*
Common Carp	*Cyprinus carpio*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Ozark Minnow	*Notropis nubilus*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Silver Redhorese	*Moxostoma anisurum*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-69. Fish sampled in Little Sac River 59 miles upstream of its confluence with the Sac River by seining, July 30, 1940. Location: 0209, UTM X - 471300 UTM Y - 4127100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Sand Shiner	*Notropis ludibundus*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-70. Fish sampled in the Little Sac River 59 miles upstream of its confluence with the Sac River by drag and kick seining, July 30, 1998. Location: 0209 UTM X - 471300 UTM Y - 4127100 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Redfin Shiner	*Lythrurus umbratilis*
Bluntnose Minnow	*Pimephales notatus*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

Table C-71. Fish sampled in Little Sac River 63 miles upstream of its confluence with the Sac River by visual observation (April 17, 1975), drag seining (October 6, 1976), and kick seining (February 22, 1977). Location: 0169, UTM X - 476600 UTM Y - 4130600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Common Carp	*Cyprinus carpio*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Yellow Bullhead	*Ameiurus natalis*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Black Crappie	*Pomoxis nigromaculatus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Least Darter	*Etheostoma microperca*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-72. Fish sampled in Little Sac River 63 miles upstream of its confluence with the Sac River by kick and drag seining, June 27, 1995. Location: 0169, UTM X - 476600 UTM Y - 4130600 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Creek Chub	*Semoltilus atromaculatus*
Northern Hogsucker	*Hypentelium Nigracans*
Slender Madtom	*Noturus exilus*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinus*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus Salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Orangethroat Darter	*Etheostoma spectabile*
Ozark Logperch	*Percina caprodes*

Table C-73. Fish sampled in Maze Creek 8 miles upstream of its confluence with the Little Sac River by kick and drag seining, October 14, 1976. Location: 0171, UTM X - 440600 UTM Y - 4152400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Golden Shiner	*Notemigonus chrysoleucas*
Ozark Minnow	*Notropis nubilis*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
White Sucker	*Catostomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Black Bullhead	*Ameiurus melas*
Yellow Bullhead	*Ameiurus natalis*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-74. Fish sampled in Maze Creek 8 miles upstream of its confluence with Little Sac River by drag and kick seining, August 11, 1998. Location: 0171, UTM X - 440600 UTM Y - 4152400 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Bleeding Shiner	*Luxilus zonatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Black Bullhead	*Amieurus melas*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceus*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare*
Stippled Darter	*Etheostoma punctulatum*
Orangethroat Darter	*Etheostoma spectabile*
Logperch	*Percina caprodes*

Table C-75. Fish sampled in Maze Creek 4 miles upstream of its confluence with Little Sac River by drag and kick seining, and electrofishing September 6, 1991. Location: 1930, UTM X - 438240 UTM Y - 4154720 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma anamalum*
Striped Shiner	*Luxilus chrysocephalus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
Common Carp	*Cyprinus carpio*
Golden Redhorse	*Moxostoma erythrurum*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceus*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare*
Banded Darter	*Etheostoma zonale*
Johnny Darter	*Etheostoma nigrum*
Orangethroat Darter	*Etheostoma spectabile*
Logperch	*Percina caprodes*

Table C-76. Fish sampled in North Dry Sac River 3 miles upstream of its confluence with the Little Sac River by seining, July 30, 1940. Location: 0170, UTM X - 468500 UTM Y - 4142300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceous*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-77. Fish sampled in North Dry Sac River 3 miles upstream of its confluence with the Little Sac River by visual observation (April 15, 1975), kick seining (June 26, 1975), and drag seining (October 23, 1975). Location: 0170, UTM X - 468500 UTM Y - 4142300 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilus umbratilis*
Ozark Minnow	*Notropis nubilis*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Longear Sunfish	*Lepomis megalotis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Niangua Darter	*Etheostoma nianguae*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-78. Fish sampled in North Dry Sac River 3 miles upstream of its confluence with Little Sac River by drag and kick seining, July 21, 1998. Location: 0170, UTM X - 468500 UTM Y - 4142500 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Common Carp	*Cyprinus carpio*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Black Bullhead	*Amieurus melas*
Slender Madtom	*Noturus exilis*
Northern Studfish	*Fundulus catenatus*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare*
Orangethroat Darter	*Etheostoma spectabile*

