CURRENT RIVER

WATERSHED INVENTORY AND ASSESSMENT

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EXECUTIVE SUMMARY

The Current River Watershed drains a land area of approximately 2,621 square miles in portions of 9 counties in Missouri and 2 Counties in Arkansas. These counties include Texas, Dent, Reynolds, Shannon, Howell, Oregon, Carter, Butler, and Ripley in Missouri; and Randolph and Clay Counties in Arkansas. Most of the watershed (95.9%) lies within Missouri. Approximately 18% of the Current River Watershed is drained by the Jacks Fork River which flows into the Current River approximately 5 air miles east northeast of Eminence, Missouri. The Jacks Fork Watershed has been addressed in a separate watershed inventory and assessment document and thus will not be addressed within unless otherwise noted. In addition, the portion of the watershed occurring in Arkansas will not be addressed in this document unless otherwise noted.

The Current River is formed by the confluence of Pigeon Creek and the Montauk Spring complex near Montauk, Missouri. From its beginnings the river flows approximately 184 miles in a southeasterly to south direction before flowing into the Black River near Pocahontas, Arkansas. The Current River

Watershed (including the Jacks Fork Watershed and Current River Watershed in Arkansas) has 16 cities and towns within or partially within its boundary and approximately 3,407 miles of road (not including the Jacks Fork Watershed or Arkansas).

The Current River Watershed lies within the Salem Plateau Subdivision of the Ozark Plateau Physiographic Region. Elevations within the watershed range from a maximum of approximately 1500 feet above sea level in the uplands to approximately 280 feet above sea level in the lower portions of the watershed. Most of the watershed occurs within the Ozark Soil Region with a small portion of the watershed occurring in the Mississippi Delta Soils Region. Ten soil associations occur within the watershed.

The geology of the Current River Watershed consists primarily of dolomites and sandstone/dolomites of Ordovician age. Significant exposures of Cambrian Dolomite and Precambrian Igneous Rock associated with the St. Francois Uplift are present in the middle portion of the watershed. Quaternary Alluvium, associated with the Bootheel area of Missouri, exists in the southeastern portion of the watershed on the southeastern side of the Little Black River. In addition, a few small areas of Mississippian limestone and limestone/sandstone occur on the watershed's eastern boundary. A combination of climate and geology has created a karst landscape in the watershed characterized by a close interaction between groundwater and surface water systems through sinkholes, losing streams, and springs. Dye trace data for the Current River Watershed indicates the watershed receives substantial amounts of ground water from neighboring watersheds; the most notable example is the Big Spring recharge area. Much of this recharge area is located in the Eleven Point River Watershed.

There are approximately 197 third order and larger streams within the watershed. The Current River is a seventh order stream. An estimated 678 stream miles in the watershed have permanent water.

In order to facilitate analysis of watershed characteristics, the Current River Watershed was divided based on eleven digit hydrologic units. The largest of these units is the Little Black River unit which drains approximately 382.2 square miles.

Channel gradient was determined for all fourth order and larger streams within the Current River Watershed using data digitized from USGS 7.5 minute topographic maps. Composite gradient graphs were constructed for all fifth order and larger streams within the watershed. Average gradients for fourth order and larger streams within the watershed range from 1.2 feet per mile to 84.5 feet per mile. The Current River has an average gradient of 3.9 feet/mile.

Historical land cover within the uplands of the Current River Watershed primarily consisted of pine and mixed pine/oak woodland with an open understory of grasses and shrubs. Occasional prairie and savanna openings were also common in some areas. Land cover of the sideslopes consisted of oak and oak/pine forests with occasional glade and woodland type openings associated with exposed slopes and ridges having shallow soils. Valley bottom land cover consisted of mixed hardwood forest with occasional fen openings. Currently, approximately 80.1% of the Current River Watershed is forested based on analysis of MoRAP Missouri Land Cover data. Grassland is the second most prevalent land cover accounting for about 16.0% of the total watershed area. Within the Current River Watershed, approximately 32% (420,576 acres) of land is under public ownership. The United States Forest Service (USFS) holds the largest amount of publicly owned land, totaling 235,279 acres.

The 1990 human population within the Current River Watershed was estimated to be 24,890 persons. Population density in 1990 was approximately 9 persons per square mile.

Average annual precipitation within the Current River Watershed is 44.5 inches. The USGS currently (2002) has two active surface discharge gauge stations within the watershed (excluding the Jacks Fork Watershed). The annual daily mean discharge of the Current River at Doniphan is 2,815 cubic feet per second.

Overall water quality within the watershed appears to be relatively good based on the limited scope of analysis provided in this document. Within the watershed (excluding the Jacks Fork), there are no streams included in the 1998 303d list. However, two issues that may require further monitoring/investigation include elevated lead concentrations at various sites within the watershed as noted in a 1995 NPS commissioned water quality study and some past indications of poor water quality at some sites within the Little Black River Hydrologic Unit. Other items which always have the potential to cause water quality problems in this watershed, as in any other, include large numbers of livestock in riparian zones for extended periods of time, private septic system failure, increased nutrients from municipal sewage treatment facilities, improper sand and gravel removal and poor land use practices such as indiscriminate land clearing. These can result in periodic high fecal coliform levels, nutrient loading, and increased sediment deposition.

Within the Current River Watershed there are currently 29 dams which have records within the Dam and Reservoir Safety Program Database. All are reinforced earth structures with heights ranging from 5 to 73 feet. Impoundment areas range from 3 to 121 acres. Estimates based on analysis of National Wetlands Inventory data indicate that approximately 98 miles of channelized stream exist within the Current River. Most of these channelized areas are located in the lowlands of the southeast corner of the watershed watershed. Riparian corridor land cover within the Current River Watershed consists of more forest/wetland (78.9%) than grassland/cropland (20.2%).

The Current River Watershed exhibits a diverse biotic community. Since 1930, an assemblage of 124 fish species, 43 mussel species and subspecies, 25 species of snails, 5 crayfish species, and 300 taxa of benthic macro-invertebrates have been identified within the Current River Watershed. A total of 169 "species and subspecies of conservation concern" are known to occur in the watershed. This list includes 17 fish species, 10 species of mussels; 4 species of amphibian, 5 species of crayfish, 7 species of insects, and 1 snail species. The most prominent game fish species within the watershed include the brown trout, chain pickerel, grass pickerel, largemouth bass, rainbow trout, shadow bass, smallmouth bass, walleye, and warmouth. Sucker species provide additional recreational opportunities. Nuisance exotic aquatic species within the watershed include the Asian clam and the common carp.

The management goals, objectives, and strategies for the Current River Watershed were developed using information collected from the Current River Watershed Inventory and Assessment (WIA) and direction provided by the Missouri Department of Conservation Strategic Plan, the Fisheries Division Five Year Strategic Plan, and the Ozark Regional Management Guidelines. Objectives and strategies were written for in-stream and riparian habitat, water quality, aquatic biota, and recreational use. All goals are of equal importance. These goals include: (1) improve riparian and aquatic habitats in the Current River Watershed, (2) improve surface and subsurface water quality in the Current River Watershed, (3) maintain the abundance, diversity, and distribution of aquatic biota at or above current levels while improving the quality of the sport fishery in the Current River Watershed, (4) increase public awareness and promote wise use of aquatic resources in the Current River Watershed. The attainment of these goals will require cooperation with private landowners, other divisions within the Missouri

Department of Conservation, as well as other state and federal agencies.

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LOCATION

The Current River Watershed drains a land area of approximately 2,621 square miles in portions of 9 counties in Missouri and 2 Counties in Arkansas (Figure Bk01). These counties include Texas, Dent, Reynolds, Shannon, Howell, Oregon, Carter, Butler, and Ripley in Missouri; and Randolph and Clay Counties in Arkansas. Most of the watershed (95.9%) lies within Missouri. The Current River Watershed is bounded to the West by the Big Piney, Eleven Point, and Fourche Creek Watersheds; and to the North by the Meremac Watershed. The Black River Watershed occupies the entire eastern boundary of the Current River Watershed.

Approximately 18% of the Current River Watershed is drained by the Jacks Fork River which flows into the Current River approximately 5 air miles east, northeast of Eminence, Missouri. The Jacks Fork Watershed has been addressed in a separate watershed inventory and assessment document and thus will not be addressed within unless otherwise noted. In addition, the portion of the watershed occurring in Arkansas will not be addressed in this document unless otherwise noted.

The Current River is formed by the confluence of Pigeon Creek and the Montauk Spring complex near Montauk, Missouri. From its beginnings the river flows in a southeasterly direction for approximately 56 miles before receiving the waters of the Jacks Fork River. It then continues in a southeasterly direction for 34 miles before reaching the city of Van Buren, Missouri. Approximately 12 miles southeast of Van Buren, the river turns to the south and follows this general direction for approximately 45 miles to the Missouri/Arkansas state line. The Current River continues for another 36 miles before flowing into the Black River near Pocahontas, Arkansas.

The Current River Watershed (including the Jacks Fork Watershed and Current River Watershed in Arkansas) has 16 cities and towns within or partially within its boundary (Figure Bk02). Three of these have populations exceeding 1,000 persons. These are the cities of Doniphan, Missouri (1,713); Mountain View, Missouri (2,036); and Winona, Missouri (1,081).

The Current River Watershed includes approximately 3,407 miles of road based on analysis of transportation route geographical information system (GIS)data of the U.S. Bureau of the Census (1997). This is 1.3 miles of road for every square mile of drainage area. Three U.S. Highways and 10 major state routes intersect the Current River Watershed.

Figure Bk01.

Current River Watershed

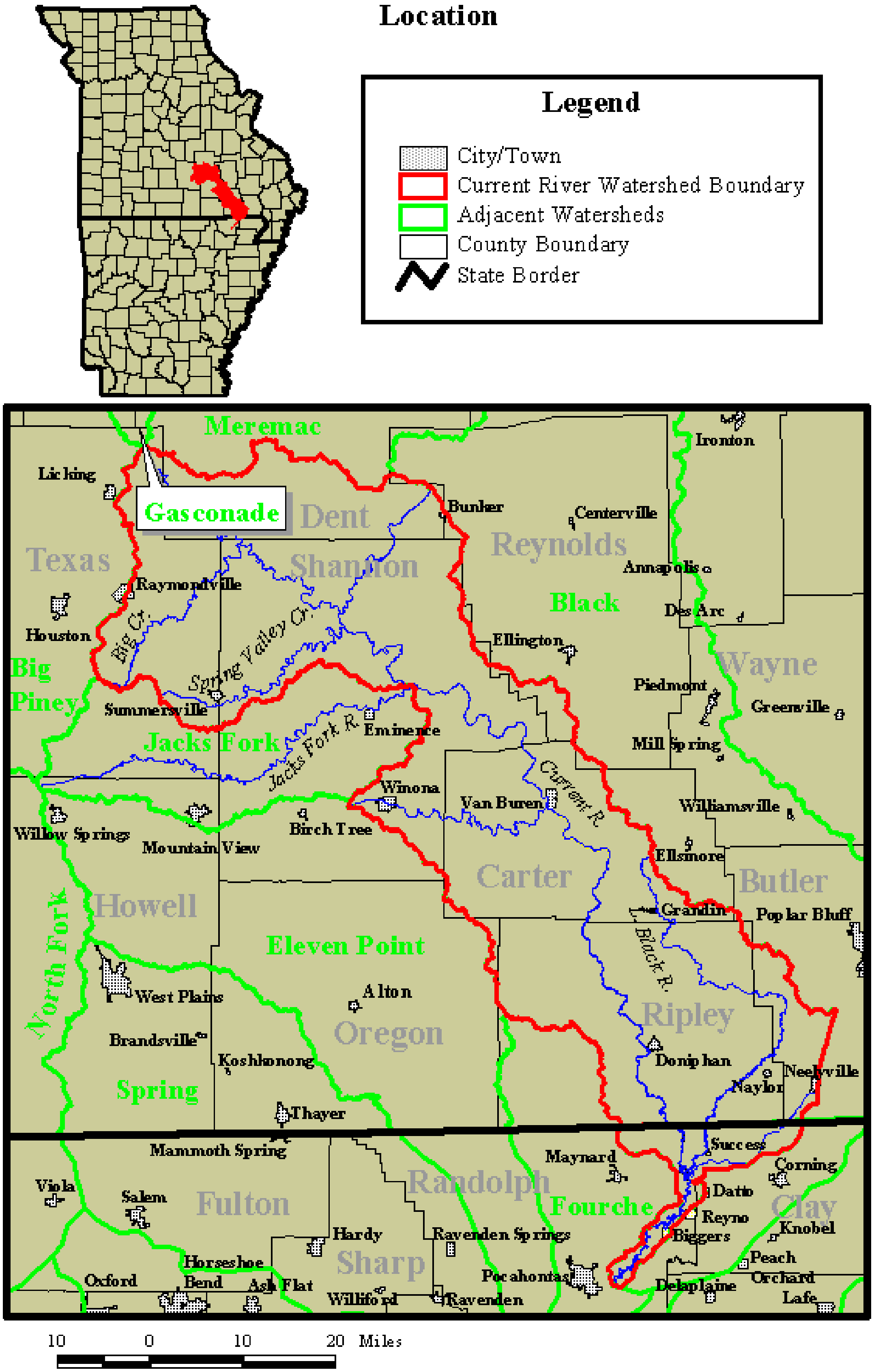
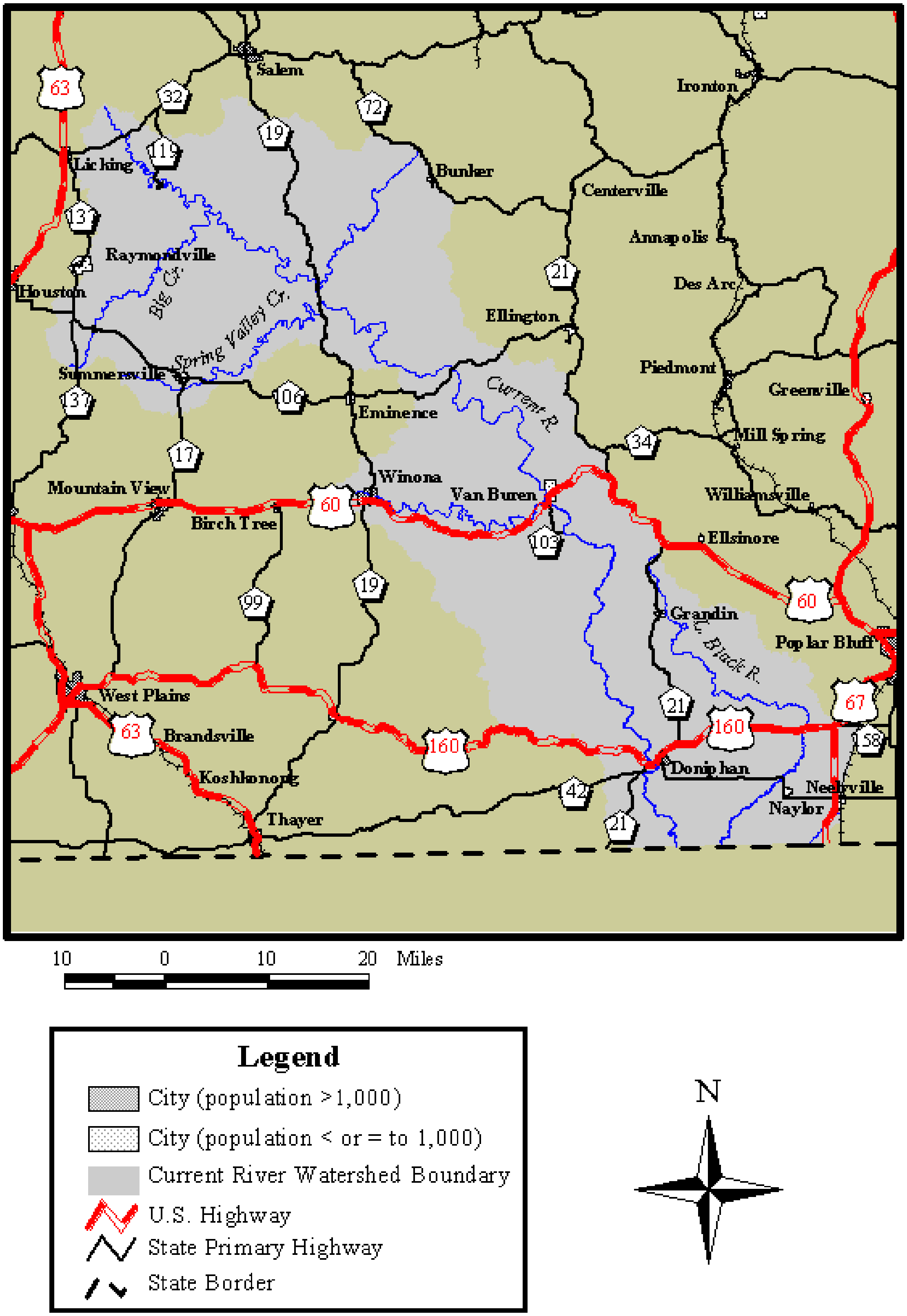


Figure Bk02.

Current River Watershed

Infrastructure



GEOLOGY

Physiographic Region

The Current River Watershed lies within the Salem Plateau Subdivision of the Ozark Plateau Physiographic Region. The Salem Plateau Subdivision is a highly dissected plateau with upland elevations ranging from 1000 to 1400 feet above mean sea level (msl) and local relief (local relief refers to the difference in elevation between two nearby points such as a valley and an adjoining ridge top) ranging from 100 - 200 feet in the uplands to 200 - 500 feet elsewhere (MDNR 1986). Elevations within the Current River Watershed range from a maximum of approximately 1500 feet msl in the uplands to approximately 280 feet in the lower portions of the watershed. Local relief data obtained from the Missouri Department of Conservation (MDC) Fisheries Research Fish Collection Database (1998a) indicates a minimum local relief of 7 feet and a maximum of 555 for Missouri Department of Conservation fish collection sites within the watershed.

Soils

The Current River Watershed occurs primarily within the Ozarks Soil Region. Allgood and Persinger (1979) describe the Ozark Soils Region as

"cherty limestone ridges that break sharply to steep side slopes of narrow valleys. Loess occurs in a thin mantle or is absent. Soils formed in the residuum from cherty limestone or dolomite range from deep to shallow and contain a high percentage of chert in most places. Some of the soils formed in a thin mantle of loess are on the ridges and have fragipans, which restrict root penetration. Soil mostly formed under forest vegetation with native, mid-tall and tall grasses common in open or glade area."

The following is a list of Ozark soil associations found in the Current River Watershed:

Captina-Clarksville-Doniphan: “Nearly level to very steep, moderately well drained to excessively drained loamy upland soils that have fragipans or soils that are cherty throughout.” (Allgood and Persinger 1979)

Captina-Macedonia-Clarksville: “Nearly level to very steep, moderately well drained to somewhat excessively drained, loamy upland soils that have fragipans or soils that are cherty throughout.” (Allgood and Persinger 1979)

Captina-Macedonia-Doniphan-Poynor: “Nearly level to very steep well drained and moderately well drained, loamy upland soils that have fragipans or soils that are cherty throughout.” (Allgood and Persinger 1979)

Hartville-Ashton-Cedar Gap-Nolin: “Deep, nearly level to gently sloping, somewhat poorly drained to excessively drained, loamy bottom land soils.” (Allgood and Persinger 1979)

Hobson-Coulstone-Clarksville: “Gently sloping to very steep, moderately well drained to somewhat excessively drained, loamy soils with fragipans or soils that are cherty throughout.”(Allgood and Persinger 1979)

Lebanon-Hobson-Clarksville: “Gently sloping to very steep, moderately well drained to somewhat excessively drained, loamy and clayey soils with fragipans or soils that are cherty throughout.” (Allgood and Persinger 1979)

Loring-Union-Doniphan: “Nearly level to very steep, well drained and moderately well drained, loamy upland soils that have cherty subsoils or fragipans.” (Allgood and Persinger 1979)

Wilderness-Clarksville-Coulstone: “Gently sloping to very steep, moderately well drained to excessively drained, loamy upland soils that have cherty subsoils or fragipans.” (Allgood and Persinger 1979)

A small portion of the Current River Watershed in southeastern Ripley and southwestern Butler Counties occurs in the Mississippi Delta Soils Region. Allgood and Persinger (1979) describe the soils of this region:

“These soils are in the broad, nearly level flood plains and low terraces of the Mississippi River and associated tributaries. Crowley’s Ridge is the major sloping landform in the region. The upland loess mantle of the ridge is underlain by loamy, sandy, or gravelly deposits. Soils are deep on the flood plains, formed in loamy, sandy, and clayey alluvium. On the ridge soils are deep, loamy, or sandy. Some areas have fragipans. These soils of the lowlands formed under vegetation consisting of wetland, grasses, forest, sedges, and shrubs.”

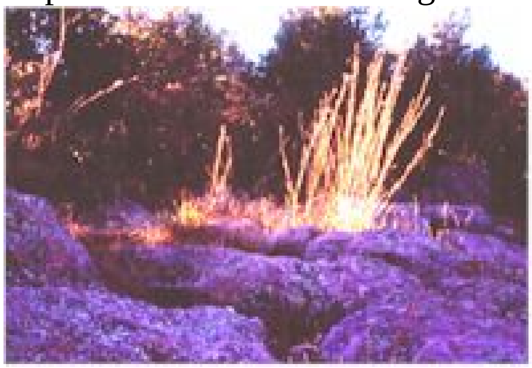
The following is a list of Mississippi Delta soil associations found in the Current River Watershed:

Calhoun-Amagon: “Deep, nearly level to gently sloping, poorly drained loamy soils on slightly concave stream terraces.” (Allgood and Persinger 1979)

Bosket-Tuckerman: “Deep, nearly level to moderately sloping, well drained to poorly drained, loamy soils on stream terraces.” (Allgood and Persinger 1979)

Geology and Karst

The geology of the Current River Watershed consists primarily of dolomites and sandstone/dolomites of Ordovician age (Figure Ge01). A significant exposure of Cambrian Dolomite is present in the middle portion of the watershed. This is mainly associated with major stream valleys. Exposures of Precambrian Igneous Rock are also present in the middle portion of the watershed. Both the Cambrian dolomite and Precambrian igneous rock are geologic exposures associated with the St. Francois Uplift. Within the Current River Watershed, the effects of the uplift are most pronounced in the middle portion of the watershed. As a result, the rocks in this portion of the watershed are older than in other areas of the watershed. Quaternary Alluvium, associated with the Bootheel area of Missouri, exists in the southeastern portion of the watershed on the southeastern side of the Little Black River. In, addition a few small areas of Mississippian limestone and limestone/sandstone occur on the watersheds eastern boundary.



As is the case in most watersheds of the Ozarks, the geology of the Current River Watershed (primarily consisting of soluble rock formations of dolomites and sandstone dolomites), in combination with an average annual precipitation of over 40 inches has created a karst landscape within the watershed. This karst landscape is characterized, in part, by a close relationship between the surface water and groundwater systems. Within karst landscapes, points or areas of surface water/ground water interaction include losing streams, sinkholes, and springs.

Losing streams are one manner in which surface water is transported or "lost" to the groundwater system. Within the Current River Watershed, 211 miles of streams have been designated as "losing" in the Rules of Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality (Table Ge01 and Figure Ge02) (MDNR 2000c). This is estimated at 1 mile of losing stream to 12.5 square miles of watershed area (1:12.5). This is a higher concentration of losing streams than has been documented within the Jacks Fork which has a ratio of 1 mile of losing streams to 50 square miles of watershed area. However, this is a relatively lower figure in comparison to the North Fork and Eleven Point Watersheds which have losing stream densities of 1:7.7 and 1:4.2 respectively. Within MDNR 2000c, a losing stream is defined as "A stream which distributes 30% or more of its flow during low flow conditions through natural processes, such as through permeable geologic materials into a bedrock aquifer within two (2) miles flow distance downstream of an existing or proposed discharge". Due to the specific nature of this definition, many streams within the watershed, which possibly lose large amounts of flow to the groundwater system, may have yet to be surveyed or classified as being "losing" in the broader sense of the word. Further study may be needed in order to develop a comprehensive understanding of the role of losing streams within the watershed.

In addition to losing streams, sinkholes provide another point of surface to groundwater interaction. While sinkholes are known to be common in the region surrounding the Current River Watershed, detailed information regarding sinkhole location and/or densities is limited. In order to better understand the extent of occurrence of sinkholes additional research is needed.

Several dye traces have been performed within the Current River Watershed by public and private agencies (Figure Ge02) (MDNR 2000a). Dye traces are useful for determining ground water movement and spring recharge area. Dye trace data for the Current River Watershed indicates that the watershed receives substantial amounts of ground water from neighboring watersheds including the Jacks Fork, Meremac, Black, and the Eleven Point. The most notable and well defined area of ground water transport is within the Big Spring recharge area. Much of the Big Spring recharge area occurs within the Eleven Point River Watershed where the longest dye trace was found originating in the Middle Fork, a strait line distance of 39 miles. There is little evidence of substantial groundwater transport from the Current River Watershed to neighboring watersheds. The exception to this is a trace completed from a sinkhole within the watershed which was recovered at Alley Spring in the Jacks Fork Watershed.

Springs are the naturally occurring outlets of groundwater systems. Spring flow accounts, to a large extent, for the higher sustained flows of many Ozark streams, including the Current River, relative to streams in other regions of Missouri. Within the watershed there are 248 known springs (1 spring /8.3 square miles of watershed area) (MDNR 2000b) (Figure Ge01). Vineyard and Feder (1974) list discharges for 49 springs within the watershed (Table Ge02). Twenty six of these springs have discharges exceeding 1 cubic foot per second (cfs). The largest spring within the watershed is Big Spring which has an average flow of approximately 428 cfs. This flow rate makes Big Spring the largest spring within the Ozarks Region of Missouri and Arkansas.

Stream Order, Mileage and Permanency

Stream order is “a hierarchy in which stream segments are arranged” (Judson et al. 1987)

The process of stream ordering is accomplished by examining maps and assigning orders to stream segments based on other streams which flow into them. When two stream segments of the same order join, the new segment they create is the next highest order. For instance, a first order stream would be a stream in which no other streams intersect it. A second order stream is created by the joining of two first order streams. A third order stream is created by the joining of two second order streams and so on. If the main channel of a stream happens to be a lower order than that of the intersecting stream, the main channel assumes the higher order. If the main channel is a higher order stream than the intersecting stream, it maintains the higher order (Figure Ge03). Two types of order are discussed within this document: Horton order which is the maximum order of a stream at its mouth; and Strahler order which is the immediate order of a stream at any given segment of its length. For instance the Strahler order of No Name Creek at point A in Figure Ge03 is second order while the Horton Order for the main channel designated as No Name Creek is third order.

Horton orders for streams within the Current Watershed have been obtained from a 1:24,000 scale Geographic Information System (GIS) hydrography coverage. There are 197 third order and larger streams within the watershed (Table Ge03 and Figures Ge04, Ge05 and Ge06). These streams account for a total of approximately 1,646 stream miles or 30% of the total stream miles within the watershed. Of the 197 third order and larger streams within the watershed, 157 are third order (857.8 miles), 30 are fourth order (351.3 miles), 8 are fifth order (164.3 miles), and 2 are sixth order (95.5 miles). The Current River is 177.3 miles long and becomes seventh order at the confluence of the Jacks Fork River.

Stream mileage per order (Strahler) for the Current River Watershed has been obtained from a 1:24,000 scale Geographic Information System (GIS) hydrography coverage. Of a total of 5,285 miles of stream within the watershed, approximately 3,255 miles (62%) are first order segments; 920 miles (17%)

are second order; 490 miles (9%) are third order; 326 miles (6%) are fourth order; 128 miles (2%) are fifth order; 31 miles (<1%) are sixth order; and 135 (3%) are seventh order. Table Ge04 lists length by order for fourth order and larger streams within the Current River Watershed.

Permanent stream mileage data based on the 1:24,000 National Hydrography Dataset (NHD) for the Current River Watershed indicates that approximately 678 stream miles (13%) within the watershed have permanent water. This equals approximately 1 mile of permanent stream for every 3.9 square miles of drainage area. Lengths of permanent stream by Strahler Order are as follows: first order-28 miles (<1% of all first order miles are permanent); second order-63 miles (7)%; third order-150 miles (31%); fourth order-213 miles (65%); fifth order- 74 miles (58%); sixth order-30 miles (97%); and seventh order-87 miles (100%).

It is important to note that permanent stream mileage data within the 1:24000 NHD is based on USGS Digital Line Graph hydrography data which, in turn is based upon USGS 1:24,000 scale topographic maps (USGS 1998e, USGS 1999b, MoRAP 2002). The USGS assigns a stream permanent status based on that stream having flow twelve months out of the year during normal precipitation (Weirich 1993, Blanc etal. 1999). This method may not take into account periods of drought or the possible 'losing' nature of a stream.

Drainage Area

Total drainage area of the Current River Watershed is River Watershed is 2,621 square miles (1,677,440 acres). The drainage area of the watershed in Missouri (not including the Jacks Fork Drainage) is 2069 square miles (1,324,424 acres). In order to facilitate analysis of watershed characteristics the watershed was divided based on eleven digit hydrologic units. This resulted in 8 units (Figure Ge07). The largest of these units is the Little Black River unit which drains approximately 382.2 square miles (244,582 acres).

Stream Channel Gradient

Channel gradient was determined for all fourth order and larger streams within the Current River Watershed using data digitized from USGS 7.5 minute topographic maps. Composite gradient graphs were constructed for all fifth order and larger streams within the watershed (Figures Ge08, Ge09, Ge10, Ge11, Ge12, Ge13, Ge14, and Ge15). Average gradients for fourth order and larger streams within the watershed range from 1.2 feet per mile to 84.5 feet per mile. The Current River has an average gradient of 3.9 feet/mile.

Figure Ge01.

Current River Watershed

Geology & Springs

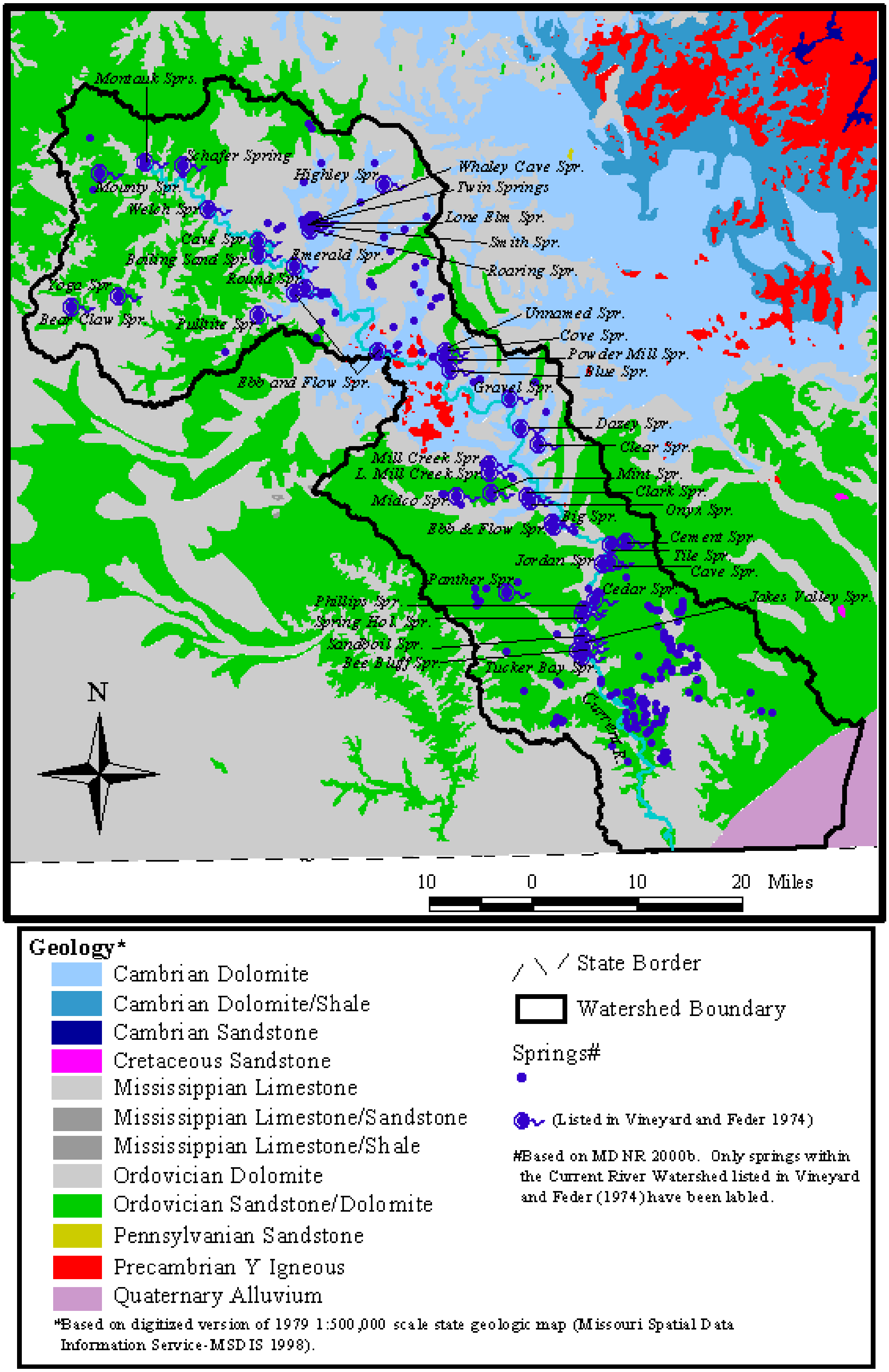


Figure Ge02.