Table C-79. Fish sampled in Sons Creek 14 miles upstream of its confluence with the Sac River by drag and kick seining, October 22, 1975. Location: 0163, UTM X - 420400 UTM Y - 4145500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Bluntnose Minnow	*Pimephales notatus*
Northern Hogsucker	*Hypentelium nigricans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Stippled Darter	*Etheostoma punctulatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-80. Fish sampled in Sons Creek 14 miles upstream of its confluence with the Sac River by kick and drag seining, August 14, 1996. Location: 0163, UTM X - 420400 UTM Y - 4145500 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Redifn Shiner	*Lythrurus unbratilus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semoltilus atromaculatus*
Common Carp	*Cyprinus carpio*
Silver Redhorse	*Moxostoma anisurum*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus Carolinae*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus Salmoides*
Greenside Darter	*Etheostoma blennoides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*
Ozark Logperch	*Percina caprodes*

Table C-81. Fish sampled in Sons Creek 14 miles upstream of its confluence with the Sac River by kick and drag seining, July 23, 1998. Location: 0163, UTM X -420400 UTM Y - 4145700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Stoneroller	*Campostoma sp.*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Common Carp	*Cyprinus Carpio*
White Sucker	*Catostomus commersoni*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-82. Fish sampled in Sons Creek 17 miles upstream of its confluence with the Sac River by kick seining, July 3, 1975. Location: 0162, UTM X - 419100 UTM Y - 4143100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Longear Sunfish	*Lepomis megalotis*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-83. Fish sampled in Turnback Creek 2 miles upstream of its confluence with the Sac River by kick and drag seining, June 4, 1960. Location: 0056, UTM X - 431700 UTM Y - 4142200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Rainbow Darter	*Etheostoma caeruleum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*

Table C-84. Fish sampled in Turnback Creek 2 miles upstream of its confluence with the Sac River by kick and drag seining, August 14, 1940 and July 27, 1942. Location: 0056, UTM X - 431700 UTM Y - 4142200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Gravel Chub	*Erimystax x-punctatus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
River Redhorse	*Moxostoma carinatum*
Golden Redhorse	*Moxostoma erythrurum*
Slender Madtom	*Noturus exilis*
Blackspotted Topminnow	*Fundulus olivaceous*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Orangespotted Sunfish	*Lepomis humilis*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Johnny Darter	*Etheostoma nigrum*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*
Slenderhead Darter	*Percina phoxocephala*

Table C-85. Fish sampled in Turnback Creek 2 miles upstream of its confluence with Sac River by drag and kick seining, August 11, 1998. Location: 0056, UTM X - 431700 UTM Y - 4142200 (MDC SW Region files, Springfield, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Red Shiner	*Cyprinella lutrensis*
Blacktail Shiner	*Cyprinella venusta*
Common Carp	*Cyprinus carpio*
Bleeding Shiner	*Luxilus zonatus*
Golden Shiner	*Notemigonus chrysoleucas*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
White Sucker	*Catotomus commersoni*
Golden Redhorse	*Moxostoma erythrurum*
Channel Catfish	*Ictalurus punctatus*
Blackspotted Topminnow	*Fundulus olivaceus*
Western Mosquitofish	*Gambusia affinis*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
White Bass	*Morone chrysops*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Spotted Bass	*Micropterus punctulatus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Orangethroat Darter	*Etheostoma spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Logperch	*Percina caprodes*
Walleye	*Stizostedion vitreum*

Table C-86. Fish sampled in Turnback Creek 15 miles upstream of its confluence with the Sac River by drag seining (October 22, 1975) and kick seining (February 23, 1977). Location: 0160, UTM X - 430900 UTM Y - 4131100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
White Crappie	*Pomoxis annularis*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-87. Fish sampled in Turnback Creek 15 miles upstream of its confluence with the Sac River by kick and drag seining, August 14, 1996. Location: 0160, UTM X - 430900 UTM Y - 4131100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Gizzard Shad	*Dorosoma cepedianum*
Freshwater Drum	*Aplodinotus grunniens*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Bluntnose Minnow	*Pimephales notatus*
Fathead Minnow	*Pimephales promelas*
Ozark Minnow	*Notropis nubilus*
Sand Shiner	*Notropis ludibundus*
Hornyhead Chub	*Nocomis biguttatus*
Creek Chub	*Semoltilus atromaculatus*
White Sucker	*Catostomus commersoni*
Northern Hog Sucker	*Hypentelium Nigracans*
Black Redhorse	*Moxostoma duquesnei*
Golden Redhorse	*Moxostoma erythrurum*
Blackspotted Topminnow	*Fundulus olivaceous*
Western Mosquitofish	*Gambusia affinis*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus Carolinae*
Largemouth Bass	*Micropterus Salmoides*
Greenside Darter	*Etheostoma blennoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*
Ozark Logperch	*Percina caprodes*

Table C-88. Fish sampled in Turnback Creek 28 miles upstream of its confluence with the Sac River by seining, August 9, 1937. Location: 0159, UTM X - 439100 UTM Y - 4115900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Red Shiner	*Cyprinella lutrensis*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Bluntnose Minnow	*Pimephales notatus*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*

Table C-89. Fish sampled in Turnback Creek 28 miles upstream of its confluence with the Sac River by visual observation (April 15, 1976) kick seining, and drag seining (October 7, 1976). Location: 0159, UTM X - 439100 UTM Y - 4115900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Common Carp	*Cyprinus carpio*
Northern Hogsucker	*Hypentelium nigricans*
Channel Catfish	*Ictalurus punctatus*
Northern Studfish	*Fundulus catenatus*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Ozark Logperch	*Percina caprodes fulvitaenia*

Table C-90. Fish sampled in Turnback Creek 28 miles upstream of its confluence with the Sac River by kick and drag seining, July 29, 1998. Location: 0159, UTM X - 439100 UTM Y - 4116100 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Stoneroller	*Campostoma sp.*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Horneyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilus*
Rosyface Shiner	*Notropis rubellus*
Sand Shiner	*Notropis ludibundus*
Bluntnose Minnow	*Pimephales notatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Common Carp	*Cyprinus Carpio*
Northern Hog Sucker	*Hypentelium Nigracans*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypeselurus*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*
Missouri Saddled Darter	*Etheostoma tetrazonum*
Banded Darter	*Etheostoma zonale*

Table C-91. Fish sampled in Limestone Creek 4 miles upstream of its confluence with Turnback Creek by seining, August 14, 1940. Location: 0161, UTM X - 425800 UTM Y - 4136200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	Campostoma oligolepis
Central Stoneroller	Campostoma pullum
Bleeding Shiner	Luxilus zonatus
Western Redfin Shiner	Lythrurus umbratilis umbratilis
Hornyhead Chub	Nocomis biguttatus
Ozark Minnow	Notropis nubilis
Rosyface Shiner	Notropis rubellus
Bluntnose Minnow	Pimephales notatus
Creek Chub	Semotilus atromaculatus
Northern Hogsucker	Hypentelium nigricans
Golden Redhorse	Moxostoma erythrurum
Slender Madtom	Noturus exilis
Blackspotted Topminnow	Fundulus olivaceous
Banded Sculpin	Cottus carolinae
Ozark Bass	Ambloplites constellatus
Longear Sunfish	Lepomis megalotis
Smallmouth Bass	Micropterus dolomieu
Greenside Darter	Etheostoma blennioides
Rainbow Darter	Etheostoma caeruleum
Striped Fantail Darter	Etheostoma flabellare lineolatum
Northern Orangethroat Darter	Etheostoma spectabile spectabile

Table C-92. Fish sampled in Limestone Creek 4 miles upstream of its confluence with Turnback Creek by drag seining (October 22, 1975) and kick seining (April 15, 1976). Location: 0161, UTM X - 425800 UTM Y - 4136200 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Western Redfin Shiner	*Lythrurus umbratilis umbratilis*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Northern Hogsucker	*Hypentelium nigricans*
Golden Redhorse	*Moxostoma erythrurum*
Blackspotted Topminnow	*Fundulus olivaceous*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-93. Fish sampled in Limestone Creek 4 miles upstream of its confluence with Turnback Creek by drag and kick seining, July 23, 1998. Location: 0161, UTM X - 425800 UTM Y - 4136200 (MDC SW Region files, Springfield, MO).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Stoneroller sp.	*Campostoma sp.*
Common Carp	*Cyprinus carpio*
Striped shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Redfin Shiner	*Lythrurus umbratilus*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catotomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Silver Redhorse	*Moxostoma anisurum*
Redhorse sp.	*Moxostoma sp.*
Blackspotted Topminnow	*Fundulus olivaceus*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Longear Sunfish	*Lepomis megalotis*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare*