Current River Watershed
Ground Water Transport

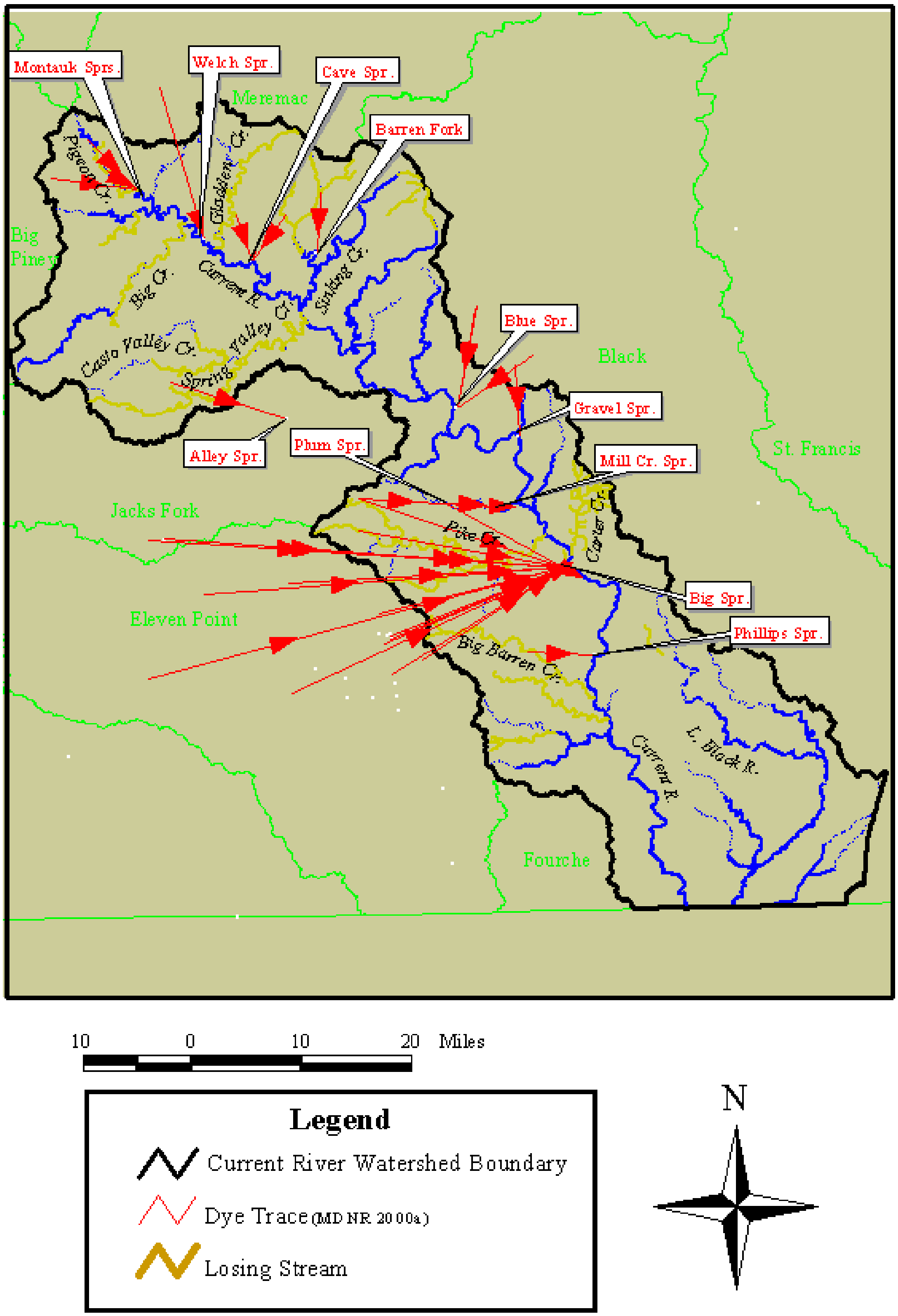
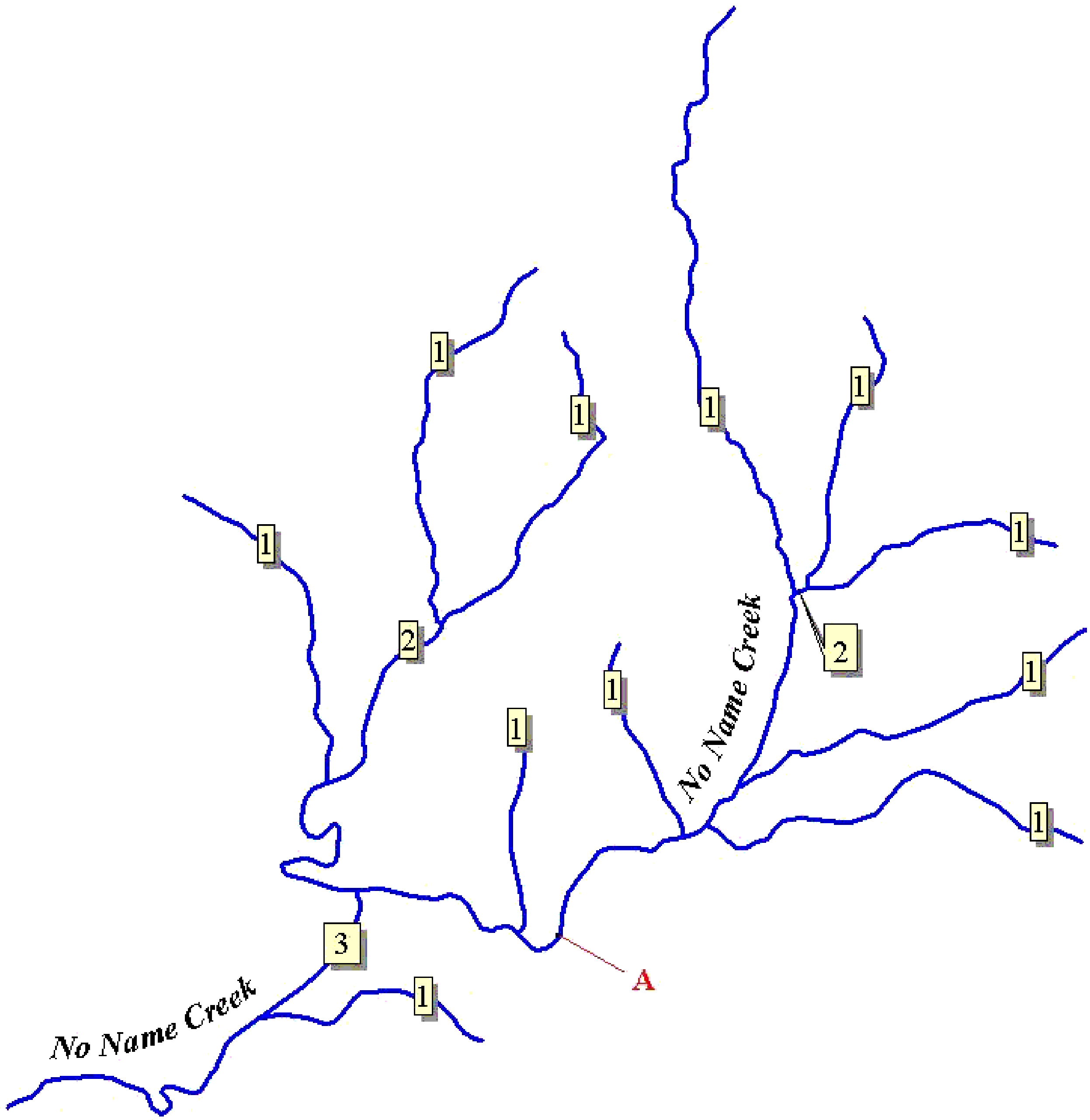


Figure Ge03. Example of Stream Order



The stream segment at Point A has a Horton order of 3 and a Strahler order of 2.

Figure Ge04.

Upper Current River
Third Order and Larger Streams

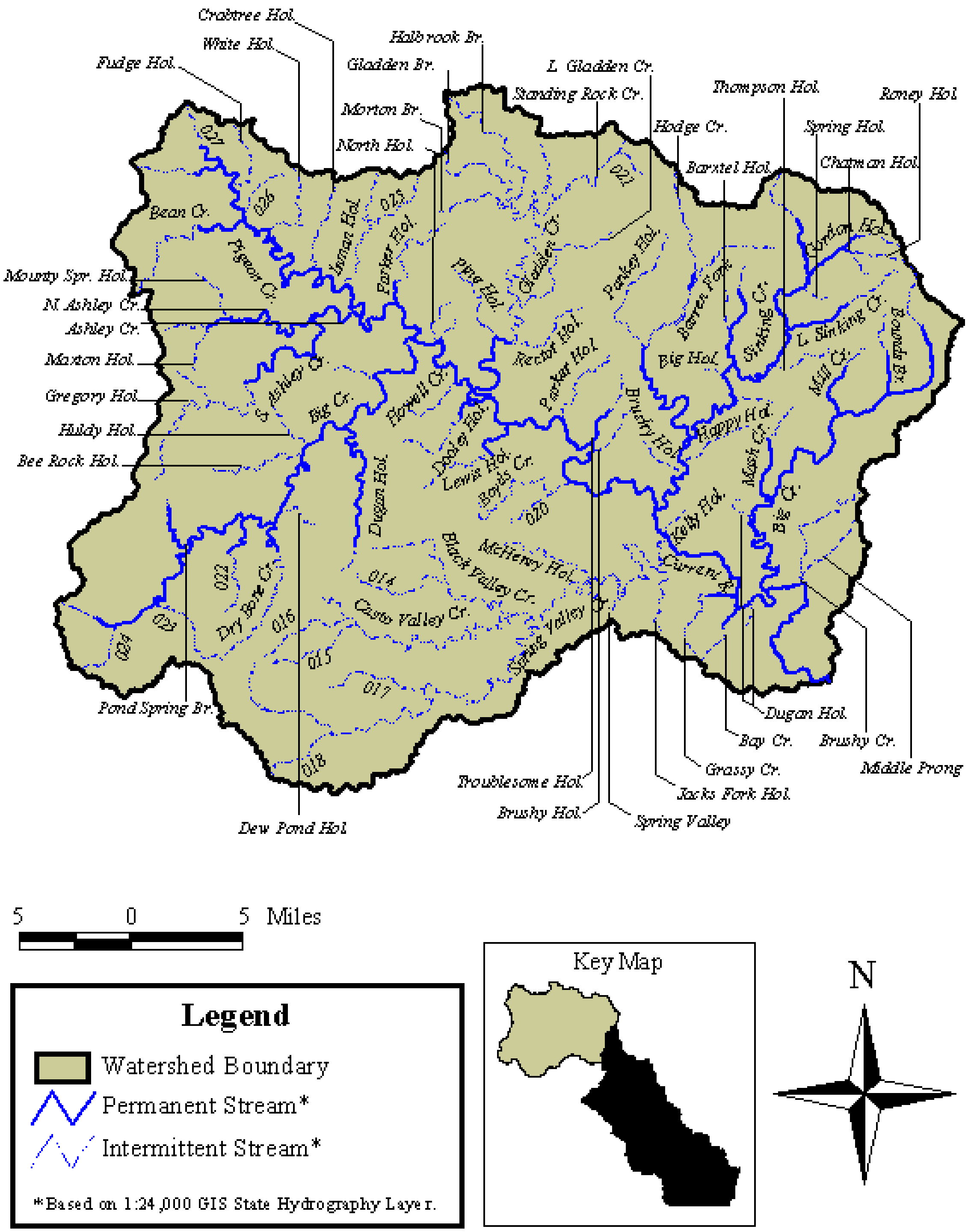


Figure Ge05.

Middle Current River
Third Order and Larger Streams

Legend

- Watershed Boundary
- Permanent Stream*
- Intermittent Stream*

*Based on 1:24,000 GIS State Hydrography Layer.

Figure Ge06

Lower Current River
Third Order and Larger Streams

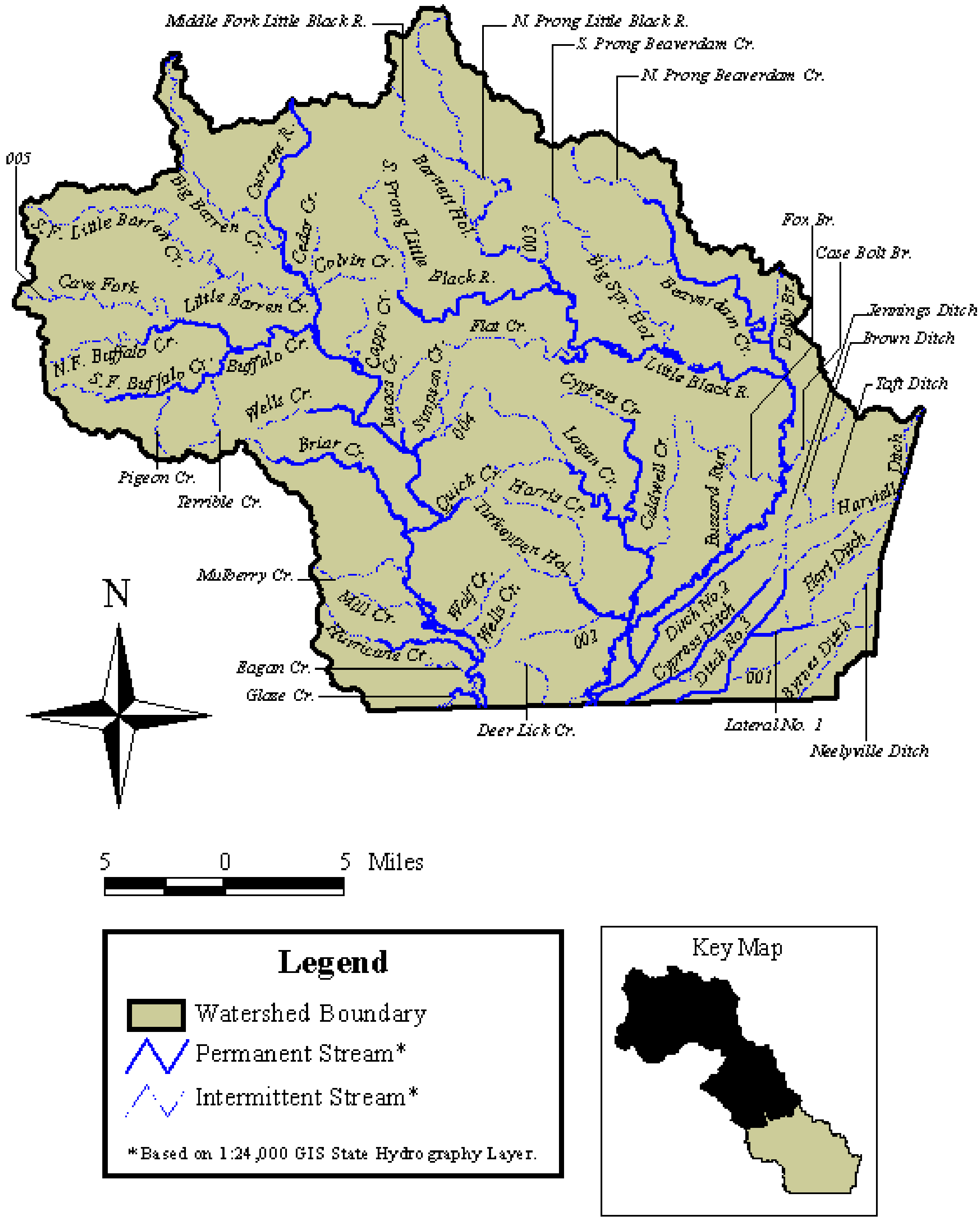
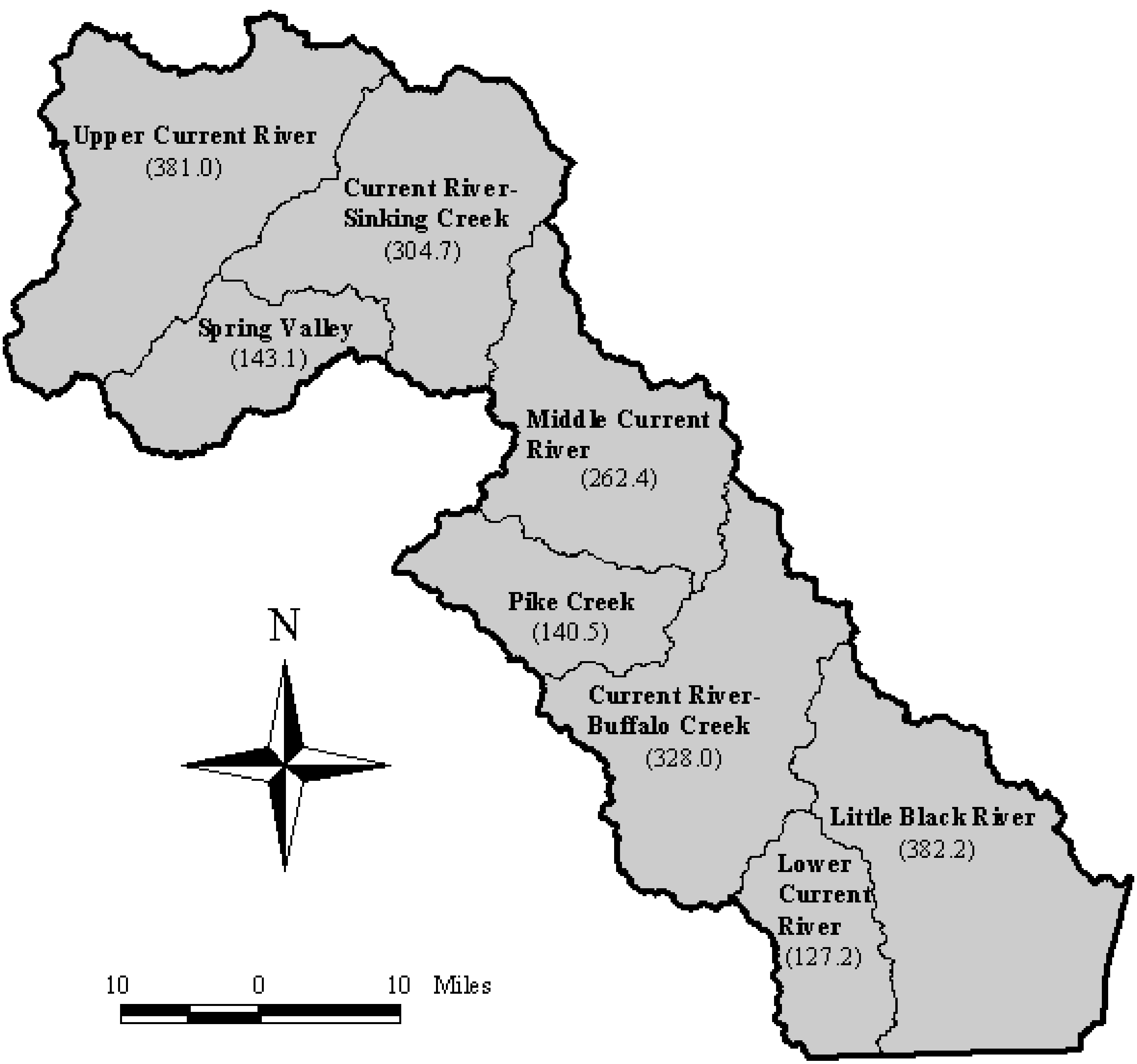


Figure Ge07.

Current River Watershed
Eleven Digit Hydrologic Units



Unit areas given in square miles.

Figure Ge08.

Gradient Plot for Lower Current River
&
Major Tributaries

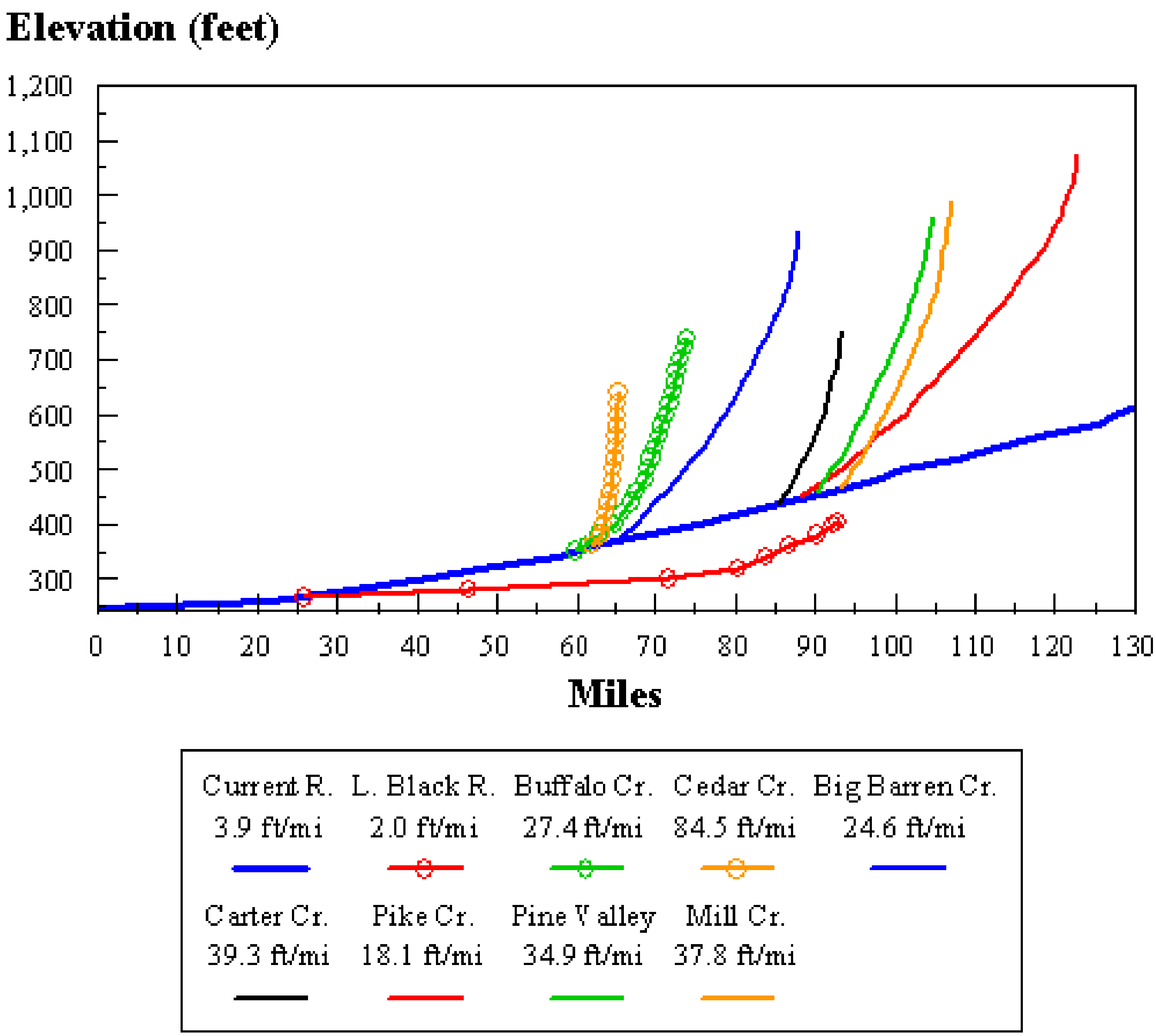


Figure Ge09.

Gradient Plot for Upper Current River
&
Major Tributaries

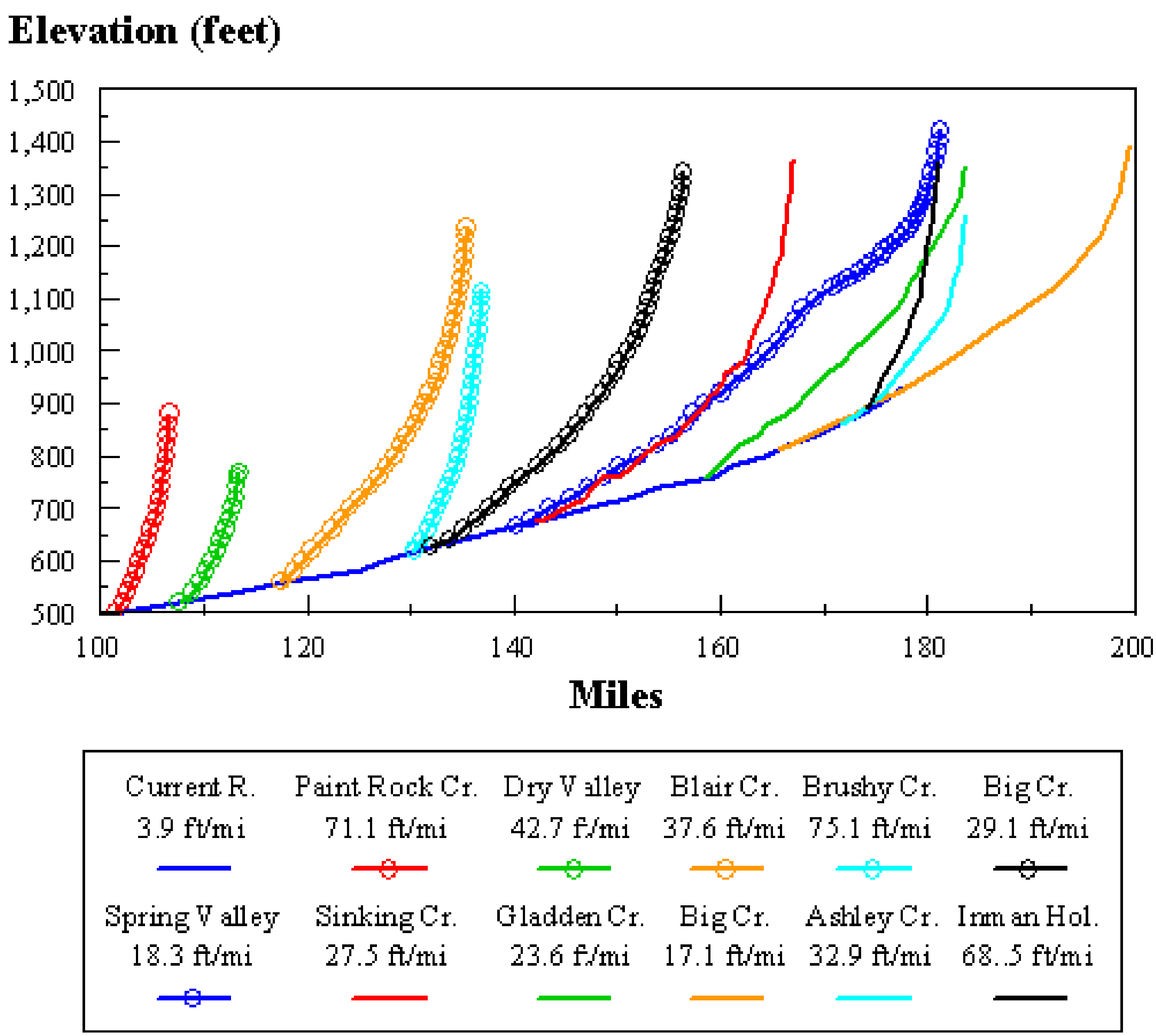


Figure Ge10.

Gradient Plot for Little Black River
&
Major Tributaries

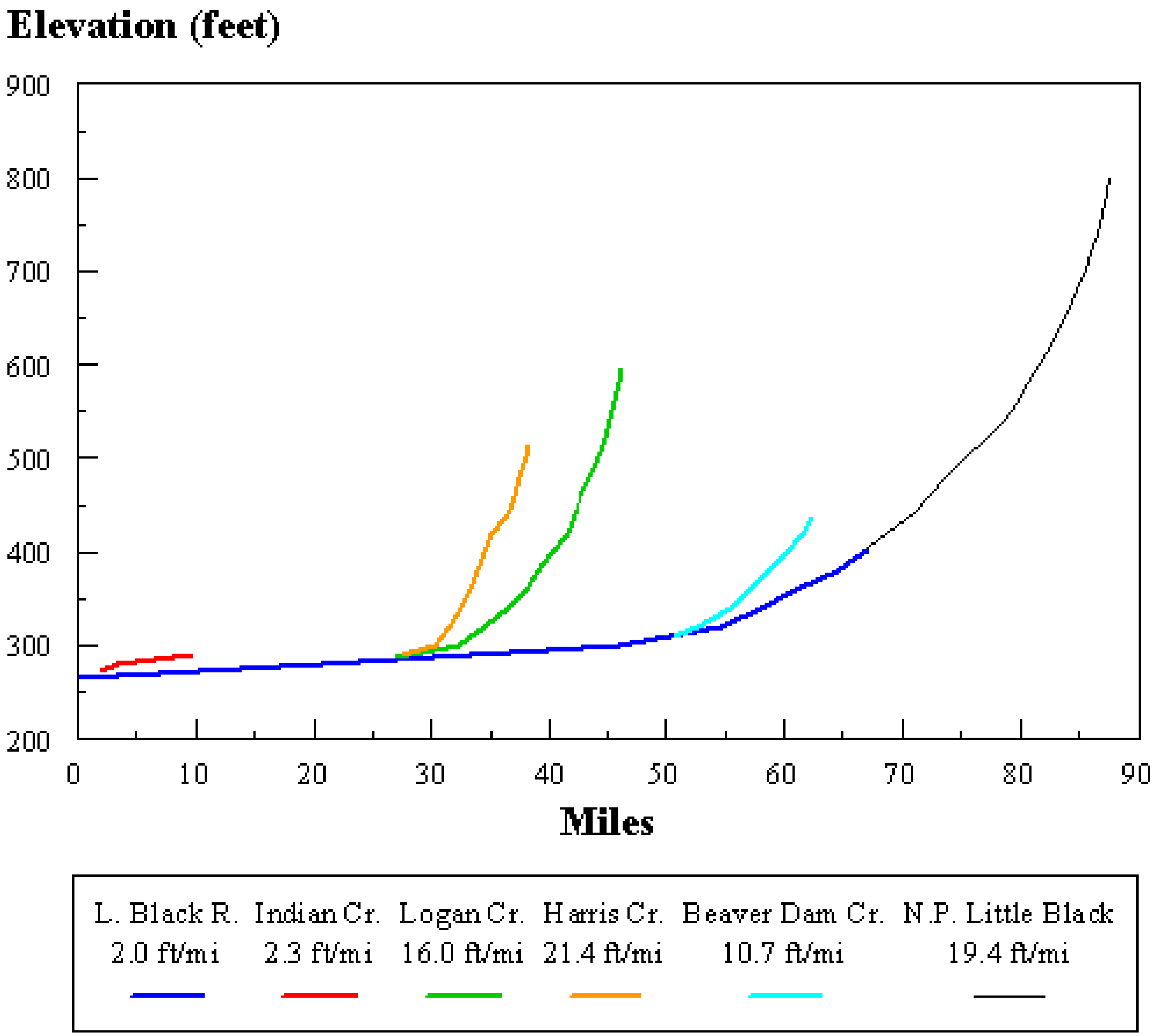


Figure Ge11.

Gradient Plot for Indian Creek Ditch
&
Major Tributaries

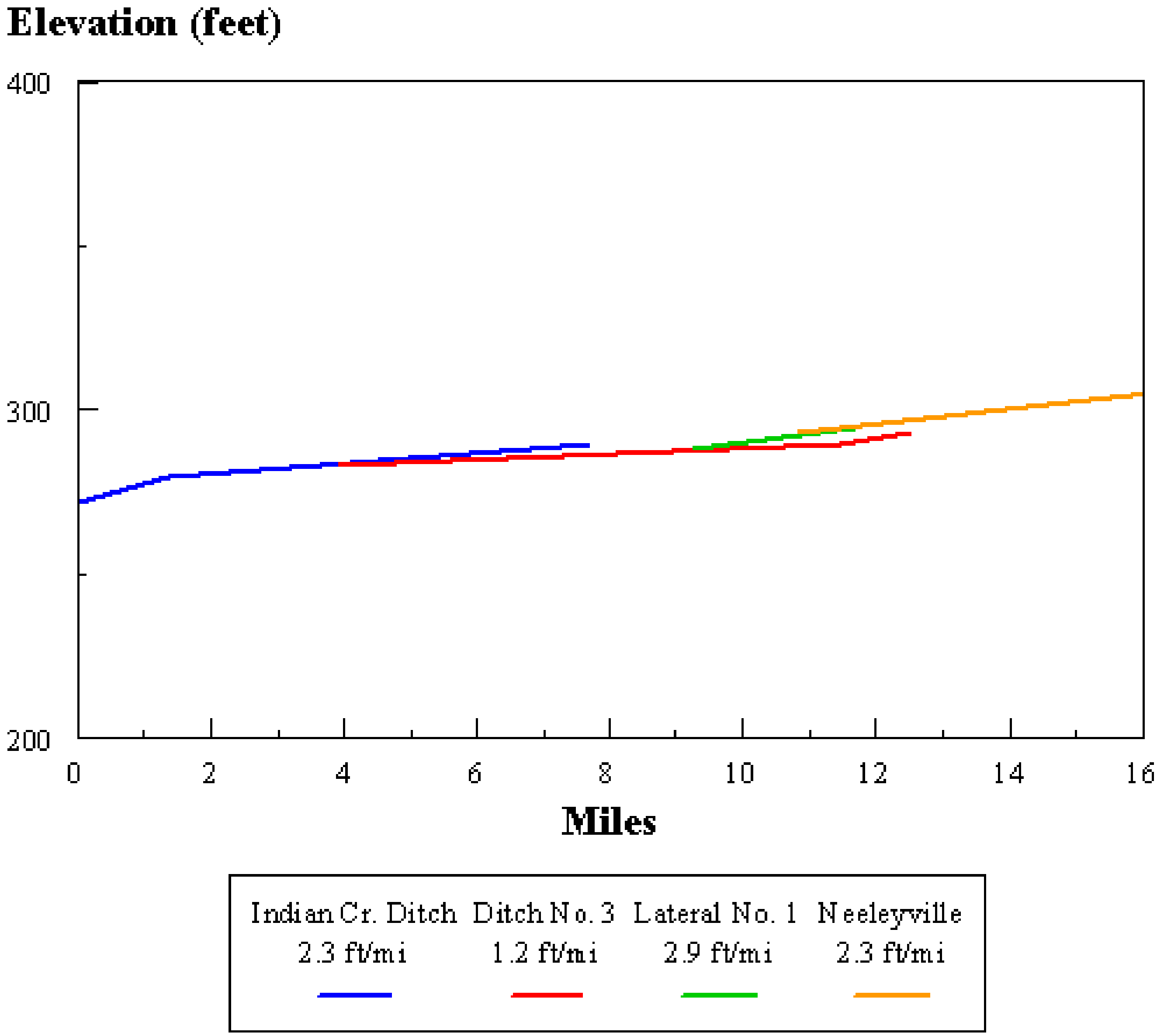


Figure Ge12.

Gradient Plot for Buffalo Creek
&
Major Tributary

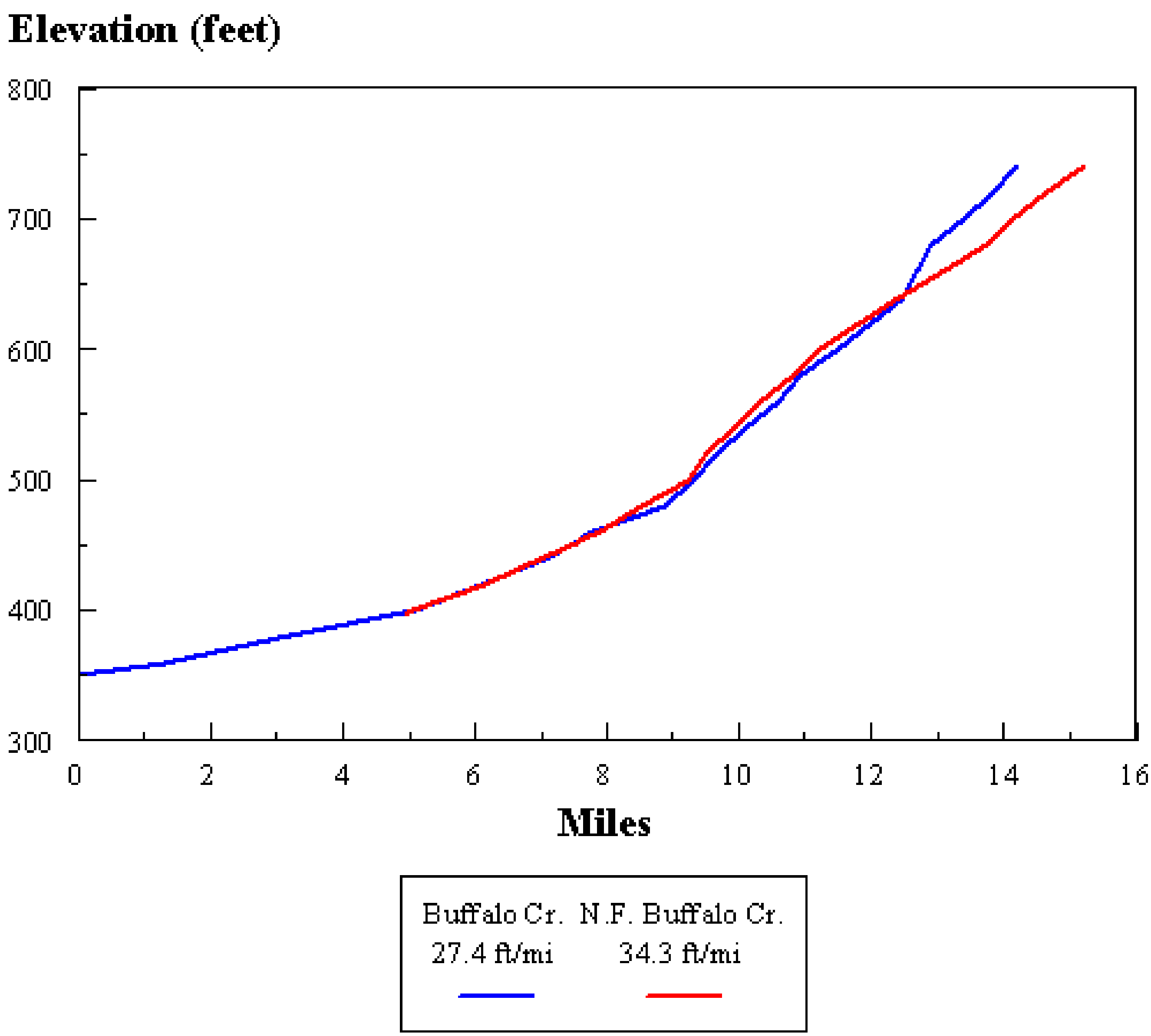


Figure Ge13.

Gradient Plot for Pike Creek

&

Major Tributaries

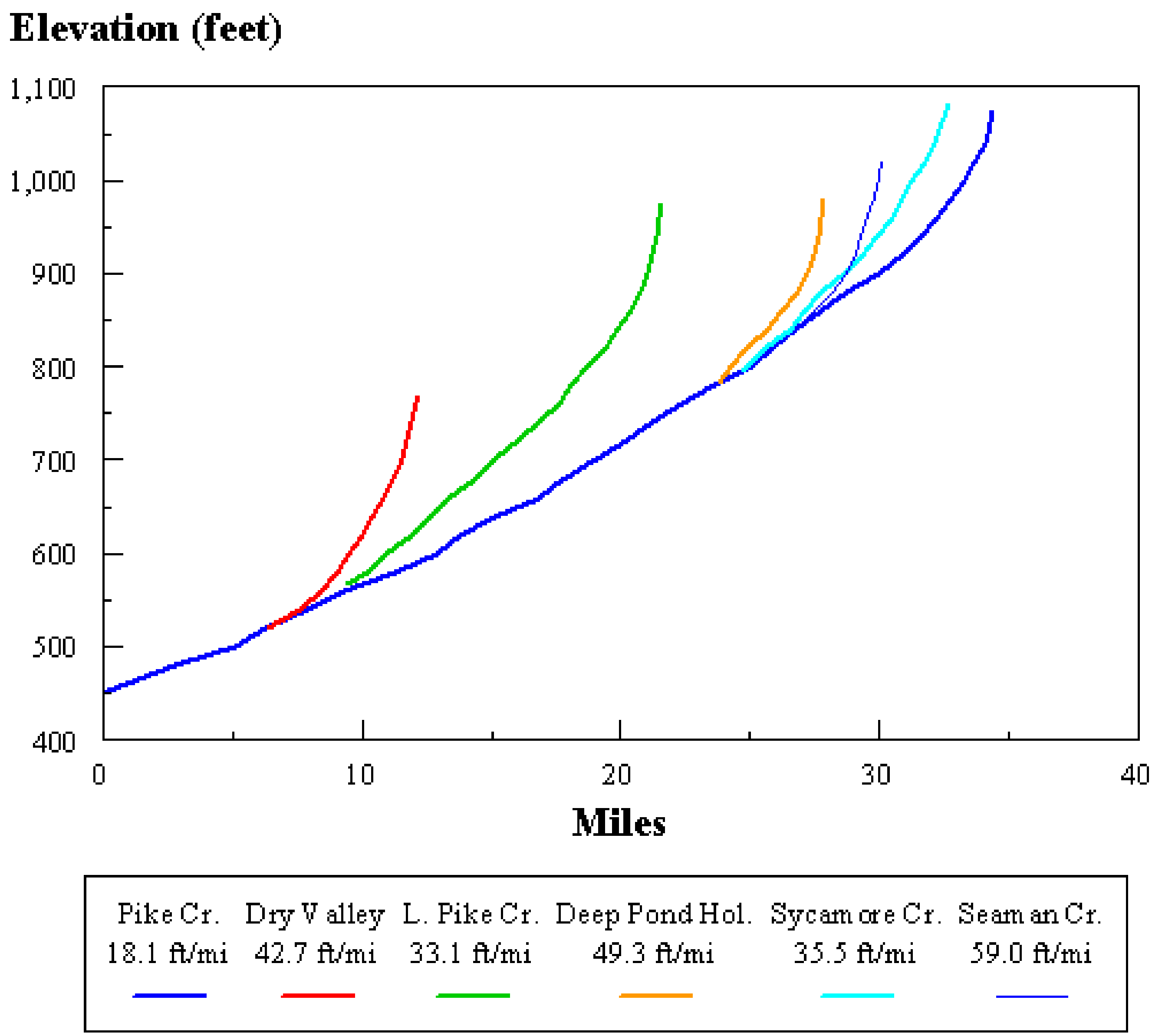
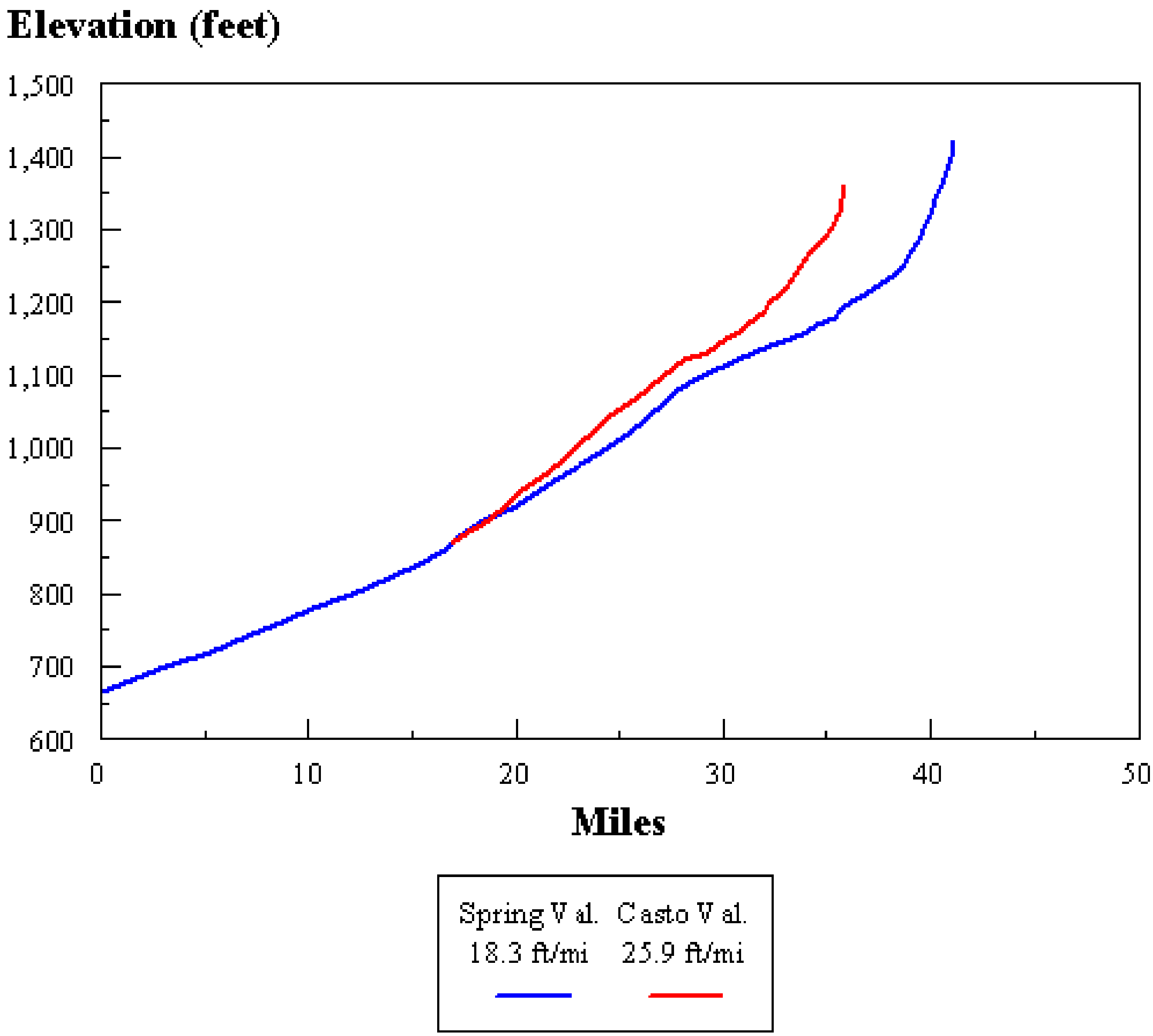


Figure Ge14.

Gradient Plot for Spring Valley & Major Tributary



FigureGe15.

Gradient Plot for Sinking Cr. & Major Tributaries

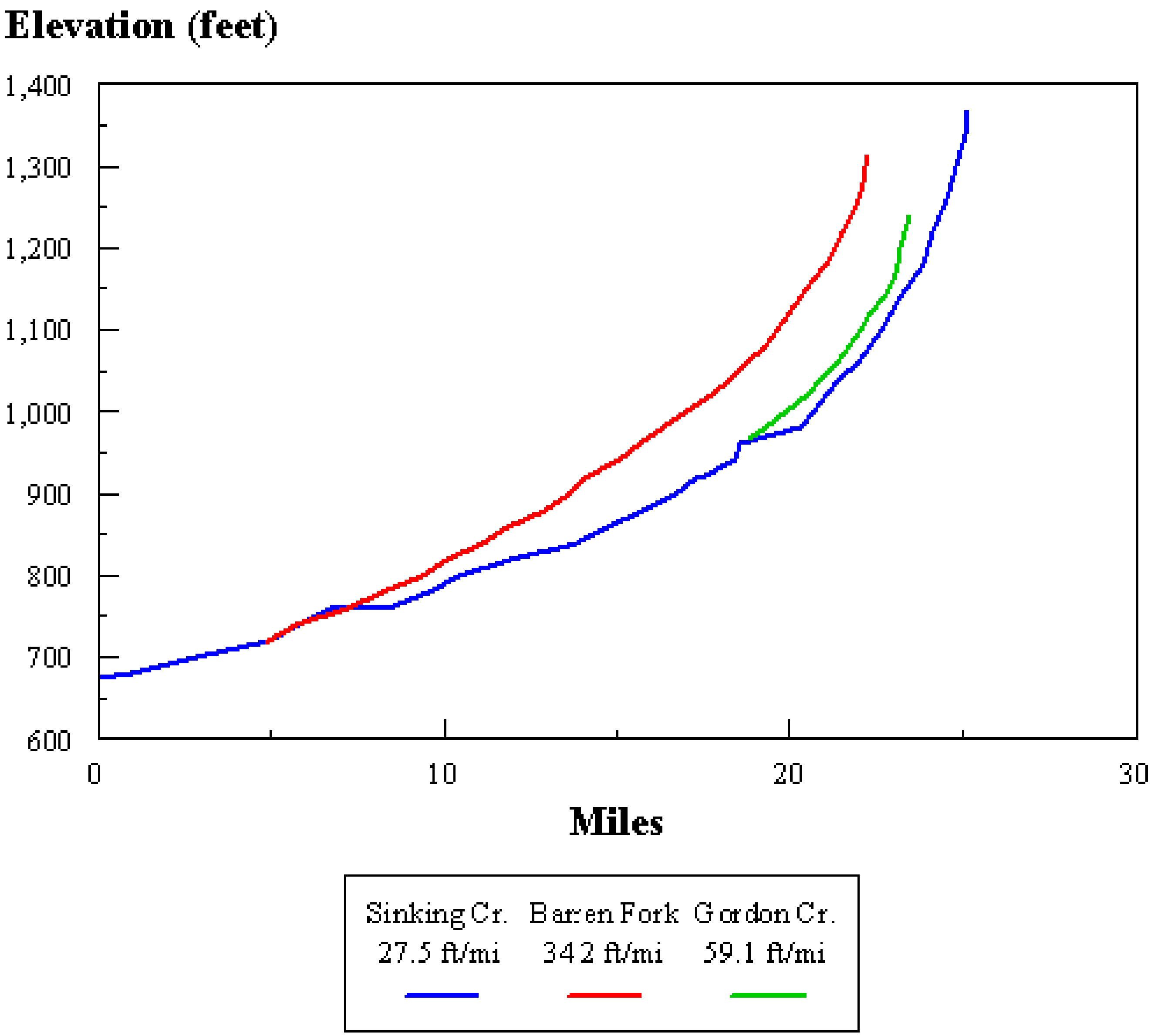


Table Ge01. Current River Watershed stream reaches designated as losing in Table J Rules of Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality. Code of State Regulations (MDNR 2000c).

Stream	Miles	From	To
Barren Fork	9.0	sw,se,ne,13,32n,04w	se,se,se,18,31n,04w
Big Cr.	3.5	nw,nw,se,1,32n,02w	sw,nw,nw,06,31n,02w
Big Cr.	2.5	se,se,ne,24,32n,03w	sw,se,se,31,32n,02w
Big Barren Cr.	16.0	ne,nw,sw,06 25n,02w	nw,se,nw,28,25n,01e
Big Barren Cr.	1.5	nw,sw,ne,30,26n,02w	se,sw,se,32,26n,02w
Buchanan Valley	4.0	nw,sw,ne,20,28n,01e	ne,ne,sw,04,27n,01e
Carter Cr.	7.0	ne,03,27n,01e	ne,ne,nw,32,27n,01e
Gladden Cr.	11.0	se,ne,sw,05,32n,05w	se,sw,sw,13,31n,06w
Gordon Hollow	2.0	nw,se,ne,13,32n,03w	ne,se,sw,11,32n,03w
Hodge Cr.	2.5	sw,sw,nw,09,32n,04w	se,nw,nw,28,32n,04w
Little Barren Cr.	12.0	nw,nw,nw,30,25n,01w	se,sw,nw,11,24n,01e
Little Pike Cr.	5.0	sw,nw,nw,18,26n,02w	ne,nw,nw,01,26n,02w
Little Sinking Cr.	2.0	ne,sw,ne,24,32n,03w	sw,nw,ne,26,32n,03w
Middle Fork	3.0	sw,sw,sw,28,26n,02e	ne,nw,se,10,25n,02e
Minning Haw Hol.	1.5	ne,ne,sw,01,32n,04w	nw,se,ne,14,32n,04w
N. Fork Buffalo Cr.	5.0	sw,sw,nw,19,24n,01w	nw,ne,ne,23,24n,01w
Orchard Mill Hol.	2.0	nw,nw,ne,32,33n,04w	sw,sw,nw,09,32n,04w
Pankey Br.	3.0	sw,nw,nw,19,32n,04w	nw,se,sw,06,31n,04w
Pigeon Cr.	9.0	sw,ne,nw,31,33n,07w	se,se,ne,22,32n,07w
Right Fork	2.0	se,ne,se,02,27n,01e	ne,ne,sw,04,27n,01e
Roney Hollow	2.0	se,se,se,13,32n,03w	sw,ne,sw,14,32n,03w
Standing Rock Cr.	5.0	sw,nw,ne,30,33n,04w	ne,ne,sw,05,32n,05w
Stringer Br.	2.0	ne,ne,se,06,32n,04w	sw,nw,nw,19,32n,04w
Unnamed Trib.	1.5	ne,sw,sw,08,29n,06w	se,sw,ne,16,29n,06w
Black Valley Cr.	6.0	sw,nw,nw,27,30n,06w	ne,se,nw,05,29n,05w
Sycamore Cr.	6.0	sw,nw,nw,01,27n,04w	nw,se,se,22,27n,03w
Pike Cr.	24.0	sw,se,sw,16,27n,04w	nw,nw,sw,24,27n,01w
Young Hol.	3.5	sw,se,sw,10,26n,03w	sw,ne,nw,18,26n,02w
Big Cr.	13.0	se,ne,se,17,30,07w	ne,nw,sw,04,31n,06w
Castro Valley	8.0	ne,se,nw,01,29n,07w	nw,se,nw,06,29n,05w
Spring Valley	29.0	sw,sw,se,13,29n,08w	se,se,nw,20,30n,04w
Dry Bone Cr.	1.0	nw,sw,sw,21,30n,07w	se,ne,se,17,30n,07w
S. Ashley Cr.	6.0	ne,se,nw,18,31n,07w	sw,se,ne,34,32n,07w
Total	210.5		

Table Ge02. Location and discharge (cubic feet per second) of selected springs in the Current River Watershed (Vineyard and Feder 1974).

Name	County	USGS 7.5' Quadrant Name	Discharge (cfs)
Barren Creek Spring	Carter	Handy	0.06
Bear Claw Spring	Texas	Raymondville	2.02
Bee Bluff	Ripley	Grandin SW	0.92
Big Spring	Carter	Big Spring	428.00*
Blue Spring	Shannon	Powder Mill Ferry	107.00*
Boiling Sand Spring (1)	Shannon	Round Spring	0.50
Boiling Sand Spring (2)	Shannon	Round Spring	12.57*
Boiling Sand Spring (3)	Shannon	Round Spring	3.68*
Cave Spring (Hunter)	Carter	Big Spring	1.81*
Cave Spring	Shannon	Round Spring	32.38*
Cedar Spring	Carter	Grandin SW	1.10*
Cement Spring	Carter	Hunter	0.68
Clark Spring	Carter	Van Buren South	0.49*
Clear Spring	Carter	Van Buren North	0.32*
Cove Spring	Shannon	Powder Mill Ferry	1.24*
Dazey Spring	Carter	Van Buren North	0.57*
Ebb and Flow Spring	Shannon	Eminence	0.14
Ebb and Flow Spring	Shannon	Round Spring	0.00
Ebb & Flow Spring	Carter	Big Spring	0.41
Emerald Spring	Shannon	Round Spring	0.08*
Gravel Spring	Shannon	Exchange	16.8*
Highley Spring	Dent	Loggers	12.37*
Jakes Valley Spring	Ripley	Grandin SW	0.59*
Jordan Spring	Carter	Big Spring	11.97*
Little Mill Creek	Carter	Van Buren North	0.90*
Lone Elm Spring	Shannon	Round Spring	0.15
Midco Spring	Carter	Fremont	1.48*
Mill Creek Spring	Carter	Van Buren North	10.1
Mint Spring	Carter	Van Buren South	0.01
Montauk Spring 3-7	Dent	Montauk	63.30*
Mounty Spring	Texas	Licking	0.02*
Onyx Spring	Carter	Van Buren South	0.00*
Panther Spring	Carter	Handy	0.44*
Phillips Spring	Carter	Grandin SW	14.80*
Powder Mill Spring	Shannon	Powder Mill Ferry	5.15

Pullite Spring	**Shannon**	**Alley Spring**	**36.08***
Roaring Spring	**Shannon**	**Round Spring**	**0.59***
Round Spring	**Shannon**	**Round Spring**	**40.00***
Sandboil	**Ripely**	**Grandin SW**	**0.63***
Shaffer Spring	**Dent**	**Cedargrove**	**2.04***
Smith Spring	**Shannon**	**Round Spring**	**0.51**
Spring Hollow Spring	**Carter**	**Grandin Sw**	**2.42***
Tile Spring	**Carter**	**Big Spring**	**0.22***
Tucker Bay Spring	**Ripley**	**Grandin SW**	**37.75***
Twin Springs	**Ripley**	**Grandin Sw**	**10.0***
Twin Springs	**Shannon**	**Round Spring**	**10.96**
Unnamed	**Shannon**	**Powder Mill Ferry**	**0.24**
Welch Spring	**Shannon**	**Cedargrove**	**121.00***
Whaley Cave Spring	**Shannon**	**Gladden**	**0.31***
Yoga Spring	**Texas**	**Hartshorn**	**1.96***

*Average of multiple measurements.

Table Ge03 (1 of 8). Third order and larger streams of the Current River Watershed (includes Arkansas).