Table C-94. Fish sampled in Johnson Creek 1 mile upstream of its confluence with Turnback Creek 0205, by seining, August 31, 1930. Location: 0205, UTM X - 438300 UTM Y - 4115700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Green Sunfish	*Lepomis cyanellus*

Table C-95. Fish sampled in Johnson Creek, 1 mile upstream of its confluence with the Sac River by kick and drag seining, July 30, 1998. Location: 0205, UTM X - 438300 UTM Y - 4115900 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Stoneroller	*Campostoma sp.*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilus*
Creek Chub	*Semotilus atromaculatus*
Slender madtom	*Noturus exilis*
Ozark Sculpin	*Cottus hypselurus*
Largemouth Bass	*Micropterus salmoides*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*

Table C-96. Fish sampled in Clear Creek 10 miles upstream of its confluence with Sac River, by seining, July 31, 1940. Location:0168, UTM X - 455800 UTM Y - 4129400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Central Stoneroller	*Campostoma pullum*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Bluntnose Minnow	*Pimephales notatus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Green Sunfish	*Lepomis cyanellus*
Longear Sunfish	*Lepomis megalotis*
Smallmouth Bass	*Micropterus dolomieu*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Missouri Saddled Darter	*Etheostoma tetrazonum*

Table C-97. Fish sampled in Clear Creek 10 miles upstream of its confluence with Sac River by drag seining (October 23, 1975) and kick seining (February 22, 1977). Location:0168, UTM X - 455800 UTM Y - 4129400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Hornyhead Chub	*Nocomis biguttatus*
Ozark Minnow	*Notropis nubilis*
Rosyface Shiner	*Notropis rubellus*
Creek Chub	*Semotilus atromaculatus*
Northern Hogsucker	*Hypentelium nigricans*
Brook Silverside	*Labidesthes sicculus*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Greenside Darter	*Etheostoma blennioides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

Table C-98. Fish sampled in Clear Creek 10 miles upstream of its confluence with the Sac River by kick and drag seining, June 28, 1995. Location: 0168, UTM X - 455800 UTM Y - 4129400 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Freshwater Drum	*Aplodinotus grunniens*
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilus*
Hornyhead Chub	*Nocomis biguttatus*
Creek Chub	*Semoltilus atromaculatus*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Mottled Sculpin	*Cottus bairdi*
Banded Sculpin	*Cottus carolinae*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus Salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Orangethroat Darter	*Etheostoma spectabile*

Table C-99. Fish sampled in Sycamore Creek 1 mile upstream of its confluence with Sac River by visual observation (April 16, 1975), drag seining (October 22, 1975 and October 6, 1976), and kick seining (February 23, 1977). Location:0167, UTM X - 447200 UTM Y - 4122700 (MDC Fisheries database, Columbia, Mo).

Common Name	Scientific Name
Largescale Stoneroller	*Campostoma oligolepis*
Central Stoneroller	*Campostoma pullum*
Striped Shiner	*Luxilus chrysocephalus*
Bleeding Shiner	*Luxilus zonatus*
Ozark Minnow	*Notropis nubilis*
Southern Redbelly Dace	*Phoxinus erythrogaster*
Creek Chub	*Semotilus atromaculatus*
White Sucker	*Catostomus commersoni*
Northern Hogsucker	*Hypentelium nigricans*
Slender Madtom	*Noturus exilis*
Banded Sculpin	*Cottus carolinae*
Ozark Sculpin	*Cottus hypselurus*
Green Sunfish	*Lepomis cyanellus*
Bluegill	*Lepomis macrochirus*
Largemouth Bass	*Micropterus salmoides*
Rainbow Darter	*Etheostoma caeruleum*
Striped Fantail Darter	*Etheostoma flabellare lineolatum*
Northern Orangethroat Darter	*Etheostoma spectabile spectabile*