Stream Name	Order	USGS 7.5' Quad at Stream Mouth	Name and Order Receiving Stream	Length	
				P	T
Current River	7	Pocahontas , AR	Black River (AR)	183.5	183.5
Little Black R.	6	Supply, AR	Current R.-7	45.6	46.4
Byrnes Ditch	3	Supply, AR	Little Black R.-6	6.9	18.1
Indian Cr. Ditch	5	Datto , AR	Little Black R.-6	0.0	0.9
Cypress Ditch	3	Datto , AR	Indian Cr. Ditch-5	8.1	11.6
Ditch No. 3	5	Datto , AR	Indian Cr. Ditch-5	8.0	11.6
CRW001	3	Naylor , AR	Ditch No. 3-5	3.7	3.8
Lateral No. 1	4	Naylor , AR	Ditch No. 3-5	1.6	2.4
Neeleyville Ditch	4	Naylor , AR	Ditch No. 3-5	1.0	5.3
Hart Ditch	3	Naylor , AR	Neeleyville Ditch-4	0.0	5.8
Harviell Ditch	3	Naylor , AR	Ditch No. 3-4	0.0	9.8
Jennings Ditch	3	Naylor , AR	Ditch No. 3-4	0.0	2.8
Brown Ditch	3	Naylor , AR	Jennings Ditch-3	0.0	2.8
Taft Ditch	3	Naylor , AR	Brown Ditch-3	0.0	2.3
Ditch No. 2	3	Datto , AR	Little Black R.-6	9.3	11.2
Deer Lick Creek	3	Oxly	Little Black R.-6	0.0	6.2
Logan Cr.	5	Oxly	Little Black R.-6	13.3	18.9
Harris Cr.	4	Oxly	Logan Cr.-5	4.7	11.4
CRW002	3	Oxly	Harris Cr.-4	0.0	3.8
Turkeypen Hol.	3	Oxly	Harris Cr.-4	0.0	3.3
Caldwell Cr.	3	Oxly	Logan Cr.-4	0.5	7.0
Cypress Cr.	3	Oxly	Logan Cr.-4	6.5	9.8
Little Logan Cr.	3	Flatwoods	Logan Cr.-4	0.0	3.8
Buzzard Run	3	Naylor	Little Black R.-5	0.0	8.5
Fox Branch	3	Fairdealing	Little Black R.-5	0.0	2.4
N.P. Beaverdam Cr.	3	Hogan Hollow	Beaverdam Cr.-4	3.6	8.5
S.P. Beaverdam Cr.	3	Hogan Hollow	Beaverdam Cr.-4	0.0	9.1
Case Bolt Br.	3	Fairdealing	Little Black R.-5	0.4	4.7
Beaverdam Cr.	4	Fairdealing	Little Black R.-5	11.5	11.5
Dolly Br.	3	Fairdealing	Beaverdam Cr.-4	1.0	3.8
Big Spring Hol.	3	Flatwoods	Little Black R.-4	1.6	5.9
Flat Cr.	3	Flatwoods	Little Black R.-4	2.2	9.8
S.P. Little Black R.	3	Flatwoods	Little Black R.-4	11.0	18.0
N.P. Little Black R.	4	Flatwoods	Little Black R.-4	5.5	20.5
CRW003	3	Grandin	N.P. Little Black R.-4	0.0	2.4
Barnett Hol.	3	Grandin	N.P. Little Black R.-4	0.0	2.6

Middle Fork	3	Grandin	N.P. Little Black R.-4	0.0	4.9
Glaze Cr.	3	Doniphan S.	Current R.-7	1.8	7.9
Eagan Cr.	3	Doniphan S.	Current R.-7	0.0	2.1
Hurricane Cr.	3	Doniphan S.	Current R.-7	6.0	9.7
Wells Cr.	3	Doniphan S.	Current R.-7	0.1	2.9
Wolf Cr.	3	Doniphan S.	Current R.-7	0.0	4.0
Mill Cr.	3	Doniphan S.	Current R.-7	0.9	4.6
Mulberry Cr.	3	Doniphan S.	Current R.-7	0.0	5.8
Briar Cr.	3	Doniphan S.	Current R.-7	9.2	11.0
Simpson Cr.	3	Doniphan N.	Current R.-7	1.4	5.1
CRW004	3	Doniphan N.	Simpson Cr.-3	0.0	3.3
Isaacs Cr.	3	Doniphan N.	Current R.-7	1.2	5.1
Wells Cr.	3	Briar	Current R.-7	3.1	5.6
Capps Cr.	3	Briar	Current R.-7	0.1	4.0
Buffalo Cr.	5	Briar	Current R.-7	5.4	5.4
S.F. Buffalo Cr.	4	Briar	Buffalo Cr.-5	8.2	10.9
Terrible Cr.	3	Briar	S.F. Buffalo Cr.-4	0.0	4.7
Pigeon Cr.	3	Bardley	S.F. Buffalo Cr.-4	0.0	3.4
N.F. Buffalo Cr.	4	Briar	Buffalo Cr.	6.4	12.0
Cave Fork	3	Bardley	N.F. Buffalo Cr.-4	0.0	14.3
Little Barren Cr.	3	Grandin S.W.	Current R.-7	0.1	8.5
S.F. Little Barren Cr.	3	Grandin S.W.	Little Barren Cr.	0.2	14.0
Cedar Cr.	4	Grandin S.W.	Current R.-7	0.0	3.2
Colvin Cr.	3	Grandin S.W.	Cedar Cr.	0.0	3.1
Big Barren Cr.	4	Grandin S.W.	Current R.-7	1.8	25.0
Cave Fork	3	Handy	Big Barren Cr.-4	0.0	6.0
CRW005	3	Handy	Cave Fork-3	0.0	1.9
Devils Run	3	Handy	Big Barren Cr.-3	0.0	5.0
Cedar Bluff Cr.	3	Handy	Big Barren Cr.-4	0.0	2.7
Bear Camp Cr.	3	Grandin S.W.	Current R.-7	0.0	7.2
Shelton Hol.	3	Big Spring	Current R.-7	0.3	3.8
Copper Mine Hol.	3	Big Spring	Current R.-7	0.1	6.6
Aldrich Valley	3	Big Spring	Current R.-7	0.0	9.2
Brown Hol.	3	Big Spring	Aldrich Valley-7	0.0	6.4
Chilton Cr.	3	Big Spring	Current R.-7	0.1	8.5
Spring Valley	3	Big Spring	Current R.-7	0.6	45.1
Sweezie Hol.	3	Big Spring	Current R.-7	0.0	2.5
CRW006	3	Big Spring	Sweezie Hol.	0.0	3.0
Carter Cr.	4	Big Spring	Current R.-7	0.1	9.2
Latty Valley	3	Big Spring	Carter Cr.-4	0.0	3.2
R. Fork Carter Cr.	3	Garwood	Carter Cr.-4	0.0	3.0
Barnsville Hol.	3	Garwood	Current R.-7	0.5	3.2

Pike Cr.	5	Van Buren S.	Current R.-7	1.0	38.7
Wilburn Br.	3	Van Buren S.	Pike Cr.-5	0.0	3.5
Dry Valley	4	Van Buren S.	Pike Cr.-5	0.0	5.6
Pocca Hol.	3	Van Buren S.	Dry Valley-4	0.0	4.1
Secesh Hol.	3	Van Buren S.	Dry Valley-4	0.0	2.6
Little Pike Cr.	4	Fremont	Pike Cr.-5	0.0	11.5
CRW007	3	Fremont	Little Pike Cr.-4	0.0	2.8
Young Hol.	3	Fremont	Little Pike Cr.-4	0.0	4.0
Midco Hol.	3	Fremont	Pike Cr.-5	0.0	4.4
Vermillion Hol.	3	Fremont	Pike Cr.-5	0.0	3.9
Windes Cr.	3	Fremont	Pike Cr.-5	0.0	3.3
Deep Pond Hol.	4	Low Wassie	Pike Cr.-5	0.0	4.8
CRW008	3	Low Wassie	Deep Pond Hol.-4	0.0	2.2
CRW009	3	Low Wassie	Deep Pond Hol.-3	0.0	1.0
Sycamore Cr.	4	Low Wassie	Pike Cr.-5	0.0	8.5
Big Hol.	3	Winona	Sycamore Cr.-4	0.0	8.5
Martin Hol.	3	Winona	Sycamore Cr.-4	0.0	3.2
CRW010	3	Winona	Sycamore Cr.-4	0.0	1.9
Seaman Cr.	4	Low Wassie	Pike Cr.-5	0.0	3.3
CRW011	3	Low Wassie	Seaman Cr.-4	0.0	2.6
CRW012	3	Winona	Pike Cr.-4	0.0	3.1
Pine Valley Cr.	4	Van Buren N.	Current R.-7	6.9	14.9
Christins Hol.	3	Van Buren N.	Pine Valley Cr.-4	0.0	1.8
Mill Cr.	4	Van Buren N.	Current R.-7	3.2	14.3
Little Mill Cr.	3	Van Buren N.	Mill Cr.-4	0.0	2.6
Rogers Cr.	3	Van Buren N.	Current R.-7	10.6	13.3
Chilton Cr.	3	Van Buren N.	Current R.-7	2.5	4.1
Long Br.	3	Van Buren N.	Current R.-7	0.0	5.8
Paint Rock Cr.	4	Exchange	Current R.-7	3.5	5.3
Little Paint Rock Cr.	3	Exchange	Paint Rock Cr.-4	2.1	2.1
Thorny Creek	3	Powdermill Ferry	Current R.-7	3.3	4.4
Carr Cr.	3	Powdermill Ferry	Current R.-7	4.2	10.4
Powdermill Cr.	3	Powdermill Ferry	Current R.-7	1.2	4.3
Bloom Cr.	3	Powdermill Ferry	Current R.-7	0.0	2.6
Blair Cr.	4	Powdermill Ferry	Current R.-7	16.5	19.5
Reeves Cox Hol.	3	Powdermill Ferry	Blair Cr.-4	0.0	2.6
Spring Hol.	3	Midridge	Blair Cr.-4	1.0	7.5
Jim's Cr.	3	Midridge	Blair Cr.-4	1.1	2.9
Laxton Hol.	3	Midridge	Blair Cr.-4	1.8	4.0
CRW013	3	Midridge	Blair Cr.-4	0.0	1.7
Matthew's Br.	3	Eminence	Current R.-7	2.7	3.8
Brushy Cr.	4	The Sinks	Current R.-7	0.0	6.9

Middle Prong	3	The Sinks	Brushy Cr.-4	0.0	3.8
Big Cr.	4	Eminence	Current R.-7	24.8	28.1
Mash Cr.	3	The Sinks	Big Cr.-4	3.1	5.0
Mill Cr.	3	The Sinks	Big Cr.-4	2.8	4.0
Bounds Br.	3	Midridge	Big Cr.-4	1.8	4.2
Bay Br.	3	Eminence	Current R.-7	1.2	3.1
Grassy Cr.	3	Eminence	Current R.-7	1.5	5.2
Spring Valley Cr.	5	Round Spring	Current R.-6	0.6	45.1
Jacks Fork Hollow	3	Alley Spring	Spring Valley Cr.-5	0.0	3.9
McHenry Hollow	3	Round Spring	Spring Valley Cr.-5	0.0	5.7
Casto Valley Cr.	5	Summersville NE	Spring Valley Cr.-5	0.0	16.5
Black Valley Cr.	4	Summersville NE	Casto Valley Cr.-5	0.0	8.2
CRW014	3	Lewis Hollow	Black Valley Cr.-4	0.0	5.2
S.F. Black Valley Cr.	3	Lewis Hollow	Black Valley Cr.-4	0.0	2.3
CRW015	3	Summersville	Casto Valley Cr.-4	0.0	4.8
CRW016	3	Summersville	Casto Valley Cr.-4	0.0	5.0
CRW017	3	Summersville NE	Spring Valley Cr.-4	0.0	5.2
CRW018	3	Summersville	Spring Valley Cr.-4	0.0	3.9
Sinking Cr.	5	Round Spring	Current R.-6	24.4	27.2
Happy Hol.	3	Round Spring	Sinking Cr.-5	0.0	3.6
Barren Fork	4	Round Spring	Sinking Cr.-5	8.9	20.5
Pankey Br.	3	Gladden	Barren Fork-4	0.0	7.1
Hodge Cr.	3	Gladden	Barren Fork-4	0.8	5.9
CRW019	3	The Sinks	Sinking Cr.-4	0.0	1.9
Little Cr.	3	Loggers Lake	Sinking Cr.-4	4.2	5.3
Barxtel Hol.	3	Loggers Lake	Little Cr.-3	0.0	2.2
Thompson Hol.	3	Loggers Lake	Sinking Cr.-4	0.0	3.5
Little Sinking Cr.	3	Loggers Lake	Sinking Cr.-4	3.3	6.2
Gordon Cr.	4	Loggers Lake	Sinking Cr.-4	3.0	5.2
Chatman Hol.	3	Loggers Lake	Gordon Cr.-4	0.4	1.8
Roney Hol.	3	Loggers Lake	Chatman Hol.-3	0.0	2.6
Boyds Cr.	3	Round Spring	Current R.-5	0.1	7.6
CRW020	3	Round Spring	Boyds Cr.-3	0.0	2.5
Harrison Hol.	3	Round Spring	Current R.-5	0.0	3.0
Troublesome Hol.	3	Round Spring	Current R.-5	2.0	3.8
Parker Hol.	3	Round Spring	Current R.-5	0.0	4.8
Lewis Hol.	3	Lewis Hollow	Current R.-5	2.2	6.9
Gladden Cr.	4	Cedar Grove	Current R.-5	6.2	22.6
Pine Hol.	3	Cedar Grove	Gladden Cr.-4	0.0	4.7
Rector Hol.	3	Cedar Grove	Gladden Cr.-4	0.0	4.4
Little Gladden Cr.	3	Cedar Grove	Gladden Cr.-4	0.0	7.7
Standing Rock Cr.	3	Cedar Grove	Gladden Cr.-4	0.0	8.0

CRW021	3	Doss	Standing Rock Cr.-3	0.0	1.9
Gladden Br.	4	Cedar Grove	Gladden Cr.-4	0.0	8.9
Halbrook Br.	3	Cedar Grove	Gladden Br.-4	0.0	9.3
Morton Br.	3	Cedar Grove	Gladden Br.-4	0.0	4.2
Dooley Hol.	3	Lewis Hollow	Current R.-5	1.6	5.5
Howell Hol.	3	Cedar Grove	Current R.-5	0.0	3.3
North Hol .	3	Cedar Grove	Current R.-5	0.0	2.5
Big Cr.	4	Cedar Grove	Current R.-5	30.2	32.2
Krewson Hol.	3	Montauk	Big Cr.-4	0.0	2.0
Dugan Hol.	3	Hartshorn	Big Cr.-4	8.3	12.6
Huldy Hol.	3	Hartshorn	Big Cr.-4	0.0	3.0
Bee Rock Hol.	3	Hartshorn	Big Cr.-4	0.0	5.4
Dew Pond Hol.	3	Hartshorn	Big Cr.-4	0.0	2.4
Dry Bone Cr.	3	Hartshorn	Big Cr.-4	2.6	9.3
CRW022	3	Hartshorn	Big Cr.-4	2.6	6.2
Pond Spring Hol.	3	Raymondville	Big Cr.-4	3.1	3.5
CRW023	3	Eunice	Big Cr.-4	0.5	5.3
CRW024	3	Eunice	Big Cr.-4	0.0	2.8
Parker Hol.	3	Cedar Grove	Current R.-5	1.2	6.5
Ashley Cr.	4	Montauk	Current R.-5	3.0	3.0
South Ashley Cr.	3	Montauk	Ashley Cr.-5	8.0	14.9
Gregory Hol.	3	Licking	South Ashley Cr.3	0.0	6.3
North Ashley Cr.	4	Montauk	Ashley Cr.-4	7.8	10.1
Mounty Spring Hol.	3	Licking	North Ashley Cr.-4	0.0	2.9
Maxton Hol.	3	Licking	North Ashley Cr.-4	0.1	2.2
Inman Hol.	4	Montauk	Current R.-5	0.0	6.5
CRW025	3	Montauk	Inman Hol.-4	0.0	3.8
Crabtree Hol.	3	Montauk	Current R.-3	0.0	5.0
White Hol.	3	Montauk	Current R.-4	0.0	4.8
Bean Cr.	3	Montauk	Current R.-4	2.8	8.4
Pigeon Cr.	3	Maples	Current R.-4	14.9	21.1
CRW026	3	Montauk	Pigeon Cr.-4	0.0	2.6
Fudge Hol.	3	Maples	Pigeon Cr.-4	0.0	3.8
CRW027	3	Maples	Pigeon Cr.-4	1.8	3.8

P-Permanent Stream Miles (Determined from 1:24,000 scale GIS hydrography coverage)

T-Total Stream Miles (Determined from 1:24,000 scale GIS hydrography coverage)

Abbreviations: Br.-Branch, Cr.-Creek, Hol.-Hollow, R-River

Table Ge04. Stream length per order (Strahler) and total length of fourth order (Horton) and larger streams in the Current River Watershed. Number in parenthesis represents combined stream miles in Missouri and Arkansas . Only the main stem of streams is included.

Stream Name	Length by Strahler Order (miles)							Total Length
	7	6	5	4	3	2	1	
Current R.	87.1 (128.6)	197.	32.0	3.2	Pigeon Cr.			142.0 (183.5)
Little Black R.		6.9 (18.6)	23.4	16.2	N.P. Little Black R.			46.5 (58.2)
Indian Cr. Ditch			(0.9)	Cypress Ditch/Ditch No. 3				(0.9)
Ditch No. 3			4.9 (8.4)	3.3	CRW001			8.2 (11.7)
Lateral No. 1				1.6	Neeleyville Ditch			1.6
Neeleyville Ditch				1.0	2.1	1.6	0.6	5.3
Logan Cr.				13.3	2.5	2.3	0.9	19.0
Harris Cr.				4.1	5.2	0.6	1.5	11.4
Beaverdam Cr.				11.5	North & South Prongs, Beaverdam Cr.			11.5
N.P. Little Black R.				12.6	5.0	1.9	1.0	20.5
Buffalo Cr.			5.4		North & South Forks, Buffalo Cr.			5.4
S.F. Buffalo Cr.				4.9	4.3	0.8	0.9	10.9
N.F. Buffalo Cr.				3.8	2.9	4.5	0.8	12.0
Cedar Cr.				0.1	1.6	0.9	0.5	3.1
Big Barren Cr.				14.3	8.5	0.4	1.8	25.0
Carter Cr.				6.4	1.3	0.8	0.6	9.1
Pike Cr.			31.3	2.8	2.7	0.5	1.4	7.4
Dry Valley				2.1	2.3	0.5	0.7	5.6
Little Pike Cr.				8.8	0.3	2.1	0.3	11.5
Deep Pond Hol.				2.4	0.9	1.2	0.3	4.8
Sycamore Cr.				5.3	1.9	0.8	0.6	8.6
Seaman Cr.				1.1	0.9	0.4	0.9	3.3
Pine Valley Cr.				8.7	1.9	3.2	1.0	14.8
Mill Cr.				2.6	9.3	1.4	1.0	14.3
Paint Rock Cr.				1.1	2.4	0.6	1.1	5.2
Blair Cr.				13.4	4.6	0.6	0.8	19.4
Brushy Cr.				0.3	2.6	3.2	0.7	6.8

Big Cr.				19.7	6.6	0.4	1.3	28.0
Spring Valley Cr.			20.2	17.8	6.0	0.4	0.8	45.2
Casto Valley Cr.			2.1	12.4	1.3	0.0	0.6	16.4
Black Valley Cr.				5.2	2.9	CRW014/S.FBlack Valley		8.1
Sinking Cr.			5.0	16.5	2.9	1.5	1.4	27.3
Barren Fork				15.6	3.7	0.4	0.8	20.5
Gordon Cr.				2.1	0.7	1.6	0.9	5.3
Gladden Cr.				17.7	3.9	0.1	1.0	22.7
Gladden Br.				2.4	4.2	1.4	1.0	9.0
Big Cr.				29.5	1.2	1.0	0.6	32.3
Ashley Cr.				3.0	N. Ashley Cr.			3.0
North Ashley Cr.				6.6	1.2	Mounty Spr. & Maxton Hol.		7.8
Inman Hol.				3.5	1.9	0.5	0.7	6.6

LAND USE

Historic Land Cover/Land Use

Historical land cover within the uplands of the Current River Watershed primarily consisted of pine and mixed pine/oak woodland with an open understory of grasses and shrubs (MDC 1997a). Occasional prairie and savanna openings were also common in some areas. Land cover of the sideslopes consisted of oak and oak/pine forests with occasional glade and woodland type openings associated with exposed slopes and ridges having shallow soils. Valley bottom land cover consisted of mixed hardwood forest with occasional fen openings.

The Ozarks are believed to have first been explored approximately 14,000 years ago by semi nomadic Native American tribes which subsisted as hunters and foragers (Rafferty 1980, Jacobson and Primm 1994). Approximately 1000 B.C., tribes on the fringes of the Ozarks became less nomadic, existing in more permanent villages and incorporating agricultural practices as a means of subsistence. Tribes in the Ozarks interior did not begin adopting these practices until A.D. 900. By A.D. 1500 this culture had disappeared as large agricultural based villages began to grow along the eastern fringe of the Ozarks and along the Mississippi River. During this period the interior of the Ozarks was used primarily as a seasonal hunting ground as well as a source for flint and chalcedony (a type of quartz) for making tools. It is believed that a climatic shift to cooler, drier summers and the resulting failure of maize crops on which early agriculture was based, may have caused an abrupt abandonment of the larger villages. Remnants of these villages and tribes reassembled to form the Osage Tribe which existed throughout much of the Ozarks and was present as European settlement of the area began to occur in the late 1700s and early 1800s (Jacobson and Primm 1994). Native American use of fire, as well as naturally occurring incidences of fire (i.e. lightening strikes), are believed to have been a large factor in determining the types of vegetation found by Schoolcraft and others as exploration of the Ozarks interior began to occur after the Louisiana Purchase of 1803. Native Americans are believed to have set fires for many reasons including harassment of enemies as well as an aid in hunting. These fires stimulated warm-season grasses such as bluestem and eliminated woody undergrowth thus creating open woodlands or savannas.

European settlement of the Ozark fringe began in the early 1700,s under French and, later, Spanish political control. After the Louisiana Purchase of 1803, American settlers began settling the same areas earlier occupied by the Spanish and French. The Osage, in treaty with the federal government, relinquished claims to much of the Ozarks interior in 1808, although they refused to relinquish their hunting rights in this area (Rafferty 1980). Settlement of the Ozarks Interior increased after the war of 1812 (Jacobson and Primm 1994). Many of the early settlers came from states such as Indiana, Illinois, Kentucky, Virginia, and Tennessee (Rafferty 1983). Most of these states were previously considered the frontier prior to the Louisiana Purchase, thus many settlers brought along skills they had learned for survival in frontier territory. Early settlers subsisted by hunting and fishing as well as maintaining gardens in the small bottomland areas which they cleared. In addition early settlers raised livestock which grazed on the open range of the slopes and uplands in the summer. In the winter livestock were fed from forage crops cultivated and harvested from the bottom lands (Jacobson and Primm 1994). The annual practice of burning was continued by early settlers in order to enhance the

livestock forage of the uplands. In addition to the influx of settlers of European origin which occurred after the war of 1812, Native American tribes such as the Cherokee, Shawnee, and Delaware, which had been displaced from the East, began moving through the region (Jacobson and Primm 1994). As the population of the area increased, more settlers were forced to settle the uplands (Ryan and Smith 1991). Fenced pasture began to replace the practice of open range. These two factors reduced the use of fire on the uplands, thus decreasing the grassland and savanna type land cover (Ryan and Smith 1991; Jacobson and Primm 1994). This region was only sparsely settled until the late 1800's, when the economic values of the vast timber resources were discovered.

The virgin forests of the Ozarks remained relatively undisturbed by logging until the late 1800s (Cunningham and Hauser 1989). Part of the reason for this was due to the rugged nature of the topography which made railroad construction (one of the main means of lumber transport) a less feasible proposition than in other less rugged areas of the country. However, as the forest resources of the Eastern United States were depleted and more settlers began moving onto the sparsely forested western plains, the demand for lumber in the Ozarks increased. Undoubtedly, the cheap price of land having uncut timber was also very attractive to eastern speculators. In some instances uncut timber land often sold for $1.00 an acre (Cunningham and Hauser 1989). This led to the construction of railroads in the region in the 1800s. Initially, the distribution of the first extensive commercial timber cutting in the Ozarks was limited by the distribution of shortleaf pine and transportation routes provided by rivers and railroads (Jacobson and Primm 1994). Shortly thereafter, however, the exploitation of hardwood species began. Larger shortleaf pine trees were harvested for lumber, while a variety of sizes of hardwood trees were harvested for products such as railroad ties, charcoal, barrel staves, and flooring (Rafferty 1983, Cunningham and Hauser 1989). The pine lumber and railroad tie industry were very prevalent within the area surrounding the Current River. The many different products produced from the timber of the area resulted in a wide range of species and sizes harvested. The population of the area sprang up as did several lumber towns including some within or bordering the Current River Watershed such as West Eminence, Birch Tree, Grandin, Midco, and Winona.

Initially, the Current River was used as a major transport route for loose logs and ties. Ties and logs were transported to yards or slides all along the Current River (Cunningham 1990). At the appropriate time, usually early summer, logs and ties were slid off steep bluffs into the river. They were then floated to the takeout points of Vanburen and Doniphan where booms, which extended two thirds of the way across the river, were used to catch the logs and ties. Large volumes of loose ties and logs often proved to be a nuisance as well as a danger for persons who lived in the area. Loose ties were often hazardous to persons crossing the river and in some instances completely prevented persons from crossing the river at fords. In addition, log and tie jams were, in some instances, so severe as to block river flow and cause flooding in some low lying areas. These problems had the effect of increasing negative public opinion against the floating of loose ties and logs. In 1915, the assistant secretary of war issued regulations limiting the size of tie and log drives. In light of the new regulations, many operators were forced to begin rafting ties and logs. This was accomplished by nailing the ties or rafts together with strips of lumber. Rafting logs and ties had their own associated problems. The failure of a raft to negotiate a bend in the river in some instances meant disaster. In addition, members of the Izaak Walton league began blaming tie rafts for the poor quality of the sport fishery caused by the destruction of bass spawning beds. This prompted several major lumber companies to halt tie and log rafting during the April 15-June 1 spawning season.

Along with the eastern-backed lumber companies came the logging practices that had decimated much of the forests of the Eastern United States. These "cut and get out" operations, as they have been referred to in Cunningham and Hauser (1989), paid little or no attention to forest regeneration; focusing only on feeding the gigantic lumber mills located in the area. The mills at Grandin, Missouri were capable of consuming 70 acres of forest a day (MDC 1991). With little or no attempt to reforest cut-over areas, land which had previously been dominated by pine and mixed pine-oak forest began to regenerate to thick oak sprouts (Nigh 1988).

As the logging industry began to decline in the area, residents turned increasingly toward farming the rugged cut-over land in an attempt to eke out a means of survival. Initially row crop farming was attempted in some areas. This is exemplified by a peak occurring between 1899 and 1920 in the acres of corn harvested within the major counties of the Current River Watershed as shown in Figure Lu01. This type of land use would have undoubtedly contributed to erosion and thus sedimentation and an increased gravel load in the streams of the regions watersheds such as the Current River. In addition, lumber companies as well as land speculators, eager to dispose of taxable cut-over land, began to offer the land for sale through nationwide advertising (Rafferty 1983; Cunningham and Hauser 1989). In many instances the land was advertised as being more productive than what it actually was.

As the century progressed, much of the area was found to be unsuitable for large scale row-cropping. Figure Lu01 shows the relatively rapid decline of acres harvested of corn in Carter, Dent, Ripley, Shannon and Texas Counties. In many counties of the Ozarks, livestock populations experienced

sharp increases as row cropping declined. In contrast, with the exception of Texas County, there appears to have been no substantial increase of cattle and hog populations in any of the major counties of the Current River Watershed relative to other counties in the region (Figure Lu02). Livestock numbers in Ripley and Shannon County experienced sporadic growth and decline between 1920 and 1980. In contrast, the livestock populations of Carter County remained relatively stable from 1920 to 1997. Livestock population trends in Dent County resembled those of Texas County from 1920 to 1980. However, Dent County livestock populations never experienced as explosive a rate of growth.

The era of natural resource management began in the Current River Watershed in the early portion of the century. In 1909, an exploratory trip was undertaken by a group of interested persons headed by Missouri Governor Hadley (Kohler and Schuchard 1984). This trip brought the area to statewide attention and inspired a 50 year debate regarding the Current River Basin and its resources. The debate centered around whether the streams and surrounding area should be preserved, used as a recreational development, or dammed for hydroelectric power. Tourism began to be more prevalent in the area; and between 1920 and 1930 the state of Missouri began development of parks at Big Spring, Round Spring, and Montauk (Kohler and Schuchard 1984). In the early 1930s, the USFS began purchasing land in the Current River/Jacks Fork area (Kohler and Schuchard 1984). Initial natural resource development was accomplished by the Civilian Conservation Corps (CCC), a work program of the Great Depression, under the guidance of the United States Forest Service (USFS). Much of this work involved pine reforestation (Kohler and Schuchard 1984). The USFS also attempted to educate local landowners regarding reforestation. In addition, creation of the Missouri Department of Conservation in 1936 provided for more intensive management of the area's fish and wildlife resources. It also provided additional opportunities for working with private landowners regarding natural resource management on private lands. In the meantime the debate over conservation vs. exploitation of the areas resources continued. Talk of impounding portions of the Current River continued to be the focus of this debate through the early 1950s at which time President Truman created the Arkansas-Red-White River Basin Interagency Committee for the purpose of a flood control survey (Kohler and Schuchard 1984). The committee's work resulted in the recommendation that the streams of the basin not only not be impounded but should be "preserved in their natural states" (Kohler and Schuchard 1984). This lead to the report entitled "Plan for the Preservation and Development of Recreation Resources -Current and Eleven Point River Country, Missouri ". Many in the Ozarks were deeply divided over the recommendations of the report. Public hearings were held which often involved heated debate regarding the proposal of the report (Kohler and Schuchard 1984). The Missouri House of Representatives passed a resolution in 1959 requesting the United States Congress create a national recreation area along the Current and Eleven Point Rivers. Initial legislation was drafted by the National Park Service. Still, those opposed insisted on additional research of the idea. President Eisenhower signed a bill allocating funding for research of the area in 1959. The results of the research suggested the inclusion of the Current and Jacks Fork Rivers in a national monument. Compromises were made after the first attempt at legislation creating the "Ozark Rivers National Monument " failed. Then in 1963, legislation establishing the "Ozark National River " was introduced. Further compromise was agreed to in which only land along the Current and Jacks Fork River would be included in the park and the bill creating the "Ozark National Scenic Riverways" was passed in both the House of Representatives and Senate. The bill was signed into law by President

Johnson in 1964 with the purchase of land beginning in 1966. The legislation, aimed at preserving an American river system with the creation of the Ozark National Scenic Riverways, was the first of its kind (Kohler and Schuchard 1984). It paved the way for the National Wild and Scenic Rivers Act of 1968. The Ozark National Scenic Riverways was dedicated in 1972.

In an effort to determine the effects of land use changes on stream disturbance in the Ozark Region, Jacobson and Primm (1994) evaluated present (1993) conditions of Ozark streams, pre-settlement period historical descriptions, stratigraphic observations, and accounts of oral-history responses on river changes during the last 90 years for the Jacks Fork River and Little Piney Creek Watersheds. This led Jacobson and Primm (1994) to the conclusion that Ozark streams are disturbed from their natural conditions. Jacobson and Primm (1994) state that this "disturbance has been characterized by accelerated aggradation of gravel, especially in formerly deep pools, accelerated channel migration and avulsion, and growth of gravel point bars". Jacobson and Primm (1994) also suggest that "land use changes have disturbed parts of the hydrologic or sediment budgets or both".

As part of the effort to determine the effects Jacobson and Primm (1994) summarized the land use changes from pre-settlement conditions to the 1970's in the Jack's Fork Watershed which drains into the Current River Watershed (Table Lu01).

"Different types of land use have taken place on different parts of the landscape, and at different times, resulting in a complex series of potential disturbances. Uplands have been subjected to suppression of a natural regime of wildfire, followed by logging, annual burning to support open range, patchy and transient attempts at cropping, a second wave of timber cutting, and most recently, increased grazing intensity. Valley side slopes have been subjected to logging, annual burning, and a second wave of logging. Valley bottoms were the first areas to be settled, cleared, and farmed; removal of riparian vegetation decreased the erosional resistance of the bottom lands. More recently, some areas of bottomland have been allowed to grow back into forest. The net effects of this complex series of land-use changes are difficult to determine and separate from natural variability."

Jacobson and Primm (1994) offer the following observations which summarize the probable, qualitative changes to runoff, soil erosion, and riparian erosional resistance on parts of the Ozarks landscape relative to man's impact (Table Lu02):

1. Initial settlement of the Ozarks may have initiated moderate channel disturbance because of decreased erosional resistance of cleared bottom lands. This trend would have been countered by decreased annual runoff and storm runoff that accompanied fire suppression in the uplands.

2. Because of low-impact skidding methods and selective cutting during initial logging for pine during the Timber-boom period, logging would have had minimal effects on runoff and soil erosion. Low-impact methods and selective cutting continued to be the norm in timber harvesting of hardwoods until the late 1940's, when mechanization and diversified markets for wood products promoted more intensive cutting. Locally, log and tie jams, tie slides, and logging debris may have added to channel instability by diverting flow, but because aggradation and instability also occurred on streams not used for floating timber, these factors were not necessary to create channel disturbance.

3. Significant channel disturbance probably began in the Timber-boom period because of continued clearing of bottom land forests and road building in the riparian zone. This hypothesis is supported by

evidence that significant stream disturbance began before the peak of upland destabilization in the post-timber-boom period. Extreme floods during 1895 to 1915 may have combined with lowered erosional thresholds on bottom lands to produce the initial channel disturbance.

4. The regional practice of annual burning to maintain open range had the most potential to increase annual and storm runoff and soil erosion because of its considerable areal extent and repeated occurrence. Burning would have been most effective in increasing runoff and erosion on the steep slopes that had been recently cut over during the timber boom. Generally, accelerated soil erosion was not observed after burning, and relict gullies presently (1993) are not apparent on valley-side slopes and uplands. These observations support the hypothesis that burning did not produce substantial quantities of sediment.

5. The greatest potential for soil erosion on valley slopes and upland areas occurred during the post-timber-boom period when marginal upland areas were cultivated for crops. Accelerated erosion of plowed fields was observed and noted by oral-history respondents and by soil scientists working in the Ozarks during the post-timber-boom period.

6. Valley bottoms have the longest history of disturbance from their natural condition because they were the first to be settled, cleared, and farmed. The lowered resistance to stream erosion that results from removing or thinning riparian woodland would have been a significant factor, especially on small to medium sized streams for which bank stability and roughness provided by trees are not overwhelmed by discharge. Disturbance of bottom land riparian forest increased as free-range grazing, crop production, and use of valley bottoms for transportation expanded and reached a peak in the post-timber-boom period. Headward extension of the channel network because of loss of riparian vegetation may have increased conveyance of the channel network (and hence flood peaks downstream) and removed gravel from storage in first and second order valleys at accelerated rates. This hypothesis is supported by a lack of other source areas for gravel and by observations that gravel came from small stream valleys, not off the slopes.

7. During present (1993) conditions, channel instability seems somewhat decreased in areas where the riparian woodland has recovered, but stability is hampered by high sedimentation rates because of large quantities of gravel already in transport and effects of instability in upstream reaches that lack a riparian corridor.

8. Land use statistics indicate that the present trend in the rural Ozarks is toward increased populations of cattle and increased grazing density. This trend has the potential to continue the historical stream-channel disturbance by increasing storm runoff and sediment supply and thus remobilization of sediment already in transit."

Human populations of the major counties (Carter, Dent, Ripley, Shannon, and Texas) of the Current River Watershed experienced little or no net growth between 1900 and 1990 (Figure Lu03)(OSEDA 1998). In reality all counties, with the exception of Dent, experienced net declines in population during this time period. Carter and Shannon Counties experienced the most substantial declines in population with decreases of 17.8% and 32.3% respectively.

The 1990 human population within the Current River Watershed was estimated to be 24,890 persons (Blodgett J. and CIESIN 1996). Population density in 1990 was approximately 9 persons per square mile as compared to the overall population density for Missouri which was approximately 73 persons per square mile (Figure Lu04). Of course, one must take into account the effect of the states urban centers on this estimate.

Projections of human population increase of Missouri counties have been calculated by the Missouri Office of Administration (MOA), Division of Budget and Planning for three different projection scenarios in a report entitled "Projections of the Population of Missouri Counties By Age, Gender, and Race: 1990 to 2020" (MOA 1994). Combined population estimates for Butler, Carter, Dent, Howell, Ripley Reynolds, Shannon, and Texas Counties from 1990-2020 have been used to calculate percent increase in population for all three scenarios. The difference in scenarios is based on calculated long-term, recent, and zero migration. The scenarios project a combined population increase of 6.4%, 16.6%, and 6.7% respectively by the year 2020.

Ecological Classification

The Ecological Classification System (ECS) is a management tool which provides a means of "describing distribution of current and potential natural resources in a manner that considers land capability upfront" using a knowledge of landform, geology, soils, and vegetation patterns (MDC 1997a). There are several levels of classification within the ECS. For purposes of this document the three lowest levels are dealt with. These levels are, in descending order, section, subsection, and land type association (LTA). The Current River Watershed intersects two sections, 4 subsections and 18 LTAs.

The sections intersected by the Current River Watershed include the Ozark Highlands Section and the Mississippi Alluvial Basin. The Ozark Highlands Section consists of very old and highly weathered plateaus which, coupled with its physiographic diversity and central geographic location relative to the continent, has created a region of unique ecosystems harboring many endemic species (MDC 1997a). Most of the watershed occurs within this section. Only a relatively small portion of the watershed occurs within the Mississippi Alluvial Basin Section. This section consists of "flat, weakly to moderately dissected alluvial plains" (USFS 1994). Overall, approximately 90% of this section has been ditched and drained for agricultural use.

The subsections intersected by Current River Watershed include the Current River Hills, Central Plateau, Black River Ozark Border, and the White and Black River Alluvial Basin (Figure Lu05).

The Current River Hills Subsection

"The Current River Hills Subsection is described within the MDC Ozark Region Resource Inventory (1997a) as encompassing "the hilly to rugged lands associated with the Current, Jacks Fork, and Eleven Point River Valleys. These Valleys have primarily cut through Roubidoux sandstone/dolomite, and Gasconade or Eminence dolomites. Soils are mainly deep and very cherty, but vary in depth, amount of chert and depth to clays. Original vegetation consisted largely of oak and oak-pine woodland and forest with scattered glades and savannas. Streams are both losing and gaining. Gaining reaches are often spring-fed and moderate to relatively high gradient" (MDC 1997a).

The Central Plateau Subsection

The Central Plateau Subsection "represents the high, flat to gently rolling plains that are the least eroded remnant of the Salem Plateau. Underlain primarily by Jefferson City-Cotter dolomites or Roubidoux sandstone/dolomite, the plains are often mantled in a thin layer of loess and have droughty soils. Streams are mainly intermittent, low gradient headwater streams that are often losing. Savannas and woodlands were originally the dominant vegetation types" (MDC 1997a).

The Black River Ozark Border

The Black River Ozark Border "Flanks the Current River Hills and the St. Francis Knobs and basins on their southeast and is adjacent to the Bootheel. It is a flat to moderately hilly landscape underlain by the Roubidoux Formation with valleys cutting into the cherty Gasconade Dolomite. A blanket of loess covers most of the flatter elevated surfaces, increasing in depth toward the Bootheel. The subsection historically supported both oak and pine-oak woodland and forest, and is still largely timbered today" (Nigh 1999).

White and Black River Alluvial Basin

The White and Black River Alluvial Basin "...occupies the lowlands west of Crowleys Ridge..." (Nigh 1999). This subsection intersects a relatively small portion of the Current River Watershed in the watersheds Southeast corner.

Land Type Associations (LTAs) represent the smallest level of the three levels previously mentioned (Figure Lu05). LTAs intersecting the Current River Watershed include the Following:

Ash Hill Low Sand Hills and Terraces

Black River Silty Lowland

Black River Oak-Pine Woodland/Forest Hills

Current River Oak-Pine Woodland/Forest Hills

Current River Oak Forest Breaks

Current-Eleven Point Pine-Oak Woodland Dissected Plain

Eleven Point River Oak-Pine Woodland/Forest Hills

Eminence Igneous Glade/Oak Forest Knobs

Flatwoods Oak Savanna/Woodland Plain

Grandin Pine-Oak Woodland Dissected Plain

Licking Oak Savanna/Woodland Plain

Little Piney Oak Woodland Dissected Plain

Ripley County Oak Woodland Dissected Plain

Salem Oak Savanna/Woodland Plain

Southeastern Oak Savanna/Woodland

Summersville Oak Savanna/Woodland Plain

Upper Meramec Oak Woodland Dissected Plain

Upper Gasconade Oak Woodland Dissected Plain

Table Lu03 gives descriptions of LTAs within the watershed.

The Ecological Classification System could prove to be a useful tool for planning and implementing management activities by providing an indication of what natural resource management options will be more adapted to specific areas thus increasing the success of management decisions as well as helping to ensure that management decisions are ecologically enhancing.

Current Land Cover

Approximately 80.1% of the Current River Watershed is forested based on analysis of MoRAP (1999) Missouri Land Cover data. Grassland is the second most prevalent land cover accounting for about 16.0% of the total watershed area. The land cover categories of wetland and water each account for approximately 0.2% of the watershed area, while the categories of cropland and urban account for approximately 0.1% each of the total watershed area (Table Lu04, Figures Lu06 and Lu07). Forest cover is the most dominant land cover type in all eleven digit hydrologic units within the watershed. The Upper Middle Current River unit has the highest percentage of forest cover at 95.9%, while the Little Black River unit has the lowest at 54.9%. This unit also has, by far, the largest percentages of grassland and cropland at 26.1% and 17.7% respectively.

Soil and Water Conservation Projects

There currently are no SALT, SALT AgNPS, or EARTH projects within the Current River Watershed. In addition, no 319 soil projects exist within the Watershed (Shannon , personal communication). Four PL-566 project watersheds have existed within the watershed (NRCS 2001). The Pike Creek and Black Creek PL-566 Watersheds are 93,032 acres and 4,720 acres respectively. Both watershed projects are listed as terminated or not active with no impoundments having been built. The Upper and Lower Little Black River PL-566 Watersheds are 124,749 and 124,390 acres respectively. In the Upper Little Black, 12 impoundments have been built with drainage areas ranging between 786 and 8,944 acres and pool sizes ranging from 11 to 70 acres. One impoundment has been built in the Lower Little Black. This structure has a drainage area of 9,597 acres and a pool area of 80 acres. The Upper and Lower Little Black Watershed Projects have not been closed out, however no future work is anticipated (Deckard, personal communication) (Figure Lu08).

Public Land

A knowledge of land ownership within a watershed is an important key to understanding various characteristics of a watershed as well as addressing watershed related issues and concerns. Within the Current River Watershed, approximately 32% (420,576 acres) of land is under public ownership (Table Lu05 and Figure Lu09). The United States Forest Service (USFS) holds the largest amount of publicly owned land totaling 235,279 acres. This is followed by the Missouri Department of Conservation (MDC)(141,270 acres), National Park Service (NPS)(42,605 acres) and Missouri Department of Natural Resources (MDNR) (1,332 acres). The public land within the watershed includes approximately 226 miles of permanent public stream frontage and 28 stream accesses.

Analysis of land ownership percentages within eleven digit hydrologic units reveals that units in the upper and lower Current River Watershed have the least percentage of publicly owned land. The

Little Black Unit has the smallest percentage of public land at 3.4% (Table Lu06 and Figure Lu10). This land is managed by the MDC and USFS. The Pike Creek Unit, located in the middle of watershed, has the highest percentage of public land at 60.1%. The majority of this land is managed by the USFS.

Figure Lu01. Historical acreage estimates of corn harvested in Carter, Dent, Ripley, Shannon, and Texas Counties (MASS 2000).

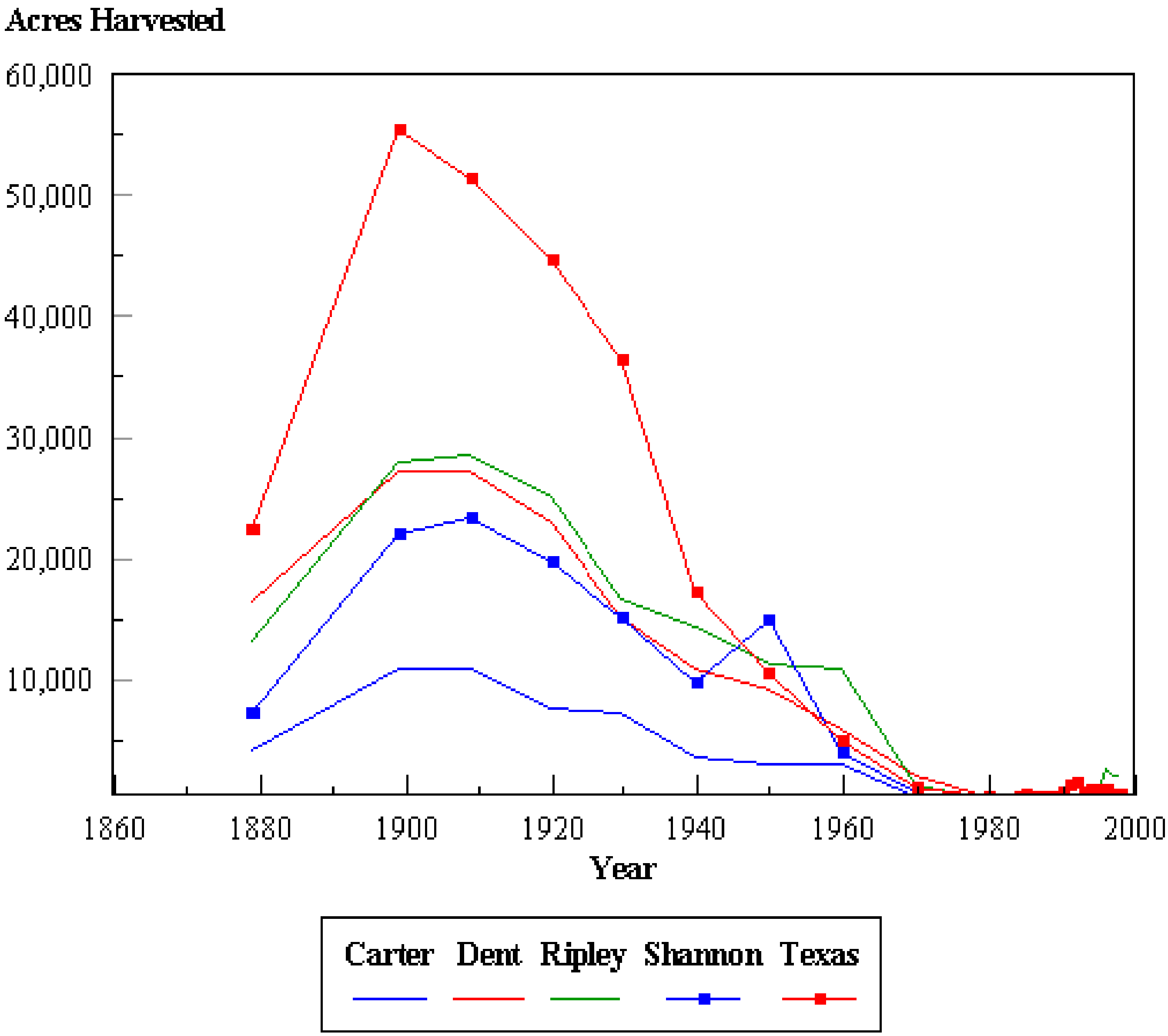
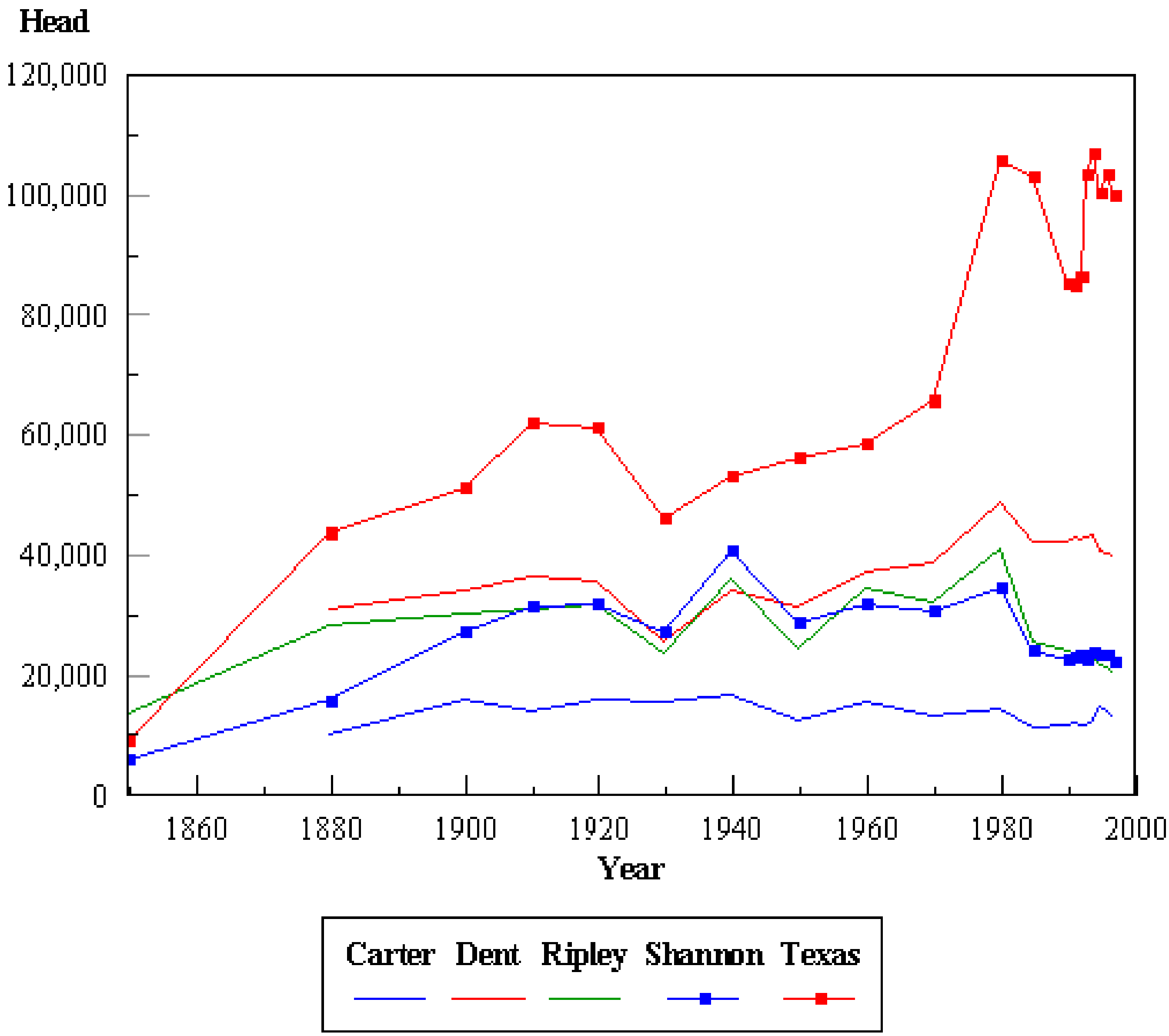


Figure Lu02. Cattle and hog population trends for Carter, Dent, Ripley, Shannon, and Texas Counties (MASS 2000).



FigureLu03. Human population trends for Carter, Dent, Ripley, Shannon, and Texas Counties (OSEDA 1998). Population growth rates given in parenthesis.

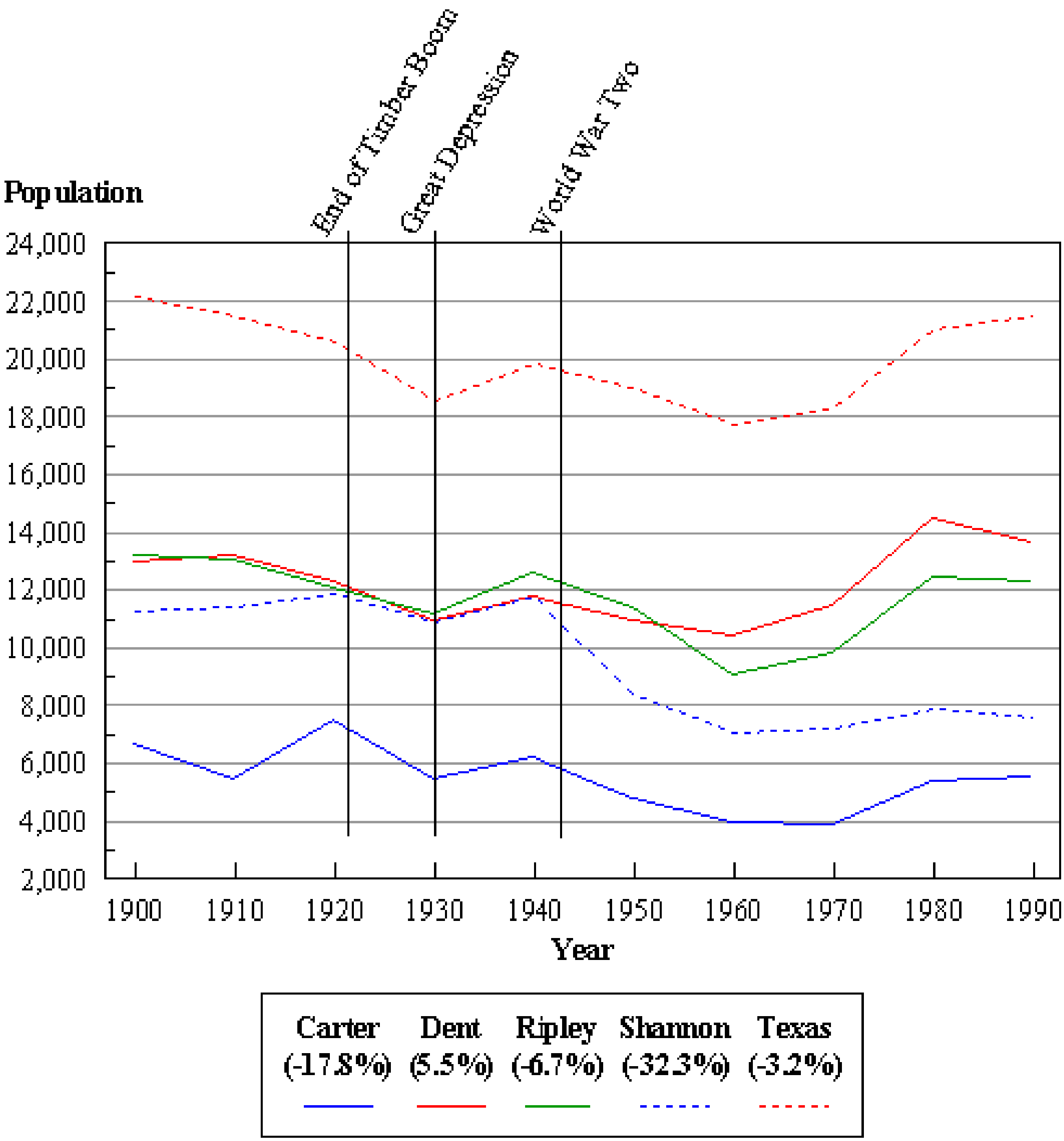


Figure Lu04.

Current River Watershed

Population Distribution (1990)

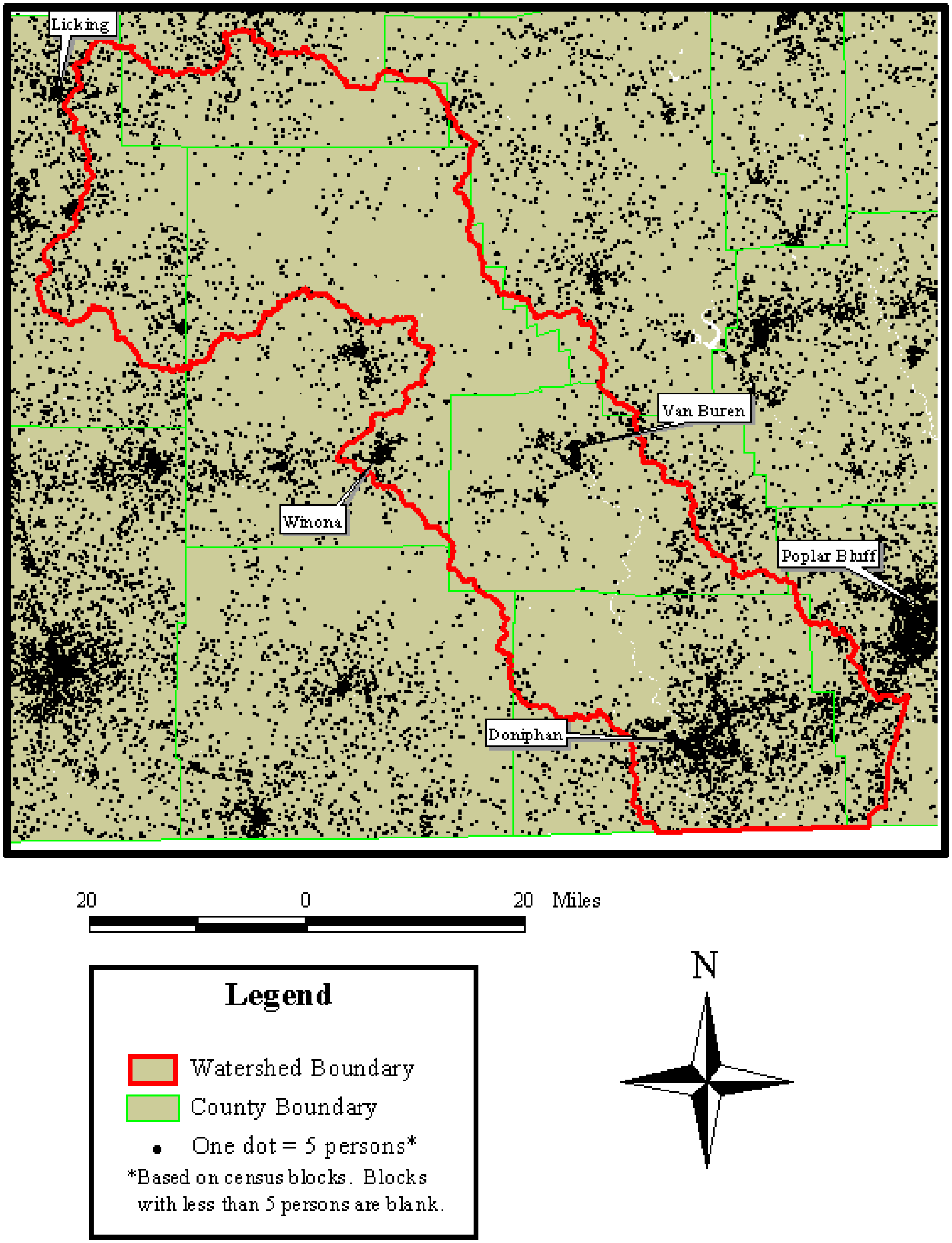
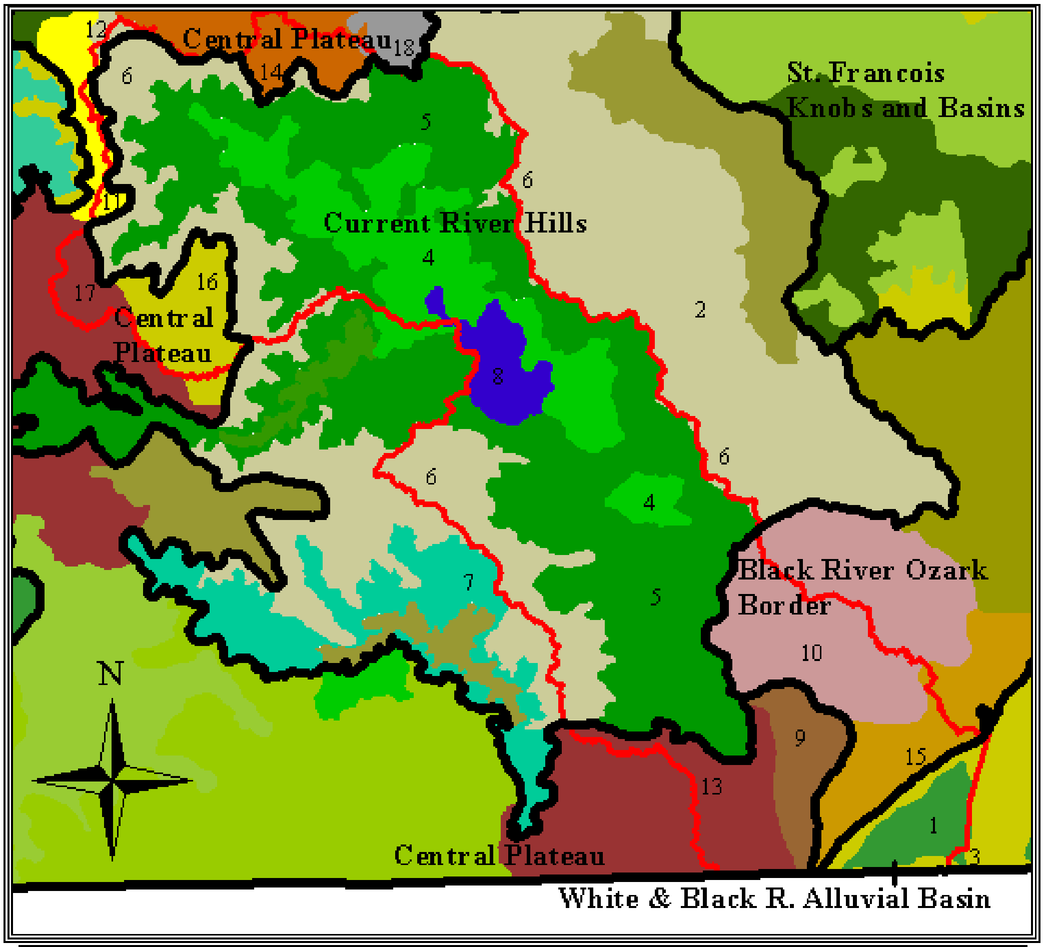


Figure Lu05.

Current River Watershed
Ecological Classification System



Watershed Boundary   Ecological Subsection Boundary (MoRAP 1997)

Land Type Association (Based on MoRAP 1997)

- Ash Hill Low Sand Hills & Terraces (1)
- Black River Oak-Pine Woodland/Forest Hills (2)
- Black River Silty Lowland (3)
- Current River Oak Forest Breaks (4)
- Current River Oak-Pine Woodland/Forest Hills (5)
- Current-Eleven Point Pine-Oak Woodland Dissected Plain (6)
- Eleven Point River Oak-Pine Woodland/Forest Hills (7)
- Eminence Igneous Glade/Oak Forest Knobs (8)
- Flatwoods Oak Savanna/Woodland Plain (9)
- Grandin Pine-Oak Woodland Dissected Plain (10)
- Licking Oak Savanna/Woodland Plain (11)
- Little Piney Oak Woodland Dissected Plain (12)
- Ripley County Oak Woodland Dissected Plain (13)
- Salem Oak Savanna/Woodland Plain (14)
- Southeastern Oak Savanna/Woodland Plain (15)
- Summersville Oak Savanna/Woodland Plain (16)
- Upper Gasconade Oak Woodland Dissected Plain (17)
- Upper Meramec Oak Woodland Dissected Plain (18)

Figure Lu06.

Current River Watershed
Land Cover

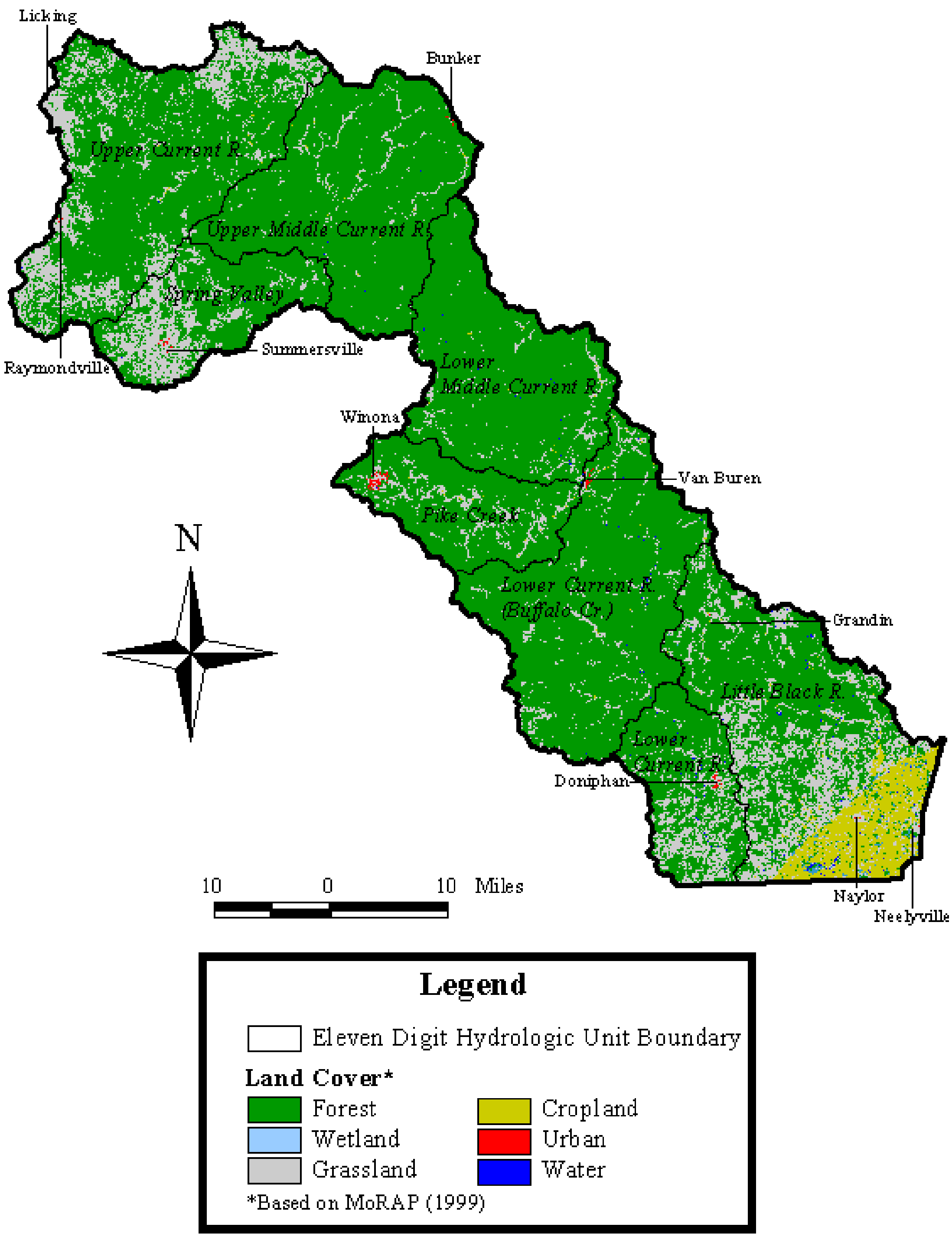


Figure Lu07.