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Glossary

Alluvial soil: Soil deposits resulting directly or indirectly from the sediment transport of streams, deposited in river beds, flood plains, and lakes.
Aquifer: An underground layer of porous, water-bearing rock, gravel, or sand.
Benthic: Bottom-dwelling; describes organisms which reside in or on any substrate.
Benthic macroinvertebrate: Bottom-dwelling (benthic) animals without backbones (invertebrate) that are visible with the naked eye (macro).
Biota: The animal and plant life of a region.
Biocriteria monitoring: The use of organisms to assess or monitor environmental conditions.
Channelization: The mechanical alteration of a stream which includes straightening or dredging of the existing channel, or creating a new channel to which the stream is diverted.
Concentrated animal feeding operation (CAFO): Large livestock (ie. cattle, chickens, turkeys, or hogs) production facilities that are considered a point source pollution, larger operations are regulated by the MDNR. Most CAFOs confine animals in large enclosed buildings, or feedlots and store liquid waste in closed lagoons or pits, or store dry manure in sheds. In many cases manure, both wet and dry, is broadcast overland.
Confining rock layer: A geologic layer through which water cannot easily move.
Chert: Hard sedimentary rock composed of microcrystalline quartz, usually light in color, common in the Springfield Plateau in gravel deposits. Resistance to chemical decay enables it to survive rough treatment from streams and other erosive forces.
Cubic feet per second (cfs): A measure of the amount of water (cubic feet) traveling past a known point for a given amount of time (one second), used to determine discharge.
Discharge: Volume of water flowing in a given stream at a given place and within a given period of time, usually expressed as cubic feet per second.
Disjunct: Separated or disjoined populations of organisms. Populations are said to be disjunct when they are geographically isolated from their main range.
Dissolved oxygen: The concentration of oxygen dissolved in water, expressed in milligrams per liter or as percent.
Dolomite: A magnesium rich, carbonate, sedimentary rock consisting mainly (more than 50% by weight) of the mineral dolomite ($CaMg(CO_3)_2$).
Endangered: In danger of becoming extinct.
Endemic: Found only in, or limited to, a particular geographic region or locality.
Environmental Protection Agency (EPA): A Federal organization, housed under the Executive branch, charged with protecting human health and safeguarding the natural environment — air, water, and land — upon which life depends.
Epilimnion: The upper layer of water in a lake that is characterized by a temperature gradient of less than 1° Celsius per meter of depth.
Eutrophication: The nutrient (nitrogen and phosphorus) enrichment of an aquatic ecosystem that promotes biological productivity.
Extirpated: Exterminated on a local basis, political or geographic portion of the range.
Faunal: The animals of a specified region or time.
Fecal coliform: A type of bacterium occurring in the guts of mammals. The degree of its presence in a lake or stream is used as an index of contamination from human or livestock waste.
Flow duration curve: A graphic representation of the number of times given quantities of flow are equaled or exceeded during a certain period of record.