Current River Watershed

Eleven Digit Hydrologic Unit Land Cover

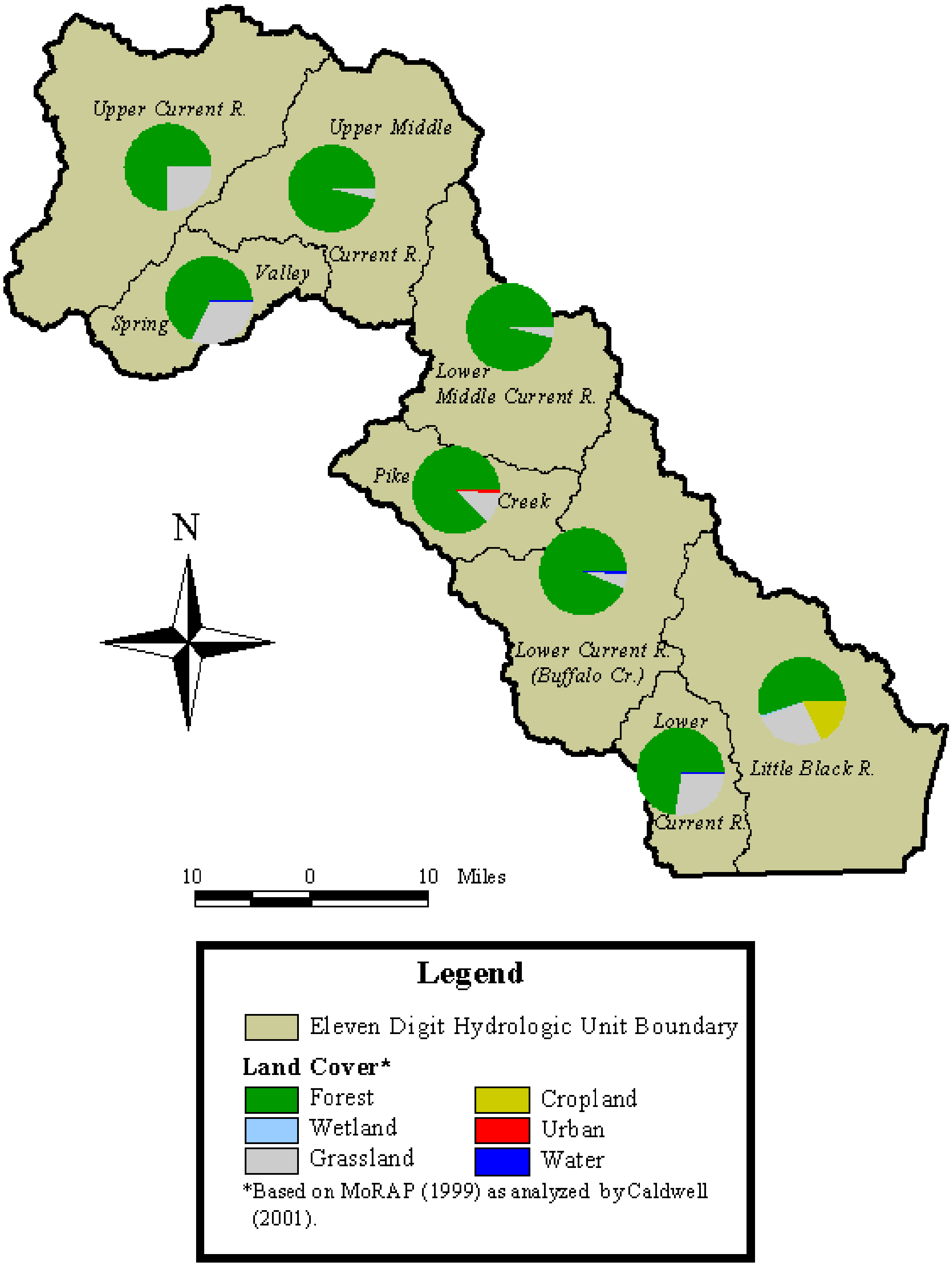
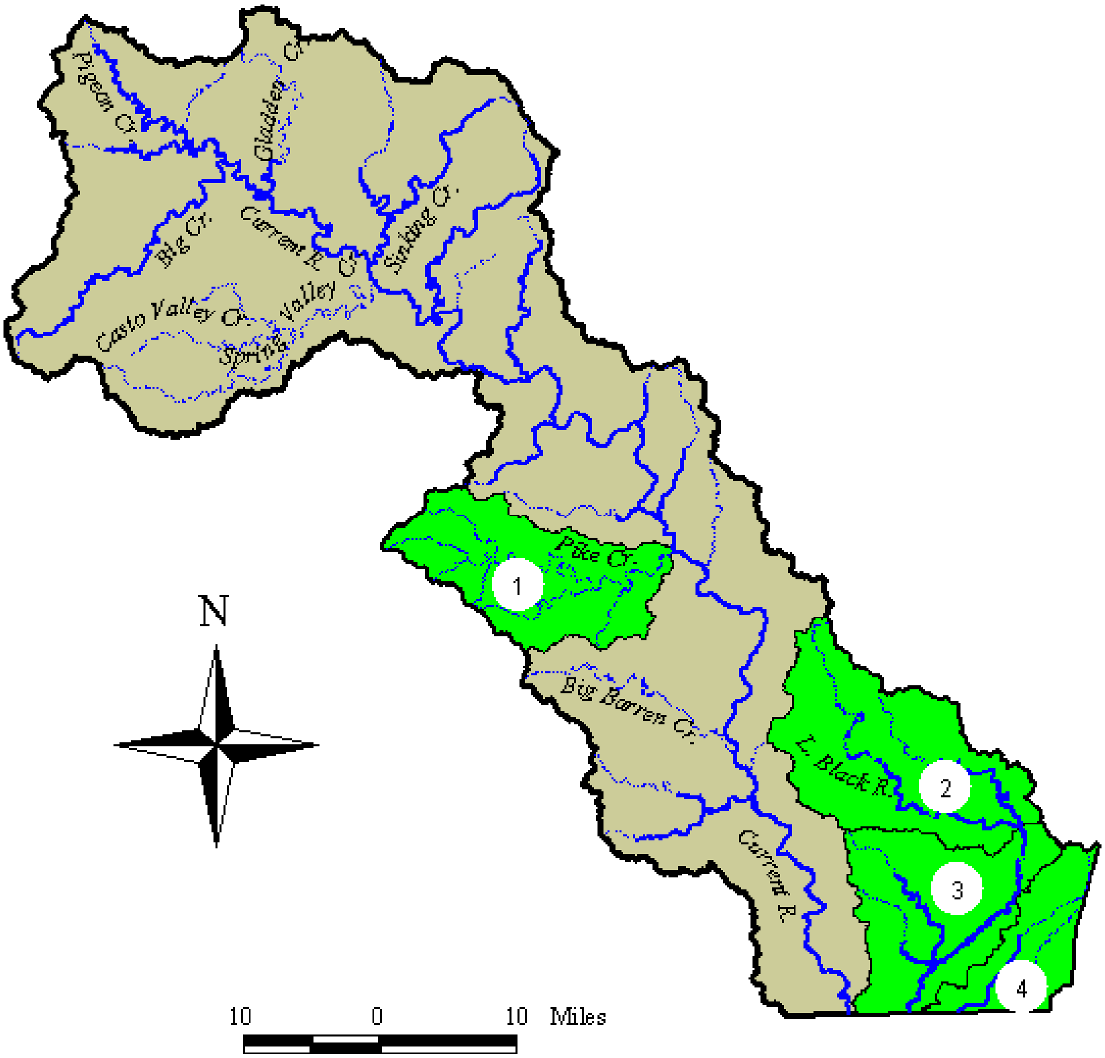


Figure Lu08.

Current River Watershed

Soil and Water Conservation Projects



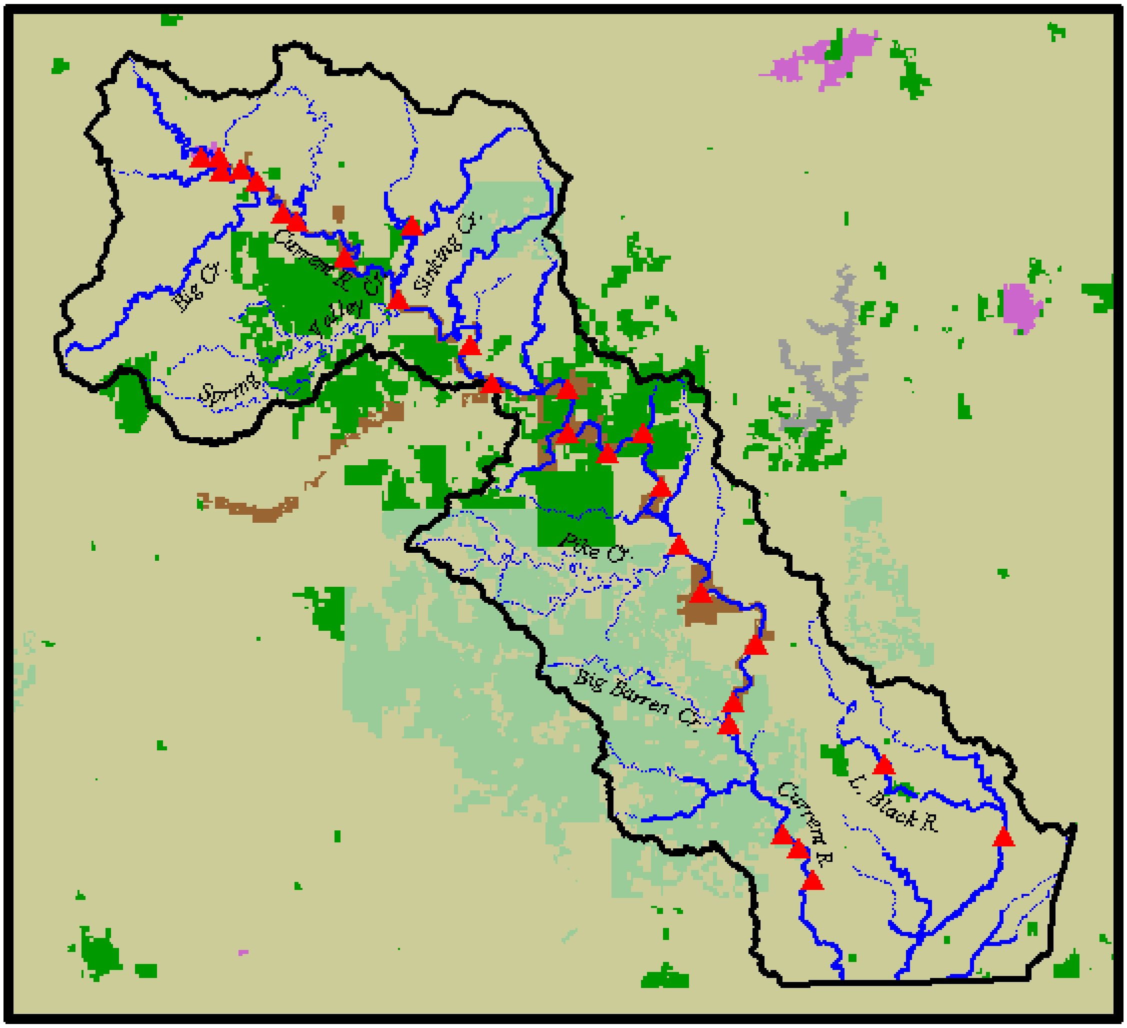
Legend

PL-566 Project Watershed

1. Pike Creek-Acres: 93,032 Structures Completed: 0
2. Upper Little Black-Acres: 124,749 Structures Completed: 12
3. Lower Little Black-Acres: 87,417 (Missouri) Structures Completed: 1
4. Black Creek-Acres: 42,605 (Missouri) Structures Completed: 0

Figure Lu09.

Current River Watershed
Public Land



20 0 20 Miles

Legend

Wateshed Boundary

Land Ownership*

- Missouri Department of Conservation
- Missouri Department of Natural Resources
- National Park Service
- United States Corps of Engineers
- United States Forest Service
- Access

* Map is not a final authority. Data subject to change.

N

Figure Lu10.

Current River Watershed

Eleven Digit Hydrologic Unit Land Ownership

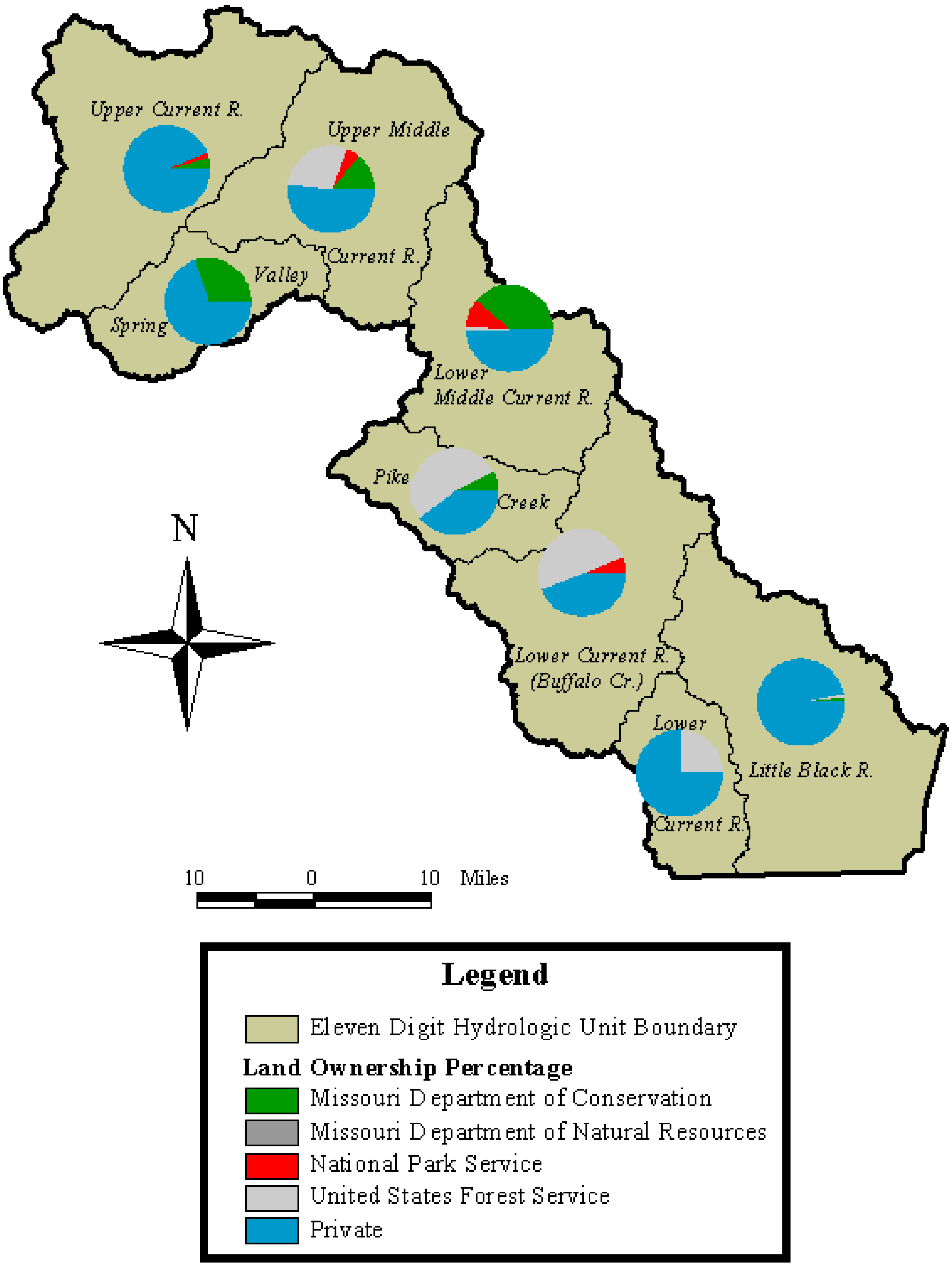


Table Lu01. Land cover/ land use change from pre-settlement period conditions (1820's) to the 1970's in the Jack's Fork Watershed, Missouri (Jacobson and Primm 1994).

1820's		1970's		%
Category	Area sq. miles	Category	Area sq. miles	
Shrub and brush rangeland	55.4	Urban/developed	1.6	3
		Pasture/cropland	26.5	48
		Deciduous forest	27.3	49
Deciduous forest	242.0	Pasture/cropland	59.9	25
		Deciduous forest	178.6	75
Evergreen forest	3.5	Deciduous forest	3.5	100
Mixed forest	323.1	Pasture/cropland	34.5	11
		Deciduous forest	281.6	87
		Mixed forest	7.0	2
Barrens	29.2	Pasture/cropland	15.5	53
		Deciduous forest	13.7	47

Table Lu02. Summary of probable qualitative changes to runoff, soil erosion, and riparian erosional resistance on parts of the Ozarks landscape relative to pre-settlement period conditions. Reproduced in whole from Jacobson and Primm (1994).

Period	Uplands	Valley Slopes	Valley Bottoms
Pre-settlement	Baseline	Baseline	Baseline
Early Settlement			
Annual Runoff	Decrease	Slight Increase	N/A
Storm Runoff	Decrease	Slight Increase	N/A
Upland Sediment Yield	Decrease	Slight Increase	N/A
Riparian Erosional Resistance	N/A	N/A	Moderate Decrease
Timber-Boom			
Annual Runoff	Slight Increase	Slight Increase	N/A
Storm Runoff	Slight Increase	Moderate Increase	N/A
Upland Sediment Yield	Slight Increase	Moderate Increase	N/A
Riparian Erosional Resistance	N/A	N/A	Decrease
Post-Timber-Boom			
Annual Runoff	Moderate Increase	Increase	N/A
Storm Runoff	Moderate Increase	Increase	N/A
Upland Sediment Yield	Moderate Increase	Increase	N/A
Riparian Erosional Resistance	N/A	N/A	Substantial Decrease
Recent			
Annual Runoff	Slight Increase	Slight Increase	N/A
Storm Runoff	Slight Increase	Moderate Increase	N/A
Upland Sediment Yield	Slight Increase	Slight Increase	N/A
Riparian Erosional Resistance	N/A	N/A	Decrease

Table Lu03 (1 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Oak Woodland Dissected Plains and Hills Group
Landform: Distinguished by rolling to moderately dissected topography. Local relief is 75-150 feet. Very broad, flat ridges give way to gentle side slopes and broad stream valleys. Karst plains with frequent shallow sinkhole depressions are common. Broad stream valleys most often occupied by losing streams, however occasional seeps do occur and can spread across substantial portions of a valley.
Geology: Commonly underlain by Jefferson City-Cotter dolomites with a common loess cap. Some minor areas underlain by Roubidoux sandtones.
Soils: Soils are variable, ranging from shallow to bedrock and fragipan soils, to deep, cherty and well-drained loams. Tree root growth is often restricted by bedrock, pans or clay mineralogy, especially high in the landscape.
HistoricVegetation: Open woodlands with occasional prairie and savanna openings was the principal vegetation type. Post oak and black oak were the principal woodland tree species. Historic fire likely played an important role in maintaining an open canopy, sparse understory and a dense herbaceous ground flora. More dissected lands likely contained mixed oak woodland and forest. Unique sinkhole ponds, wet prairies and seeps were scattered in the broad valleys and depressions.
Current Conditions: Currently a mosaic of fescue pasture (35-65% cover) and dense, often grazed oak forest. The transition from open grassland to closed forest is abrupt and the patch work blocky. Very few native grasslands or savannas are known, and the dense second growth woodlands have very little ground flora. Most sinkoles, wet prairies and seeps have been drained and heavily grazed. Many roads, towns, cities and businesses are located in these LTAs.
Little Piney Oak Woodland Dissected Plain: Dissected plains associated with the headwaters of the Little Piney River and Spring Creek; Roubidoux sandstone locally common. **Ripley County Oak Woodland Dissected Plain: Very dissected plain between lower Eleven Point and Current Rivers. Contains an unsual cluster of dolomite knobs on the east side of Eleven Point.** **Upper Gasconade Oak Woodland Dissected Plain: Broad divide encompassing the headwaters of the Big Piney and Gasconade River Watersheds.**

Table Lu03 (2 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Oak Savanna/Woodland Plains Group
Landform: Very broad flat uplands slope gently to very broad flat drains or solution (karst) depressions. Local relief is less than 75 feet.

<u>Geology</u>: Underlain mainly by Jefferson City-Cotter dolomites with a common loess cap. Minor areas of the Roubidoux formation occur. Headwater streams are nearly all losing.
<u>Soils</u>: Fragipan soils or soils with shallow restrictive clays or bedrock are common, inhibiting tree root growth.
<u>HistoricVegetation</u>: Oak savannas and woodlands with common prairie openings were the predominant historic vegetation. While few prairies were named by original land surveyors, early descriptions portray an open, "oak prairie" landscape. Fire likely played a principal role in maintaining a grassland-open woodland structure. Some sinkhole depressions would have had unique ponds and seeps.
<u>Current Conditions</u>: The largest blocks and greatest acres of grassland (45-65% cover) are currently associated with these LTAs; grasslands are mainly fescue pasture. Less than 40% of these LTAs are timbered, mainly in dense, second growth oak forest (post and black oaks) with common grazing pressure. Very few quality native prairies, savannas, woodlands, sinkhole ponds or seeps are known. Many of the regions roads, towns, and businesses are associated with these LTAs.
<u>Flatwoods Oak Savanna/Woodland Plain</u>: Flat plain on east of lower Current River. **<u>Licking Oak Savanna/Woodland Plain</u>: Long, linear flat divide between the Big Piney on the west and the Current/Meramec Drainages on the east.** **<u>Salem Oak Savanna/Woodland Plain</u>: Broad, flat upland between the upper Current River and Meramec drainage. Mainly Roubidoux geologies and shallo fragipan soils.** **<u>Southeastern Oak Savanna/Woodland Plain</u>: Flat, loess cover plain bordering the Mississippi Lowlands.** **<u>Summersville Oak Savanna/Woodland Plain</u>: Broad, flat divide between upper Current and Jacks Fork Rivers.**

Table Lu03 (3 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Oak-Pine Woodland Forest Hills Group
<u>Landform</u>: Mainly broad ridges, moderately sloping (<25%) side slopes, and relatively broad entrenched valleys with local relief between 150-250 feet. Steeper, more dissected areas occur locally near larger stream valleys. Sinkhole depressions are common on broader ridges. Stream valleys vary somewhat from broad and rather shallow, to more deeply entrenched, narrow, and meandering. Many losing streams occur in valleys distant from the main rivers. Cliffs, caves and springs are commonly associated with larger, perennial stream valleys.
<u>Geology</u>: Roubidoux cherty sandstones and dolomites occupy most ridges and upper side slopes, while lower side slopes, especially near major streams are in cherty upper Gasconade dolomite materials.
<u>Soils</u>: Soils are mainly deep, highly weathered and very cherty silt loams with clays at varying depth. Broad ridges may have a loess cap with occasional fragipans, and shallow soils with dolomite bedrock near the surface occur frequently on steeper, exposed slopes.

Historic Vegetation: Pine and mixed oak-pine woodland originally dominated the more gently sloping upland surface associated with the Roubidoux Formation. Early descriptions portray an open, grassy and shrubby understory in these woodlands, a condition related to the prevalence of fire in the historic landscape. Oak and oak-pine forest occupied lower slopes and more dissected, hilly parts of these landscapes, as well as the wider and more well-drained bottom. Bottoms with richer alluvial soils and more abundant water likely were forested in mixed hardwood timber. Dolomite glade and open savanna/woodland complexes were common on exposed slopes with shallow soils. Sinkhole ponds and fens were dotted occasionally throughout.

Current Conditions: Mainly forested in second growth oak and oak-pine forests; forest cover ranges from sixty to over 80%. Most forests are rather dense, near even-age second growth, with very little woodland ground flora. The occurrence of shortleaf pine in these forests has diminished from its original extent, today having only 20-30% of the forest cover containing a substantial component (>25%) of pine. Even age stands dominated by scarlet, black, and white oak are common, oak die back is a common problem. Much of the existing timber land is associated with public land ownership. Cleared pasture lands occupy many of the broad stream valleys and highest, flattest ridges. Many glades and woodlands suffer from woody encroachment, and sinkhole ponds and fens have been drained or severely overgrazed. An exceptional proportion of state-listed species sites are associated with the streams, springs, caves, cliffs, fens, and sinkhole ponds in this group.

Black River Oak-Pine Woodland/Forest Hills: Less Roubidoux and associated oak-pine timber.

Current River Oak-Pine Woodland/Forest Hills: Hills associated with the Current and Jacks Fork Rivers, excluding steep breaks.

Eleven Point River Oak-Pine Woodland/Forest Hills: Hills associated with the Eleven Point, mainly north of the river; excludes breaks.

Table Lu03 (4 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Pine-Oak Woodland Dissected Plains

Landform: Broad, flat to gently rolling plains which give way to moderately dissected and sloping lands associated with the headwaters of major drainages. Valleys are broad and local relief 100-150 feet. Clusters of karst sinkholes are common. Streams are mainly headwater streams with flashy, intermittent flow.

Geology: Underlain by cherty sandstone and dolomite of the Roubidoux Formation with frequent loess deposits on the flatter uplands.

Soils: Soils are formed principally in cherty sandstone and dolomite residuum from the Roubidoux Formation. Soils are mainly deep, cherty, and highly weathered, low base soils. However occasional fragipans and shallow to bedrock soils do occur. Most soils are extremely well drained and droughty.

HistoricVegetation: Originally covered in woodlands of shortleaf pine and mixed pine oak with an open understory of dense grass and shrub ground cover. Post oak woodlands occupied occasional loess covered flats. Unique sinkhole ponds dotted the landscape.

Current Conditions: Over 75% of this group are currently forested in dense, even-age oak and oak-pine forest. Only 20% of these forests have a strong pine component. However, the proportion of forests containing shortleaf pine is the highest in this group. Dense stands of near even age scarlet, black, and post oak occur in the place of pine. Understories are dense, woodland ground flora sparse, and oak die-back common. A substantial component of these forested lands are publicly owned. Approximately 20% of this group is currently pasture, which often occupies the broad valley bottoms or karst plains. Most sinkhole ponds have been drained, dozed or severely overgrazed. Headwater streams are subject to grazing and bank erosion.
Current-Eleven Point Pine-Oak Woodland Dissected Plain: High, flat to rolling divide between Current and Eleven Point Rivers . **Grandin Pine-Oak Woodland Dissected Plain: The large pine plain that originally attracted attention to the pine resource of the region; still contains some of the largest current tracts of pine-oak forest.**

Table Lu03 (5 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Igneous Knobs
Landform: Characterized by prominent, broadly rounded knobs which rise 500 to 600 feet above the middle Current River Valley. The knobs range from less than half to over 5 miles across and contain 58 distinct summits. Mainly broad, gently sloping knob tops give way to gentle to very steep sideslopes (10 to more than 35%). Narrow igneous shut-ins are common. Moderately broad, inter-knob basins with low gradient streams are often abruptly restricted by these shut-ins.
Geology: The knobs are composed of Precambrian age ryolite interconnected with Cambrian-age Eminence dolomite.
Soils: Soils mainly consist of shallow to moderately deep and cobbly loams on the upper slopes and tops of the rhyolite knobs. Very deep, cherty silt loams predominate on the sedimentary areas between the knobs.
HistoricVegetation: Extensive igneous glades and open oak woodlands encircled the tops of most knobs, while oak and oak-pine forests covered the side slopes. Scattered dolomite glades, woodlands and fens were associated with shallow soils on the Eminence dolomite, sometimes filling low slopes and valley bottoms.
Current Conditions: Igneous glades and open woodlands are largely overgrown with eastern red cedar, winged elm and other woody invaders. Over 90% of this LTA is forested in second growth oak and oak-pine timber. Much of the forest land is publicly owned. Clearing for pasture has occurred in the broader valleys (15% of LTA). Few high quality dolomite glades or fens are known.
Eminence Igneous Glade/Oak Forest Knobs: The only LTA in this group.

Table Lu03 (6 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Oak and Oak-Pine Forest Breaks
Landform: Distinguished by local relief over 300 feet, narrow ridges, steep side slopes and mainly narrow sinuous valleys. Cliffs, caves, and springs are common.
Geology: Thick caps of Roubidoux Sandstone on ridges and upper slopes streams cut into the Lower Gasconade Dolomite.
Soils: Soils formed from Roubidoux and Upper Gasconade materials.
HistoricVegetation: Originally forested in oak pine, oak and mixed hardwood forest types. Scattered glades and open woodlands would have occurred on exposed slopes and ridges, especially in areas of shallow soil. Relatively small fen openings occasionally filled narrow tributary valleys.
Current Conditions: A high percentage of public land (45%) is associated with this group. Because of the large amount of public land, as well as the steep topography, this group is still mostly forested(88%) in second growth oak, oak-pine and mixed hardwood timber. Open areas are confined to valleys, so bottomland forest is less than originally. Dolomite glades are largely overgrown with eastern red cedar, and many fens have been drained or heavily grazed. Numerous rare or endangered species, some restricted to this group, are associated with the streams, springs, caves, cliffs, and fens in these landscapes. The rivers have been recognized as national treasures and are an important recreational resource in the region.
Current River Oak Forest Breaks: Cuts into Eminence dolomite. Consequently, unique benches occur on the Gunter sandstone, and extensive areas of more productive, higher base soils with oak and mixed hardwood communities occur here.

Bootheel Sand Ridges, Hills, and Plains
Landform: Slightly elevated old terraces and levees.
Geology: See soils.
Soils: Course, well drained, sandy and loamy soils.
HistoricVegetation: Originally covered in prarie and open oak savannas and woodlands. In the Ash Hills, unusual dunes and wet swales supported unique wetland communities. Many unique species were associated with these sand communities.
Current Conditions: While most of these LTAs have been converted to cropland (65-85%), there is substantial grassland on the most exessively drained areas, especially within the East Prairie, Blodgett, and Sikeston Ridge LTAs. Several sand prairie/savanna remnants occur in northern Scott County.
Ash Hill Low Sand Hills and Terraces: Alluvial and aeolian sands, with some dune and swale topography. Sand Ponds NA and other unique species sites occur.

Table Lu03 (7 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Mississippi River and Bootheel Alluvial Plains and Lowlands
Landform: Large and flat floodplains and lowlands.
Geology: See soils.
Soils: Dominated by mainly clayey and poorly drained alluvial soils with occasional loamy or sandy materials on natural levees.
HistoricVegetation: These landscapes historically supported extensive marshes and swamps, as well as wet bottomland forests. Occasional prairies occurred on levees of courser soil materials. Widespread flooding at least once per year was important in creating and maintaining these outstanding wetland complexes.
Current Conditions: While most of these LTAs have been drained and converted to cropland, there is more remnant natural vegetation in these than in the other two lowland LTAs in the Bootheel. It appears that some of the lowest, wettest portions of these landscapes have escaped draining, and while hydrologically altered, offer some opportunity for maintenance and restoration of native ecosystems. Many of the best remaining lands are associated with existing conservation ownership, but significant opportunity to expand conservation influence still exists.
Black River Silty Lowland: Drained alluvial plain associated with Lower Black River .

Table Lu03 (8 of 8). Descriptions of land type association (LTAs) groups as well as a condensed description of the 15 LTAs (underlined in bold) within the Current River Watershed. Descriptions are quoted in part or whole from MDC (1997a), Nigh (1998), and Nigh (1999).

Upper Meramec Oak Woodland Dissected Plain
Landform: Rolling moderately dissected topography. Local relief is 75-150 feet. Very broad, flat ridges give way to gentle sideslopes and broad stream valleys. Some more dissected areas occur near major stream valleys. Karst plains with frequent shallow sinkhole depressions are common.
Geology: Jefferson City-Cotter dolomite, and to a lesser extent Roubidoux and occassional Pennsylvanian sandstones.
Soils: Soils are variable, ranging from shallow to bedrock and fragipan soils, to deep, cherty and well drained cherty loams. Tree root growth is often restricted by bedrock, pans, or clay mineralogy, especially high in the landscape. Broad stream valleys are most often occupied by losing streams, however occasional seeps do occur and can spread across substantial portions of a valley.
HistoricVegetation: Open oak woodlands with occasional prairie and savanna openings was historically the principal vegetation type. Post oak and black oak were the principal woodland tree species. Historic Fire likely played an important role in maintaining an open canopy, sparse understory and a dense herbaceous ground flora. More dissected lands likely contained mixed oak woodland and forest. Unique sinkhole ponds and seeps were scattered in the broad valleys and depressions.

<u>Current Conditions</u>: These LTAs are currently a mosaic of fescue pasture and dense, often grazed oak forest. The transition from open grassland to closed forest is abrupt and the patchwork blocky. Very few native grasslands or savannas are known, and the dense second growth woodlands have very little ground flora. Most sinkholes and seeps have been drained and heavily grazed. Headwater streams and creeks suffer from grazing or gravel removal. Many roads, towns, cities, and businesses are located in these LTAs
<u>Upper Meramec Oak Woodland Dissected Plain:</u> Broad divide at the very headwaters of the Meramec, within the Central Plateau Subsection.

Table Lu04. Percent land cover for eleven digit hydrologic units within the Current River Watershed. Data is based on MoRAP Missouri Land Cover Data (1999) as analyzed by Caldwell (2001).

Unit Name	FOR	WET	GRS	CRP	URB	WAT
Upper Current R.	**74.2**	**0.0**	**25.6**	**0.1**	**<0.1**	**<0.1**
Spring Valley	**68.3**	**0.0**	**31.5**	**<0.1**	**0.2**	**<0.1**
Current R.-Sinking Cr.	**95.9**	**0.0**	**3.8**	**0.1**	**0.1**	**0.1**
Middle Current R.	**95.5**	**0.0**	**4.1**	**0.1**	**<0.1**	**0.1**
Pike Cr.	**87.4**	**0.0**	**11.7**	**0.2**	**0.7**	**<0.1**
Current R.-Buffalo Cr.	**94.1**	**0.0**	**5.4**	**0.1**	**0.1**	**0.2**
Lower Current R.	**73.2**	**0.0**	**25.9**	**<0.1**	**0.3**	**0.6**
Little Black R.	**54.9**	**0.8**	**26.1**	**17.7**	**0.1**	**0.4**
Current R. Watershed	***80.1***	***0.2***	***16.0***	***0.1***	***0.1***	***0.2***

FOR = Forest , **WET**=Wetland, **GRS**=Grassland, **CRP**=Cropland, **URB**=Urban, **WAT**=Water

Table Lu05. Public lands within the Current River Watershed. Acreage and permanent stream mile estimates are approximate.

Area Name	Owner[1]	Acres	Permanent Stream Miles
Angeline CA	MDC	20,434	1.6
Ashley Creek CA	MDC	316	0.4
Carter Creek CA	MDC	444	0.0
Cedar Grove CA	MDC	1168	0.0
Clearwater CA	MDC	442	0.0
Current River CA	MDC	26,619	9.7
Doniphan Towersite	MDC	10	0.0
Fourche Creek CA	MDC	162	0.0
Gist Ranch CA	MDC	3,984	0.0
Grandin Towersite	MDC	158	0.0
Greenville Ford Access	MDC	7	0.1
Hemenway CA	MDC	173	0.0
Hunter Towersite	MDC	79	0.0
Little Black CA	MDC	2,313	1.8
Logan Creek CA	MDC	967	0.0
Midvale CA	MDC	85	0.0
Montauk Towersite	MDC	40	0.0
Mudpuppy CA	MDC	1,354	5.0
Peck Ranch CA	MDC	22,909	5.7
Rocky Creek CA	MDC	21,346	8.3
Sand Pond CA	MDC	298	0.0
Sunklands CA	MDC	37,843	7.2
Missouri Dept. of Conservation	*Total*	*141,270*	*39.8*
Doniphan-Eleven Point District	USFS	176,885	30.3
Poplar Bluff District	USFS	319	0.0
Salem-Potosi District	USFS	58,075	10.2
United State Forest Service	Total	235,279	40.5
Montauk State Park	MDNR	1,332	5.0
Missouri Dept. of Natural Resources	*Total*	*1,332*	*5.0*
Big Spring Pines NA	NPS	492	0.0
Big Spring NA	NPS	17	0.2
Cardareva Bluff	NPS	106	1.3
Lower Current R. District	NPS	134	1.1
Mill Mountain NA	NPS	194	0.3
Ozark National Scenic Riverways	NPS	40,693	133.5
Prairie Hollow Gorge NA	NPS	185	0.9

Stegall Mountain NA	**NPS**	**613**	**1.8**
Tunnel Bluff Woods DNA	**NPS**	**261**	**1.3**
National Park Service	***Total***	***42,605***	***140.4***
Watershed Total		***420,576***	***225.7***

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

[1]Owner: MDC=Missouri Department of Conservation

MDNR=Missouri Department of Natural Resources

NPS=National Park Service

USFS=United States Forest Service

Table Lu06. Percentages of public land ownership within eleven digit hydrologic units of the Current River Watershed.

Unit	MDC	MDNR	NPS	USFS	Total
Upper Current R.	3.8	0.4	1.6	0.1	5.9
Spring Valley	30.4	0.0	0.2	0.0	30.6
Upper Middle Current R.	14.0	0.0	5.0	28.7	47.6
Lower Middle Current R.	38.9	0.0	10.2	1.6	50.7
Pike Cr.	8.4	0.0	0.0	51.7	60.1
Lower Current R. (Buffalo Cr.)	0.3	0.0	5.7	50.0	56.0
Lower Current R.	0.2	0.0	0.0	23.9	24.1
Little Black R.	2.0	0.0	0.0	1.4	3.4
Watershed	*10.7*	*<0.1*	*3.2*	*17.7*	*31.6*

MDC=Missouri Department of Conservation

MDNR=Missouri Department of Natural Resources

NPS=National Park Service

USFS= United States Forest Service

HYDROLOGY

Precipitation

The Current River Watershed is situated in one of the wetter parts of Missouri, which receives from 32 inches of precipitation in the Northwest to 48 inches in the Southeast of the state (Figure Hy01)(MDNR 1986). Precipitation data based on Easterling et al. (1995) indicates an average annual precipitation of 44.5 inches within the Current River Basin (including the Jacks Fork and Current River Basin in Arkansas) for the period of 1923-1994. Analysis of individual annual precipitation amounts for the previously mentioned period indicate a trend toward increased annual precipitation amounts within the basin (Figure Hy02a). Mean monthly precipitation data for the period indicate that the combined months of April, May, and June receive the most precipitation at 13.46 inches. The combined months of December, January, and February receive the least amount of precipitation at 9.11 inches. May receives the highest mean precipitation amount at 4.91 inches, while February receives the lowest at 2.83 inches (Figure Hy02b).

United States Geological Survey Gaging Stations

The United States Geological Survey (USGS) currently (2000) has two active surface discharge gaging stations within the Current River Watershed (Table Hy01 and Figure Hy01) (USGS 2000a and USGS 2000b). Station 07067000 (Current River at Van Buren, Mo.) http://waterdata.usgs.gov/mo/nwis/uv?07067000 is located on the Current River 0.4 miles downstream from Pike Creek (USGS 2000a). The datum of the gage is 442.78 ft above mean sea level (msl). Station 07067000 has been recording continuous discharge data from October 1921 to the present. Station 07068000 (Current River at Doniphan, Mo.) http://waterdata.usgs.gov/mo/nwis/uv?07068000 is located on the Current River 2.5 miles upstream from Briar Creek. The datum of the gage is 321.21 ft above msl. Station 07068000 has also been recording continuous discharge data from October 1921 to the present.

Historical daily discharge and/or peak flow records exist for an additional 15 continuous surface discharge stations within the watershed with various records available from 1904 to 2001 (Table Hy01). In addition to the water discharge records, the USGS has collected surface water quality records from 10 location within the Current River Watershed (USGS 2000a).

Daily Mean Discharge Statistics

Daily mean discharge statistics as well other long term hydrologic trends were determined using data from gage stations 07067000 (Current River at Van Buren, MO), 07067500 (Big Spring near Van Buren, MO), and 07068000 (Current River at Doniphan, MO). These stations have been chosen for analysis because they provide the most comprehensive flow datasets for the Current River Watershed. In addition some statistics are included for station 07068600 (Little Black River at Success, Ar). However station 07068600 is not included in all analysis due to its relatively short period of record (6 years as opposed to greater than 70 years for the other stations).

The annual daily mean discharge of the Current River at Doniphan is 2,815 cubic feet per second (cfs) (USGS 2000a). The highest daily mean discharge at this station is 90,000 cfs, which occurred on March 12, 1935. The lowest daily mean discharge is 852 cfs which occurred on October 8, 1956. Table Hy02 lists annual, highest, and lowest daily mean discharges for four analyzed stations. Annual mean daily discharges for the period 1923-1994 for analyzed stations (not including the Little Black River at Success, Ar.) show possible trends of increased discharges at all three stations (Figure Hy03). These data seem to reflect an increase in annual precipitation during the same time period (Figure Hy02). Analysis of historical discharge data for the period 1923-1994, available through the USGS National Water Information System (NWIS) (2000b), reveals that daily mean discharge has been lowest during the months of August, September, and October and highest during March, April and May (Figure Hy04).

Flow Duration

Flow duration curves are useful for determining the variability or flashiness of stream flow as well as how the discharge of a stream is sustained over time. These factors are determined by many variables including climate, watershed land cover/land use, soil type, and topography. Daily flow duration curves have been plotted for USGS surface gage stations on the Current River at Van Buren and Doniphan as well as for stations at Big Spring near Van Buren and the Little Black River at Success, Arkansas using daily flow duration data available from the United States Geological Survey (USGS 2000c) Daily Values Statistical Program (DVSTAT) (Figure Hy05). Slopes of all duration curves are relatively steep at the higher discharges indicating that flood discharges are infrequent or not sustained for long periods of time. In the 10 to 90 percentile range, the curves flatten out considerably for the Current River stations as well as for Big Spring indicating well sustained stream discharges over extended periods of time. This is at least partially attributable to the storage and transport capacity of the karst topography within the watershed and surrounding area. As has been noted in the geology section of this document substantial stream flow from much of the upper portion of the Eleven Point Watershed is lost to the groundwater system. Much of this eventually reemerges in the Current River Watershed most notably at Big Spring.

While base flows are moderately well sustained in the Little Black River (MDNR 1994), it seems, unlike other portions of the Current Watershed, to lack the substantial influence of springs. Only one "spring of note" associated with the Little Black River is mentioned in the MDNR Water Quality Basin Plan (MDNR 1994). This spring has an average discharge of 5 cubic feet per second. In addition, several streams in the lower portion of the Little Black River have been channelized. This has the effect of increasing surface drainage, reducing infiltration to the groundwater system thus reducing the duration of flows. The flow duration curve for the Little Black River indicates flows are not as well sustained as flows for the Current River Stations. While the duration curve for the Little Black River becomes less steep in the 10 to 90 percentile range, it remains substantially steeper than the curves of the Current River and Big Spring (Figure Hy05). However, it is important to note that duration values for the Little Black River are based on available data for the period 1980-1986. While values for the other stations are based on data for the period 1923-1994. Meaningful conclusions can not be made about Little Black River flow duration because of the short period in which data were collected.

Comparison of duration curves for Big Spring and both Current River stations (Little Black River excluded due to lack of data) between the periods 1923-1958 and 1959-1994 show a slight upward shift for all three stations and a slight decrease in slope for Big Spring and the Current River at Doniphan in the 10 to 90 percentile range (Figure Hy06). The Current River at Van Buren appears to have experienced a slight increase in its flow duration curve slope between the 10 to 90 percentile range in the latter time period. The upward shift of the flow duration curve reflects an overall increase in discharge in the latter time period. The changes in the flow duration curve and discharge rates are possibly an indication of changes in precipitation (intensity, amount, seasonal timing, and duration and type i.e. snow, rain, etc.), watershed land cover/land use, and/or changes in the groundwater system. As stated previously, the Current River Basin seems to have experienced an overall increase in average annual precipitation (Figure Hy02). Land cover/land use changes within the watershed have also possibly had an effect on flow duration. The variability of land use/land cover data collection methodology and analysis, as well as the spatial and temporal variability of land cover changes make it difficult to reliably determine actual quantitative land use/land cover changes which have occurred within the watershed for the previously discussed time periods. In addition, a lack of hydrologic data for the late 1800s and very early 1900s leaves to speculation hydrologic trends prior to and through the "timber boom" period. Geologically, possible changes in the karst groundwater system of the area leading to an increased groundwater influence in the watershed may be another explanation. Many factors influence long term changes in stream discharge. Analysis of all factors is beyond the scope of this document. However, further data collection and analysis of hydrologic data will be important for the determination of long term trends within the watershed.

10:90 Ratio

The 10:90 ratio is used as an indicator of discharge variability. It is the ratio of the discharge which is equaled or exceeded 10% of the time to the discharge which is equaled or exceeded 90% of the time. It is useful for determining summer carrying capacity in streams as well as interbasin comparisons. The lower the 10:90 ratio, the lower the variability of flow. The 10:90 ratio for the Current River at Doniphan is 4.1. This is a low value relative to 10:90 values of drainages of similar size within the state (Skelton 1976). This value is similar to 10:90 values from surrounding watersheds (Table Hy03). The relatively low 10:90 ratios of the Current and surrounding watersheds are due in large part to the water storage and release characteristics of the karst geology. It is, however, important to note that many streams within the area (most of which do not have discharge records) are “losing” in nature and thus will typically exhibit higher 10:90 ratios. An example of this is the Eleven Point River near Thomasville (Station 07070500) which has a drainage area similar in size to that of the Jacks Fork, but which has a high concentration of losing streams and a 10:90 ratio of X:Y. Much of the water which is lost to the ground water system from the Upper Eleven Point River reemerges at Big Spring in the Current River Watershed.

Instantaneous Discharge

Table Hy02 lists the highest and lowest instantaneous discharge rates that have occurred at Current River at Van Buren, MO and the Current River at Doniphan, MO. The highest instantaneous peak flow of 125,000 cfs was recorded in 1915 at Van Buren (no USGS gage station existed at Doniphan until 1918). The record instantaneous low flow of 473 cfs was also recorded at Van Buren in 1956.

7-day Q2, Q10, Q20 Low Flow and Slope Index

Q2, Q10, and Q20 seven day low flows refer to the lowest 7 day discharges that have a recurrence interval, on average, of 2, 10, and 20 years respectively. Some of the issues which low flow statistics help answer include the relative permanency of a stream and thus the streams ability to support aquatic life, the influence of groundwater in a particular watershed, as well as addressing issues related to effluent discharge. The Current River at Doniphan has seven day Q2, Q10, and Q20 low flow values of approximately 1,170, 940, and 890 cfs, respectively (Skelton 1976). Table Hy04 lists low flow values for additional sites within the Current River Watershed. When analyzed relative to drainage area, these values are 100 times higher than north and west Missouri prairie streams and, in many cases, 2 to 5 times higher than other Ozark streams which, as a basic rule, tend to have the highest sustained low flows in Missouri (Skelton 1976 and MDNR 1994).

The slope index (SI, ratio of the seven day Q2 to Q20) is 1.3 for the Current River at Doniphan for discharge data between 1936 and 1995. This is a low slope index, an indication of low variability in annual low flows. Slope index values for additional Gage Stations are given in Table Hy04.

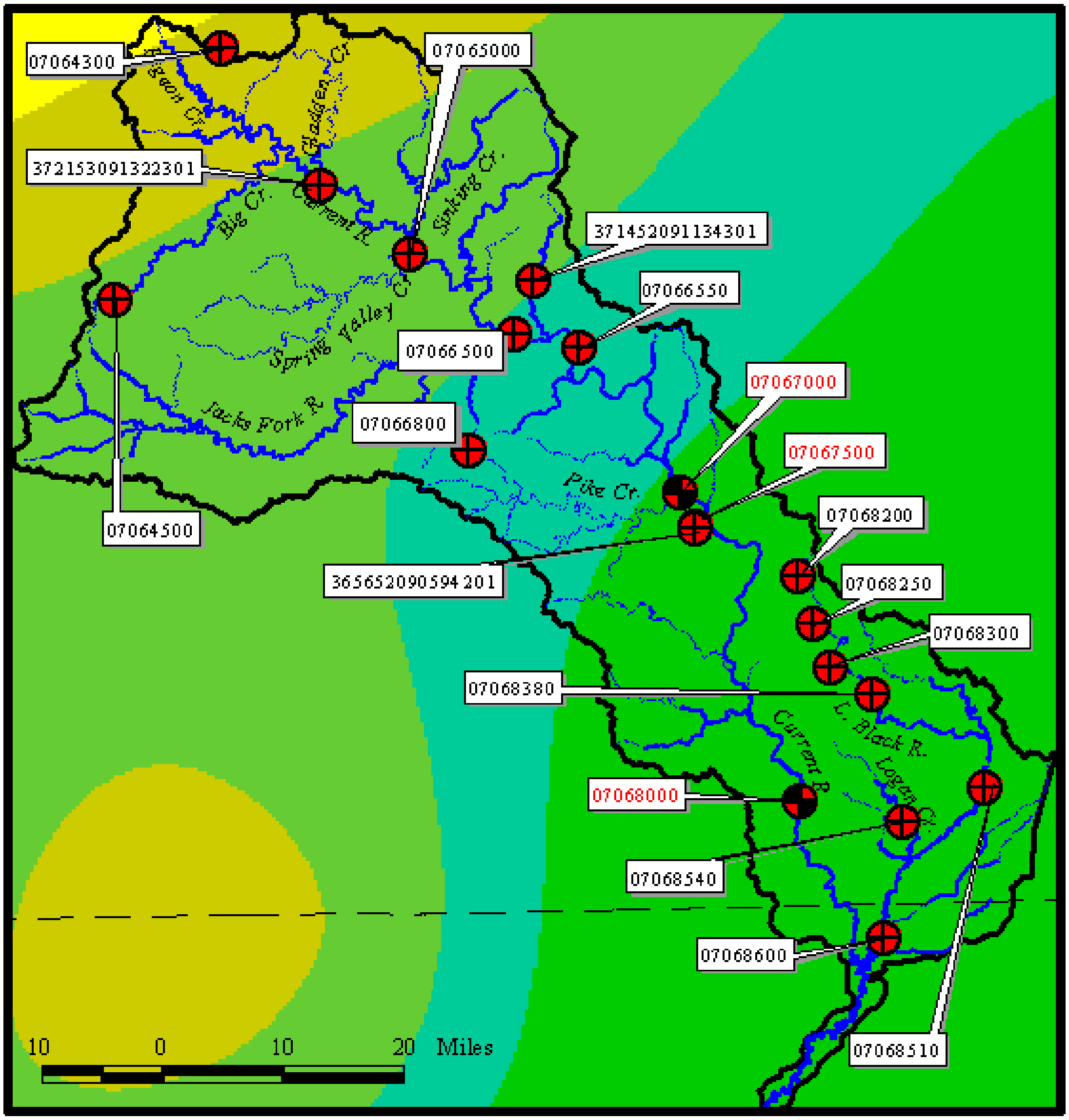
Flood Frequency

Magnitudes and frequencies of flooding for the Current River at Doniphan range from 27,300 cfs with a frequency of 2 years to 134,000 cfs for a 100 year frequency (Alexander and Wilson 1995). Table Hy05 lists flood frequency estimates for additional selected gage stations within the Current River Watershed.

Figure Hy01.

Current River Watershed

Precipitation and Gage Stations



Annual Precipitation* Distribution Pattern

- 41 - 42 (inches)
- 42 - 43
- 43 - 44
- 44 - 45
- 45 - 46
- 46 - 47
- 47 - 48

USGS Gage Station

- Inactive
- Active

Current Basin Boundary

State Line

N

* Based on analysis of United States Historical Climatology Network Serial Temperature and Precipitation Data, Revision 3 (Easterling et al. 1995).

Figure Hy02. (a) Estimated mean annual precipitation amounts and (b) mean monthly precipitation amounts in the Current River Basin for years 1923-1994 based on analysis of Easterling et al. (1995).

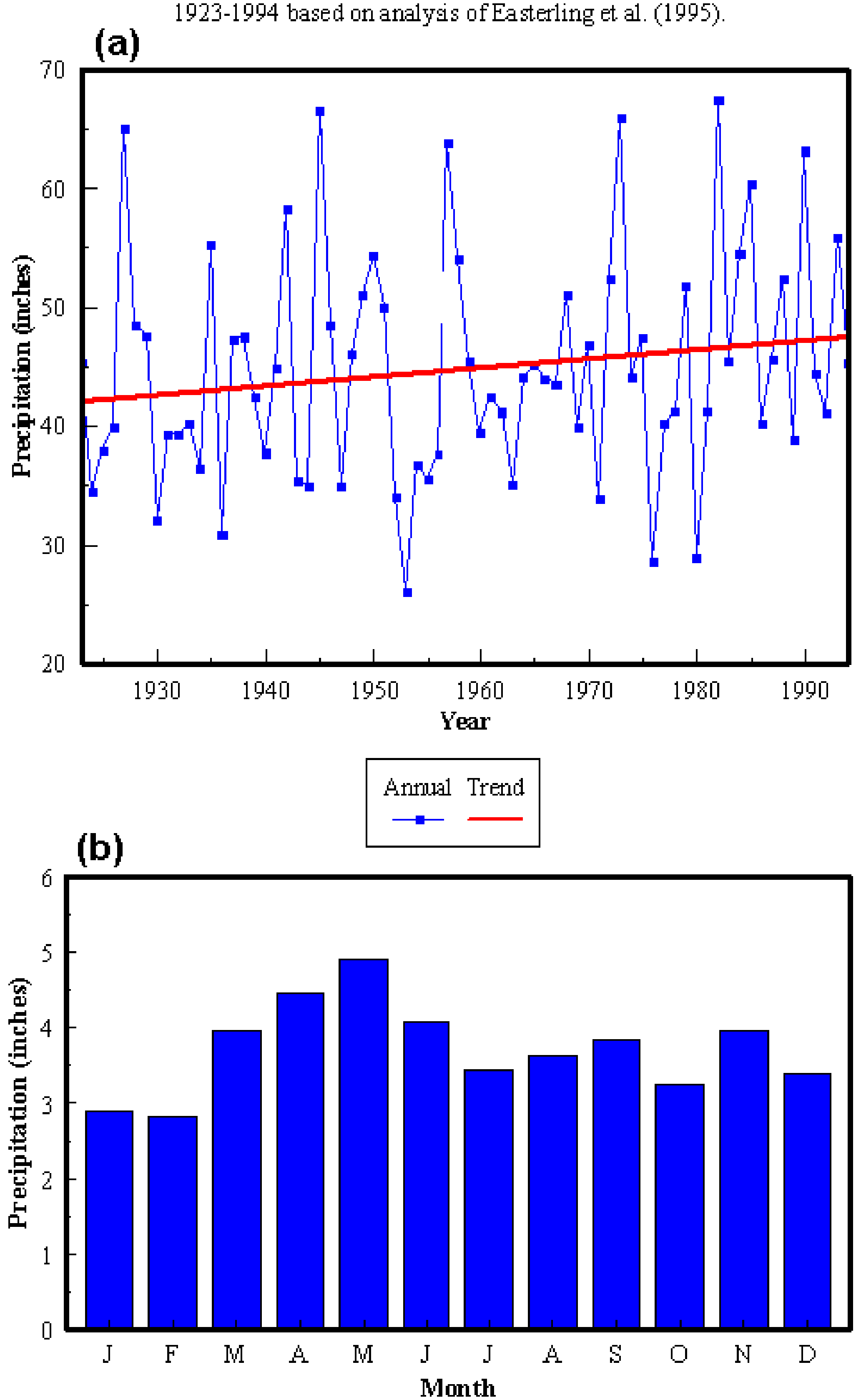


Figure Hy03. Annual mean daily discharge and trend (in red) for selected USGS gage stations within the Current River Watershed for the period 1923-1994 (USGS 2000b).

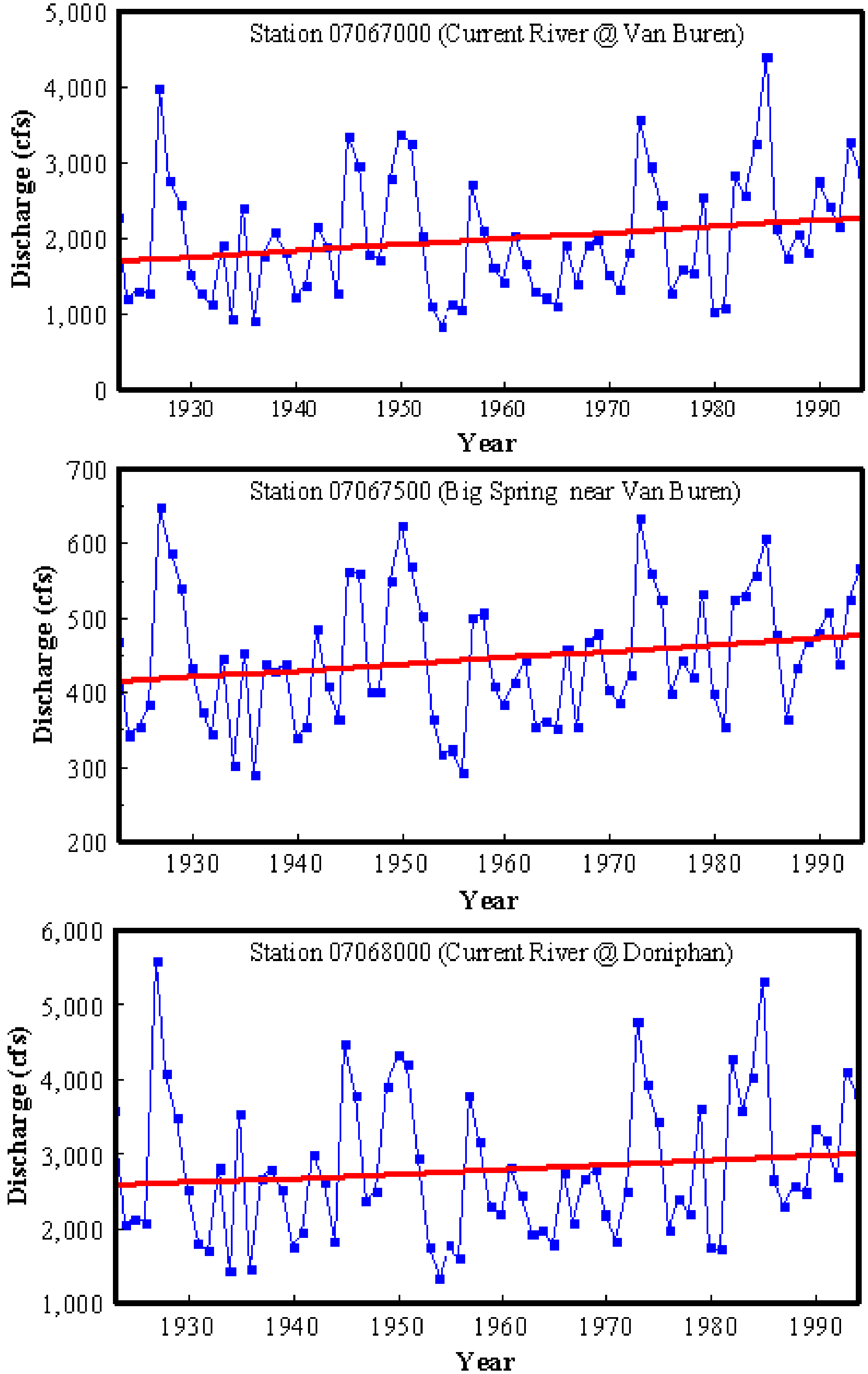


Figure Hy04. Monthly mean daily discharge at selected USGS Gage Stations within the Current River Watershed (USGS 2000b).

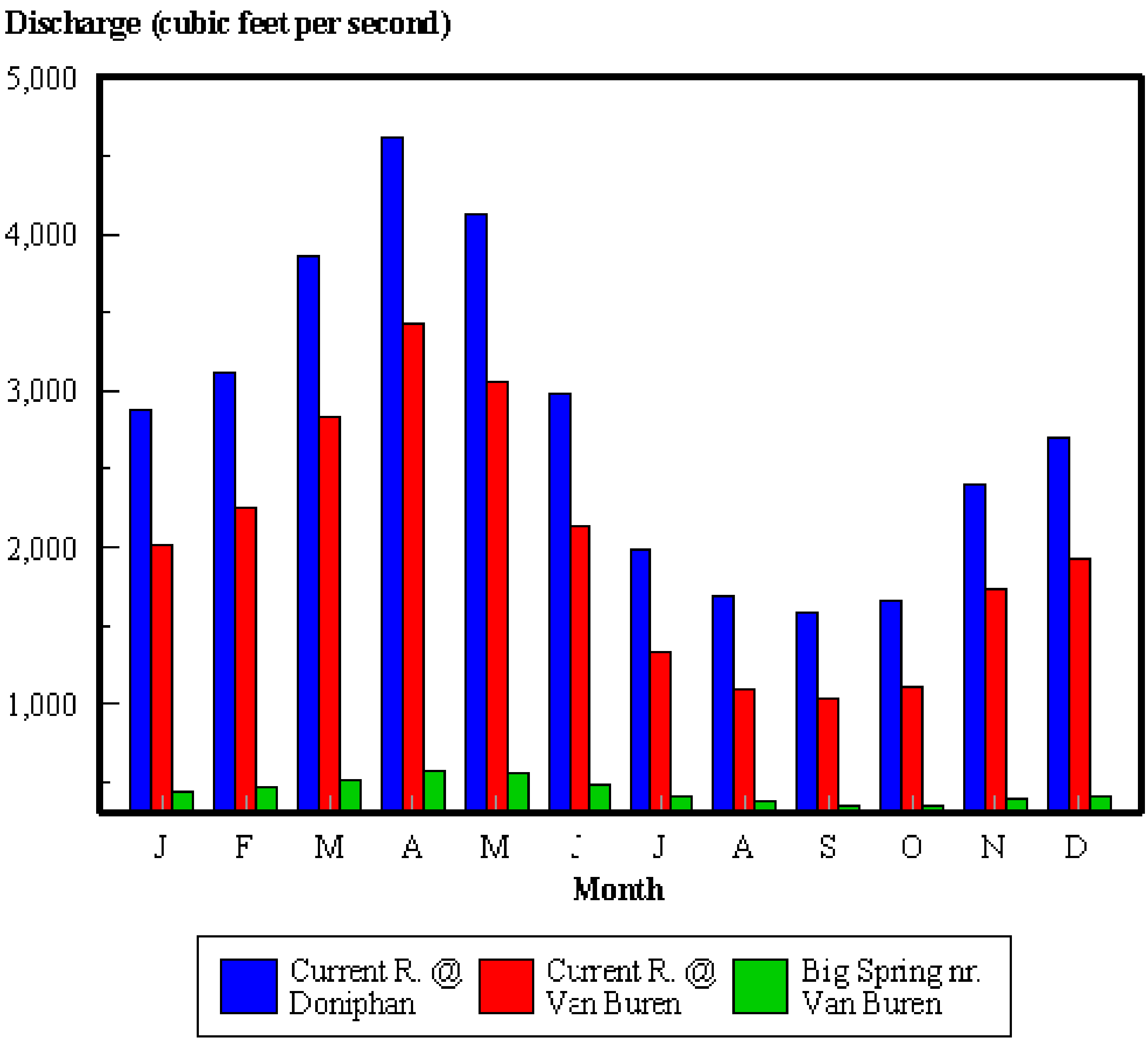


Figure Hy05. Flow duration curves for selected USGS gage stations within the Current River Watershed (USGS 2000c).