Fragipans: A natural subsurface soil horizon seemingly cemented when dry, but when moist showing moderate to weak brittleness, usually low in organic matter, and very slow to permeate water.
Gage stations: The site on a stream or lake where hydrologic data is collected.
Gradient plots: A graph representing the gradient of a specified reach of stream. Elevation is represented on the Y-axis and length of channel is represented on the X- axis.
Hydropeaking: Rapid and frequent fluctuations in flow resulting from power generation by a hydroelectric dam's need to meet peak electrical demands.
Hydrologic unit (HUC): A subdivision of watersheds, generally 40,000-50,000 acres or less, created by the USGS. Hydrologic units do not represent true subwatersheds.
Hypolimnion: The region of a body of water that extends from the thermocline to the bottom and is essentially removed from major surface influences during periods of thermal stratification.
Incised: Deep, well defined channel with narrow width to depth ration, and limited or no lateral movement. Often newly formed, and as a result of rapid down-cutting in the substrate
Intermittent stream: One that has intervals of flow interspersed with intervals of no flow. A stream that ceases to flow for a time.
Karst topography: An area of limestone formations marked by sinkholes, caves, springs, and underground streams.
Loess: Loamy soils deposited by wind, often quite erodible.
Low flow: The lowest discharge recorded over a specified period of time.
Missouri Department of Conservation (MDC): Missouri agency charged with: protecting and managing the fish, forest, and wildlife resources of the state; serving the public and facilitating their participation in resource management activities; and providing opportunity for all citizens to use, enjoy, and learn about fish, forest, and wildlife resources.
Missouri Department of Natural Resources (MDNR): Missouri agency charged with preserving and protecting the state's natural, cultural, and energy resources and inspiring their enjoyment and responsible use for present and future generations.
Mean monthly flow: Arithmetic mean of the individual daily mean discharge of a stream for the given month.
Mean sea level (MSL): A measure of the surface of the Earth, usually represented in feet above mean sea level. MSL for conservation pool at Pomme de Terre Lake is 839 ft. MSL and Truman Lake conservation pool is 706 ft. MSL.
Necktonic: Organisms that live in the open water areas (mid and upper) of waterbodies and streams.
Non-point source: Source of pollution in which wastes are not released at a specific, identifiable point, but from numerous points that are spread out and difficult to identify and control, as compared to point sources.
National Pollution Discharge Elimination System (NPDES): Permits required under The Federal Clean Water Act authorizing point source discharges into waters of the United States in an effort to protect public health and the nation's waters.
Nutrification: Increased inputs, viewed as a pollutant, such as phosphorous or nitrogen, that fuel abnormally high organic growth in aquatic systems.
Optimal flow: Flow regime designed to maximize fishery potential.
Perennial streams: Streams fed continuously by a shallow water table an flowing year-round.

pH: Numeric value that describes the intensity of the acid or basic (alkaline) conditions of a solution. The pH scale is from 0 to 14, with the neutral point at 7.0. Values lower than 7 indicate the presence of acids and greater than 7.0 the presence of alkalis (bases).
Point source: Source of pollution that involves discharge of wastes from an identifiable point, such as a smokestack or sewage treatment plant.
Recurrence interval: The inverse probability that a certain flow will occur. It represents a mean time interval based on the distribution of flows over a period of record. A 2-year recurrence interval means that the flow event is expected, on average, once every two years.
Residuum: Unconsolidated and partially weathered mineral materials accumulated by disintegration of consolidated rock in place.
Riparian: Pertaining to, situated, or dwelling on the margin of a river or other body of water.
Riparian corridor: The parcel of land that includes the channel and an adjoining strip of the floodplain, generally considered to be 100 feet on each side of the channel.
7-day Q^{10}: Lowest 7-day flow that occurs an average of every ten years.
7-day Q^{2}: Lowest 7-day flow that occurs an average of every two years.
Solum: The upper and most weathered portion of the soil profile.
Special Area Land Treatment project (SALT): Small, state funded watershed programs overseen by MDNR and administered by local Soil and Water Conservation Districts. Salt projects are implemented in an attempt to slow or stop soil erosion.
Stream Habitat Annotation Device (SHAD): Qualitative method of describing stream corridor and instream habitat using a set of selected parameters and descriptors.
Stream gradient: The change of a stream in vertical elevation per unit of horizontal distance.
Stream order: A hierarchical ordering of streams based on the degree of branching. A first order stream is an unbranched or unforked stream. Two first order streams flow together to make a second order stream; two second order streams combine to make a third order stream. Stream order is often determined from 7.5 minute topographic maps.
Substrate: The mineral and/or organic material forming the bottom of a waterway or waterbody.
Thermocline: The plane or surface of maximum rate of decrease of temperature with respect to depth in a waterbody.
Threatened: A species likely to become endangered within the foreseeable future if certain conditions continue to deteriorate.
United States Army Corps of Engineers (USCOE) and now (USACE): Federal agency under control of the Army, responsible for certain regulation of water courses, some dams, wetlands, and flood control projects.
United States Geological Survey (USGS): Federal agency charged with providing reliable information to: describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect the quality of life.
Watershed: The total land area that water runs over or under when draining to a stream, river, pond, or lake.
Waste water treatment facility (WWTF): Facilities that store and process municipal sewage, before release. These facilities are under the regulation of the Missouri Department of Natural Resources.