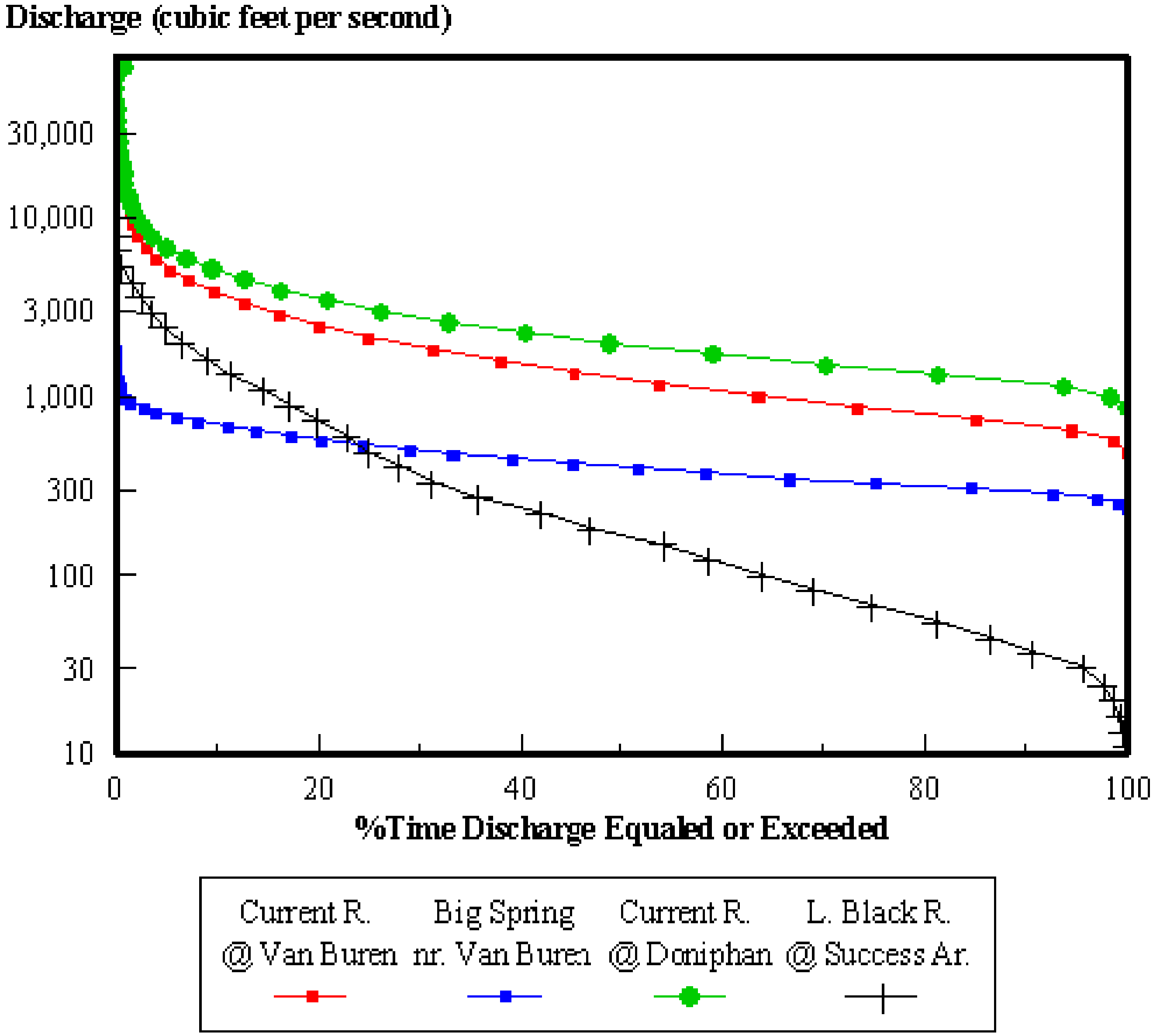


Figure Hy06. Flow duration changes between two time periods (1923-1958 and 1959-1994) at selected USGS Gage Stations within the Current River Watershed (USGS 2000c).

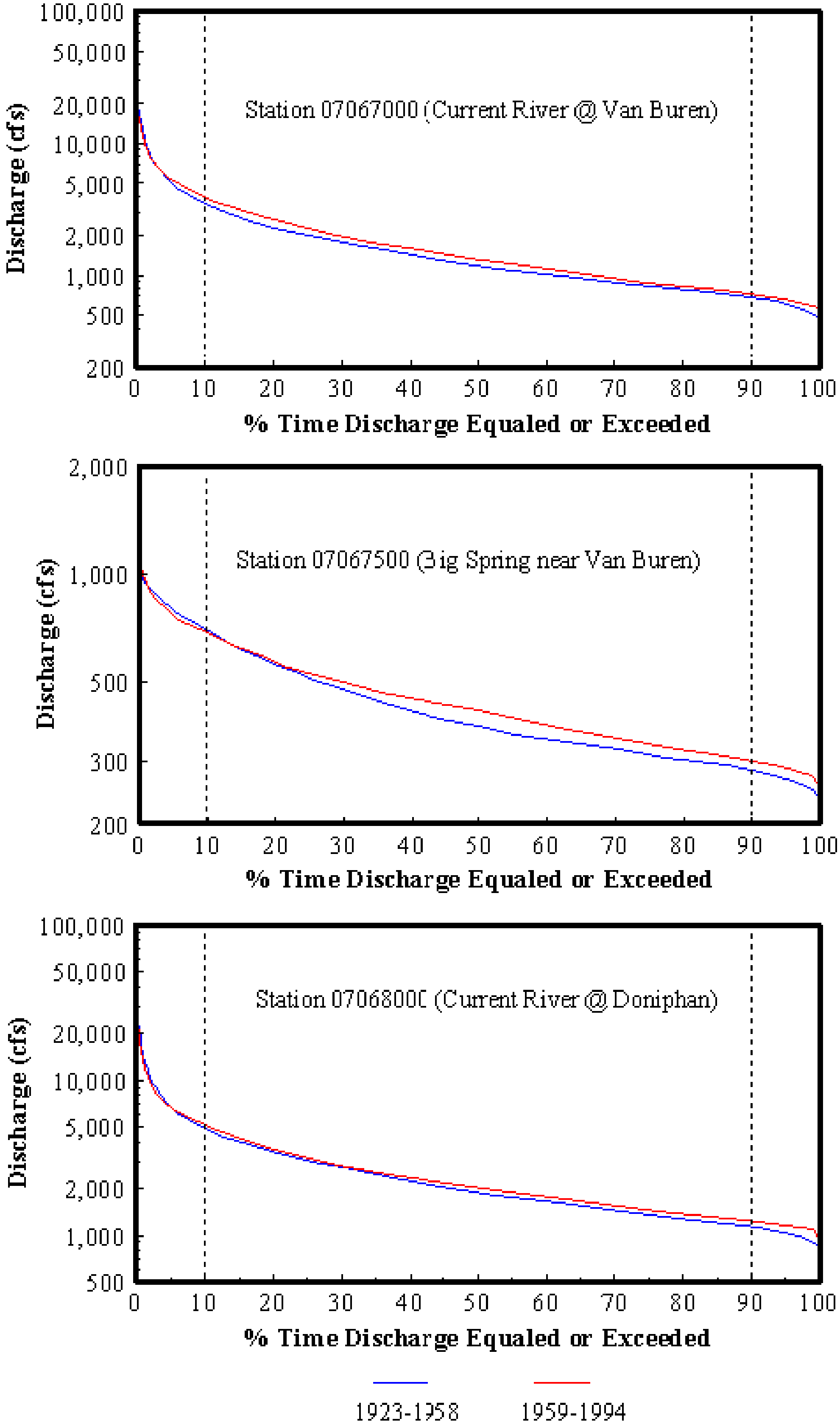


Table Hy01. USGS continuous surface discharge gage stations within the Current River Watershed (USGS 2000a and 2002a). Active stations (as of 2001) are in *green*. Period of record for peak flow measurements is given in parenthesis.

Station #	Station Name	Drainage Area (mi^2)	Period of Record
07064300	Fudge Hollow near Licking, Mo.	2	1956-1976 (1959-1976)
07064500	Big Creek near Yukon, Mo.	8	1949-1975 (1965-1979)
07065000	Round Spring at Round Spring, Mo.	-	1928-1939 (1965-1979)
07066500	Current River near Eminence, Mo.	1,272	1921-1976 (1904-1975)
07066550	Blue Spring near Eminence, Mo.	-	1970-1971
07066800	Sycamore Creek near Winona, Mo.	1	(1955-1979)
07067000	*Current River at Van Buren, Mo.*	*1,667*	*1921-2001 (1904-1998)*
07067500	*Big Spring near Van Buren, Mo.*	*100*	*1921-1996, 2000-2001 (1981-1989)*
07068000	*Current River at Doniphan, Mo.*	*2,038*	*1904-2001 (1921-2000)*
07068200	N. Prong L. Black River at Hunter, Mo.	1	(1958-1980)
07068250	M. Fork L. Black River at Grandin, Mo.	7	1980-1984 (1981-1983)
07068300	N. Prong L. Black River near Grandin, Mo.	39	1980-1984 (1981-1983)
07068380	Little Black River near Grandin, Mo.	80	1980-1984 (1981-1983)
07068500	Little Black River near Fairdealing, Mo.	297	(1940-1979)
07068510	Little Black River below Fairdealing, Mo.	194	1980-1986 1981-1986
07068540	Logan Creek at Oxly, Mo.	38	1980-1984 (1981-1983)
07068600	Little Black River at Success, Ar.	386	1980-1986 (1981-1986)

Table Hy02. Discharge statistics for United States Geological Survey Discharge Gage Stations within the Current River Watershed (USGS 1987, USGS 1997, USGS 2000a, and USGS 2003) for period of record at each station except for median.

Station	Median	Mean (cfs)	Instant Peak Flow (cfs)	Max (cfs)	Instant Low Flow (cfs)	Min (cfs)
07067000 (Current R. at Van Buren)	1,270	2,006	125,000 8/21/1915	72,000 11/15/1993	473 10/7/1956	476 10/8/1956
07067500 (Big Spring near Van Buren)	397	447	N/A	2,000 12/3/1982	N/A	236 10/6/1956
07068000 (Current R. at Doniphan)	1,940	2,815	122,000 12/3/1982	90,000 3/12/1935	852 10/8-19/1956	852 10/8/1956
07068600 (Little Black R. at Success, AR)	165	487	N/A	8,630 12/5/1982	N/A	11 8/12/1982

Mean=Average Daily Discharge

Max=Highest Daily Mean

Min=Lowest Daily Mean

Med=Median (Only complete calendar years with daily discharge records used for computation)

N/A=Not Available

Table Hy03. Comparison of 10:90 ratios from the Current River and surrounding watersheds (Skelton 1976).

Station #	Name	Watershed	Drainage Area	10:90
07066000	Jacks Fork at Eminence	Jacks Fork	398	6.8
07057500	North Fork River near Tecumseh	North Fork	561	4.6
07058000	Bryant Creek near Tecumseh	North Fork	570	6.9
07066500	Current River near Eminence	Current	1,272	5.5
07067000	Current River at Van Buren	Current	1,667	5.0
07068000	Current River at Doniphan	Current	2,038	4.1
07070500	Eleven Point River near Thomasville	Eleven Point	361	22.9
07071500	Eleven Point River near Bardley	Eleven Point	793	5.4
06930000	Big Piney River near Big Piney	Big Piney	560	8.3
07061500	Black River near Annapolis	Black River	484	9.1
07061500	Meramec R. near Eureka	Meramec	3,788	12.8

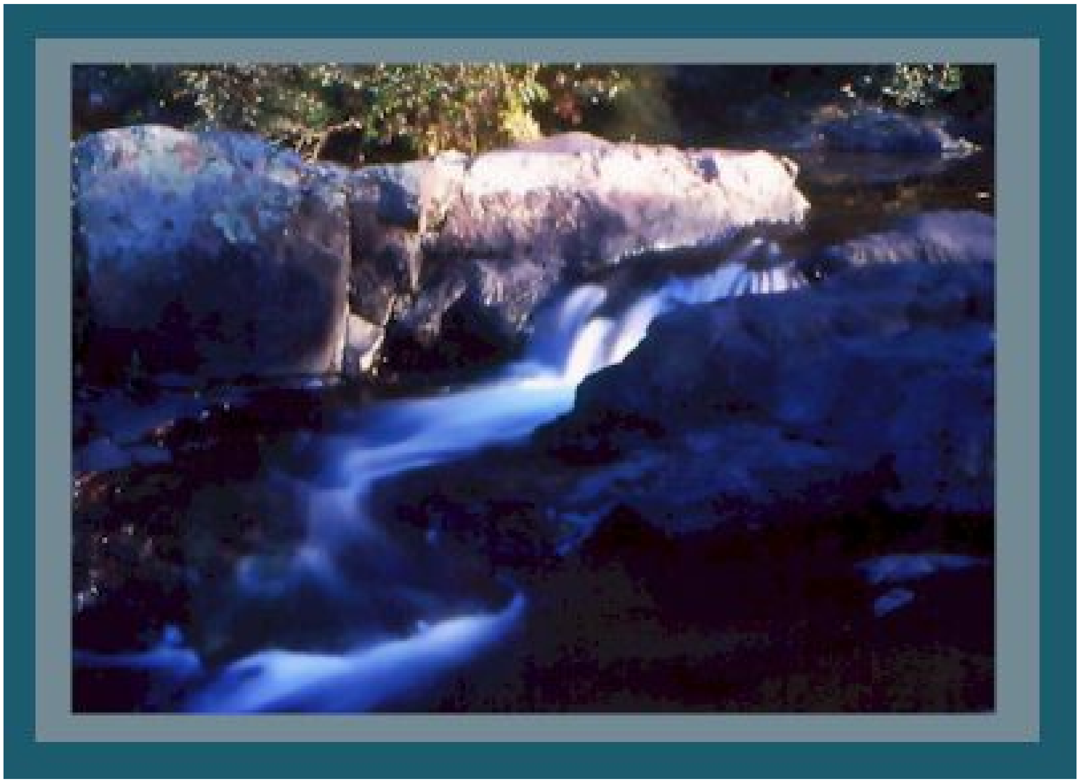
Table Hy04. Low flow calculations for USGS Surface Discharge stations within the Current River Watershed (Skelton 1976). Partial record stations in italics.

Station #	Station Name	Drainage Area (mi^2)	Q2	Q10	Q20	Slope Index
07064300	Fudge Hollow near Licking, Mo.	2	0	0	0	-
07064400	*Montauk Spring at Montauk State Park*	-	*62.0*	*46.0*	*42.0*	*1.4*
07064500	Big Creek near Yukon , Mo.	8	0	0	0	-
07064530	*Welch Spring near Akers*		*95.0*	*75.0*	*72.0*	*1.3*
07064555	Pulltite Spring near Round Spring	-	16.0	-	-	-
07064760	*Twin Springs near Shannondale*	-	*10.0*	*8.4*	-	-
07064800	*Sinking Creek near Round Spring*	-	*38.0*	*28.0*	*26.0*	*1.5*
07064950	*Current River at Round Spring*	-	*320.0*	*230.0*	*220.0*	*1.5*
07065000	Round Spring at Round Spring, Mo.	-	16.0	11.0	10.0	1.6
07066500	Current River near Eminence, Mo.	1,272	512.0	382.0	358.0	1.4
07066550	Blue Spring near Eminence, Mo.	-	78.0	62.0	-	-
07066600	*Rocky Creek near Eminence*	-	*0.1*	*0*	*0*	-
07066990	*Pike Creek at Van Buren*	-	*1.0*	-	-	-
07067000	Current River at Van Buren , Mo.	1,667	700.0	540.0	510.0	1.3
07067500	Big Spring near Van Buren , Mo.	100	290.0	254.0	246.0	1.2
07067680	*Cave Spring near Hunter*	-	*1.6*	-	-	-
07067700	*Phillips Spring near Van Buren*	-	*12.0*	*9.0*	-	-
07067900	*Tucker Spring near Bennett*	-	*29.0*	-	-	-
07068000	Current River at Doniphan , Mo.	2,038	1,170.0	940.0	890.0	1.3
07068500	Little Black River near Fairdealing , Mo.	297	23.0	14.0	12.0	1.9

Table Hy05. Two to 100 year flood discharges (cubic feet per second) for selected USGS Gage Stations within the Current River Watershed (Alexander and Wilson 1995).

Station	Recurrence Interval (Discharge in cubic feet per second)					
	2	5	10	25	50	100
07064300 (Fudge Hollow near Licking, Mo.)	124	234	332	489	633	803
07064500 (Big Creek near Yukon, Mo.)	1,840	3,350	4,480	6,020	7,220	8,460
07066500 (Current River near Eminence, Mo.)	23,500	45,500	62,500	85,900	104,000	124,000
07067000 (Current River at Van Buren, Mo.)	26,700	48,900	65,500	87,800	105,000	123,000
07068000 (Current River at Doniphan, Mo.)	27,300	50,700	68,700	93,500	113,000	185,000
07068500 (Little Black R. near Fairdealing, Mo.)	7,220	15,700	23,000	33,800	43,000	52,800

WATER QUALITY



Beneficial Use Attainment

Approximately 593 stream miles and 45 impoundment acres within the Current River Watershed are classified and have designated beneficial uses as presented in Tables G and H of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality (Table Wq01) (MDNR 2000c). These waters must meet or exceed established criteria as defined in Table A of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality for those beneficial uses (MDNR 1999a). All watershed streams and impoundments listed in Tables G and H are designated for livestock/wildlife watering as well as protection of aquatic life. In addition, the two classified impoundments within the watershed are also designated for whole body contact recreation and boating. Approximately 118 miles of the Current River from the State Line to Township (T) 31N, Range (R) 6W, Section (S) 24 are designated for irrigation, livestock and wildlife watering, protection of aquatic life, cool water fishery, whole body contact recreation, and boating. Another 19 miles of the Current River from T 31N, R6W, S 24 to Montauk Spring are designated for livestock and wildlife watering, protection of aquatic life, cold water fishery, whole body contact recreation, and boating. Sixteen other streams within the watershed also have additional designated beneficial uses. In addition to the aforementioned designated uses, the Current River has been designated as “Outstanding National Resource Waters” from its headwaters to the northern Ripley County Line (MDNR 2000c). The Little Black River is designated as “outstanding state resource waters” from T24N,R3E,S22 to T24N,R3E,S25 (MudPuppy Conservation Area). The South Prong of the Little Black River is also designated as “outstanding state resource waters” in the Little Black Conservation Area. No streams within the Current River Watershed are designated for industrial use or as a drinking water supply.

Section 303(d) of the Federal Clean Water Law requires that states identify those waters for which current pollution control measures are inadequate (MDNR 1999a). This is accomplished by comparing data from those waters with water quality criteria established for designated beneficial uses of those waters (MDNR 1999a). Waters that do not meet their criteria are then included in the 303(d) list. The state must then conduct Total Maximum Daily Load (TMDL) studies on those waters in order to determine what pollution control measures are required and then insure those measures are implemented (MDNR 1999b). Currently, there are no streams within the Current River Watershed included in the 1998 303(d). However, five miles of the Jacks Fork River, a major tributary of the Current River which is discussed in the Jacks Fork Watershed Inventory and Assessment, from T29n, R3w, section 9 to T29n, R4w, section 26 are currently included in the 1998 303(d) list (MDNR 1999d). In this section of the Jacks fork, fecal coliform counts are periodically high indicating the presence of excessive organic wastes. The Clean Water Act requires that the 303(d) list be updated every four years (MDNR 2000d).

Chemical and Biological Quality of Streamflow

Data regarding the chemical and biological quality of stream flow within the Current River Watershed has been collected by several different entities since the 1960s. Government agencies which have conducted water quality sampling within the watershed include the Environmental Protection Agency (EPA), Missouri Department of Conservation (MDC), Missouri Department of Natural Resources Clean Water Commission, National Park Service (NPS), United States Forest Service (USFS), and the United States Geological Survey (USGS). In addition some water quality data has been collected by Stream Team organizations. The extensive amount of water quality data available for various parameters and varying time periods within the Current River Watershed makes an adequate summary of water quality data within this document impractical.

In order to avoid going beyond the scope of this document by attempting to provide a comprehensive summary of all water quality data by all agencies for all available years, nine USGS stations within the Current River Watershed were selected in order to provide a spatially broad view of selected water quality values within the Current River Watershed (Figure Wq01). These included 5 stations on the Current River, one each at Montauk and Big Springs, and two stations within the Little Black River Hydrologic Unit including one station on the Little Black River and one on Logan Creek. Water quality was analyzed using data collected between 1995 and 1999 for all stations with the exception of the stations located on Logan Creek and the Little Black River. Data collected during the period 2000-2001 was analyzed for the Little Black River station and data collected during the period 1980-1984 and was analyzed for the Logan Creek station due to the limited availability of recent water quality data for these stations. Water quality parameters selected for analysis (where available) included temperature, pH, dissolved oxygen, fecal coliform, hardness, nitrate, total ammonia nitrogen, phosphorous, dissolved lead, and dissolved zinc. In addition, total recoverable lead and zinc were analyzed for two stations. These values were compared with state standards (when available) and the number of exceedences were noted (Table Wq02).

Analysis of water quality from stations located on the Current River, as well as at Montauk and Big Springs, reveals that water quality at these stations consistently met water quality standards for the selected parameters during the years examined with the exception of fecal coliform bacteria. Three out of the seven stations examined experienced levels of fecal coliform that exceeded state standards for whole body contact recreation. Station 07067000 (Current River at Van Buren, Mo.) experienced the highest percentage of this occurrence with a rate of 18.1% (2 out of 11 observances). At the remaining two stations, 07066510 (Current River above Powder Mill) and 07068000 (Current River at Doniphan), state standards were exceeded in 12.5% (1 of 8) and 5.9% (2 of 34) of the samples respectively. It is important to note that many of the fecal coliform values analyzed were based on non-ideal colony counts (too large a sample, colonies merged).

While the values for dissolved lead at stations located on the Current River, as well as at Montauk and Big Springs did not exceed state standards in the analyzed observations, results for dissolved lead at Stations 07067500 (Big Spring near Van Buren, Mo.) and 07068000 (Current River at Doniphan) were inconclusive. It is important to note that a much more comprehensive analysis commissioned by the NPS (1995) revealed that lead concentrations exceeded the EPA acute freshwater criterion standard as well as the EPA drinking water action level in several observations between 1973 and 1995. This occurred at two sites on the Current River as well as several springs including Big Spring, Blue Spring, Round Spring, Pulltite Spring, Welch Spring, and Montauk Springs.

Analysis of water quality data for Logan Creek at Oxly, Mo. (Station 07068540) for the period 1980-1984 and for the Little Black River below Fair Dealing, Mo. (Station 07068510) for the period 2000-2001 revealed a different water quality picture than that of the rest of the Current River Watershed. At Logan Creek at Oxly, Mo., state standards were exceeded for pH (1/26 observations), dissolved oxygen (3/26 observations), and fecal coliform (4/17 observations). State standards were also exceeded at the Little Black River below Fair Dealing, Mo. for dissolved oxygen (1/12 observations) and fecal coliform (3/12 observations). The EPA- recommended standard for phosphorous was also exceeded in 2 out of 12 observations at this site. In addition to the aforementioned USGS data, Missouri stream team (MST 2001) water quality data collected in October of 1997 revealed two sites on the Little Black River which failed to meet the state standard for dissolved oxygen. This coupled with the USGS data for the Little Black River would appear to point to the possibility that water quality problems in the Little Black River occur on a relatively regular basis. The limited amount of recent (since 1995) USGS water quality data for sites in the Little Black River Hydrologic Unit makes it difficult to determine the extent and frequency of water quality problems within the unit. An expanded water quality sampling program will be needed in order to adequately monitor water quality on the Little Black River as well as determine the extent of water quality problems in the Little Black Hydrologic Unit.

As stated previously, a large amount of water quality data for a variety of parameters is available for the Current River Watershed. Water quality data is available for additional parameters from the USGS Historical Water Quality Data Website and the annual USGS Water Resources Data Reports as well as the EPA Storage and Retrieval (STORET) Database. In addition, volunteer water quality monitoring data is available from the Missouri Stream Team online database. Additional State Water Quality Standards are available in the most current document of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

USGS Pesticides National Synthesis Project

The United States Geological Survey conducted water quality samples within the Current River Watershed from 1993-1995 as part of the Pesticides National Synthesis Project in an effort to determine the spatial and temporal distribution of contamination by pesticides in the water resources of the United States (USGS 1999a). The watershed was part of the Ozark Plateaus Study Unit of the National Water

Quality Assessment Program. Four surface water sampling sites and four ground water sampling sites were selected within the watershed (Figure Wq01) (USGS 1998a and 1998b). A single sample was taken at each ground water sampling site in 1993. Two samples were collected at three of the four surface water sites between 1994 and 1995, while four samples were taken at the fourth site during the same period (USGS 1998c and 2000d).

A total of nine pesticide or pesticide related compounds were detected from samples collected within the watershed (Table Wq03). These compounds included Cis-Permethrin; Deethyl Atrazine; P,P'DDE; Tebuthiuron; Atrazine; Metolachlor; Molinate; Propanil; and Thiobencarb. Pesticide compounds were detected in a single sample collected from one of the four ground water sites. These compounds included P,P'DDE and Propanil. The surface sample sites exhibited a higher number of detections, with all four sites having detections of pesticide compounds. Site 4 had the most detections of pesticide compounds with all nine of the previously mentioned compounds present. For comparison; 39 of 43 surface water sites within the Ozark Plateaus Study Unit had detections of pesticides with 18 sites having samples with six or more pesticide detections (Bell et al. 1997). In addition 73 of 215 ground water sample sites within the Ozark Plateaus Study Unit had pesticide detections with a maximum of 5 pesticides detected in any one sample (Adamski 1996). It is important to note that the number of samples at individual sites varied. It is also important to note that analysis for specific pesticide compounds varied from site to site and/or sample to sample.

Ground Water Quality

The presence of karst features within and around the Current River Watershed such as Spring Valley Creek and Pike Creek (losing streams), increases the risk of ground water contamination from point and non-point sources of pollution located on the surface. Due to the fact that most of the watershed's population is rural, indicating that most receive their water from untreated private wells, the quality of surface water which has the potential to enter the groundwater system is important. In addition, large portions of the permanent flow within the watershed are enhanced by springs such as Montauk and Big Springs. Thus any contaminant which affects ground water quality is likely to affect surface water quality as well as drinking water quality. There are several ways in which contaminants can enter the groundwater system. These include losing streams, sinkholes, and abandoned wells. As indicated by dye traces performed within the watershed, ground water movement is not always restricted by surface watershed boundaries. This is no more effectively demonstrated than by observing the recharge area of Big Spring which receives much of its recharge from portions of the Eleven Point Watershed (Figure Ge02).

Point Source Pollution

Table Wq04 lists 21 municipal and non-municipal waste water facilities within the Current River Watershed (Figure Wq02) (MDNR 1998a, 2000e). There are 6 municipal waste water facilities within the watershed. These serve the cities/towns of Doniphan, Grandin, Naylor, Summersville, Van Buren, and Winona. Discharges from these facilities have a combined flow of approximately 0.992 million gallons per day. Table Wq04 lists individual flows for municipal facilities as well as some non-municipal facilities within the watershed.

The MDNR "Incidents of Mines Occurrences, and Prospects" (IMOP) Database contains data on 53 active mines and 134 past producers within the Current River Watershed in Missouri (MDNR 2001a). All active mines are sand and gravel removal operations with the exception of 1 sandstone quarry.

Improper gravel mining techniques and site location have the potential to threaten water quality as well as aquatic and riparian habitats within the watershed. The negative impacts of improper gravel mining have been shown to include channel deepening, sedimentation of downstream habitats, accelerated bank erosion, the formation of a wider and shallower channel, the lowering of the flood plain water table, and channel shift (Roell 1999). The highest percentage of past producers are iron mines (MDNR 2001a). Nearly all of these are surface mines which dot the watershed. When these occur as open pits they have the potential to act as a direct link to the ground water system and thus pose a threat to ground water quality if pollutants are allowed to enter. This can affect wells from which the watersheds population receives its water.

Non-point Source Pollution

Perhaps one of the more difficult challenges to address within any watershed is non-point source pollution. Whereas point source pollution can usually be traced to a single discharge point or area such as a waste water treatment plant discharge, non point source pollution, such as sheet erosion of topsoil, runoff of nutrients from pastures, or pesticide or fertilizer runoff from fields, is much more difficult to detect as well as remedy. It takes the cooperation of the landowners within a watershed to minimize non-point source pollution and its impacts.

Land disruption from road and bridge construction and maintenance as well as urban expansion often results in increased sediment loads to receiving water systems. Bridge construction can also result in stream channel modification, which affects stream flow both up and downstream from the bridge. Within the Current River Watershed, there are approximately 3,407 miles of Highways, Streets, and County and Private Roads. This is approximately 1.2 miles of road per square mile (mi/sq mi)of watershed area. Approximately 2,634 miles of these roads are probably unpaved (1.0 mi/sq mi). This is based on the assumption that most county and private roads not intersecting a municipality are unpaved. According to the Missouri Department of Transportation Highway and Bridge Construction Schedule, there are currently (2001) four state highway projects which involve drainage and/or bridge construction or maintenance scheduled within the watershed from 2001-2003 (MDT 1998).

The potential for contamination by septic systems has been shown by Aley (1972 and 1974) to be increased in areas of soluble bedrock (MDNR 1984). As part of an NPS Ozark National Scenic Riverways Groundwater Study, Aley and Aley (1987) identified pollution hazards including sewage disposal in the study region. They state that the primary type of sewage disposal within the study region is septic systems. Aley and Aley (1987) also state that according to a 1972 Missouri Clean Water Commission publication, sewage production is approximately 100 gallons per person per day. Using this information and assuming that nearly all of the populations of the municipalities within the watershed are served by municipal waste water treatment facilities, it can be estimated that 1,857,900 gallons of septic system effluent is generated per day within the Current River Watershed. Aley and Aley (1987) conclude that the "dispersed pattern of settlement in the study region is of great help in reducing groundwater contamination problems resulting from sewage disposal." Aley and Aley (1987) state that: "Instead, problems are centered on areas with concentrated settlement". It is important to stress that proper septic system installation and maintenance remains important to the protection of both surface and ground water systems.

Non-Point source contaminants of forestry activities within the Ozark National Scenic Riverways Groundwater Study Region were determined not to be significant enough to be designated by Aley and Aley (1987) as a hazard area within the study region. However, in certain areas of the study region, they did observe localized erosion “related primarily to logging roads and skid trails in rugged terrain” and concluded that “as a result, logging in the study region undoubtedly contributes to the sediment load of the springs in the Riverways”. It is important to note that since publication of this report a considerable amount of land within the study region has been transferred to public ownership.

As with other watersheds in the area, livestock, and in particular cattle populations, can potentially adversely affect both surface and ground water quality within the Current River Watershed. This is especially true when livestock are allowed to linger in riparian zones. Current estimates of livestock populations based on watersheds appear to be scarce if not non-existent. Much of the livestock population data currently available is based on county estimates. Applying this data proportionally to a watershed is a dubious method, at best, due to the potential variability of spatial distribution of livestock populations within counties. Land cover may provide a partial clue: Approximately 80.1% of the land cover within the Current River Watershed is Forest . Land cover within the riparian corridor reflects this characteristic with an estimated 78.7 percent consisting of forest. A high percentage of forest cover within the watershed would tend to indicate lower livestock populations. In addition, a high percentage of timbered riparian corridor would indicate, perhaps, more limited access to streams by livestock. Without good watershed-based livestock population data, much is left to speculation. What can be stated reliably is that limiting the presence of livestock from the riparian corridor is an effective way to help insure both surface and groundwater quality.

Other non-point pollution concerns within the Current River Watershed are recreation oriented. These include the large numbers of floaters (including people using johnboats, canoes, and innertubes) and people on summer weekends as well as horse trail rides and the associated facilities which are located along the Jacks Fork, a major tributary of the Current River. As stated previously, a portion of the Jacks Fork is currently included on the 303d list due to high fecal coliform counts which periodically exceed state standards for whole-body contact recreation indicating the presence of excessive organic wastes (MDNR 1994 and USGS 2001c). The USGS in cooperation with the NPS is currently conducting a multiphase study to determine the locations, magnitude, and sources of microbiological contamination on the Jacks Fork (USGS 2001c). Additional information regarding this study can be found in the USGS Fact Sheet 026ñ01: Assessment of Microbiological Contamination of the Jacks Fork within the Ozark National Scenic Riverways, Missouri--Phase 1.

An increased awareness by the public will be important to the protection of both surface and ground water quality from non-point sources of pollution within the Current River Watershed.

Water Pollution and Fish Kill Investigations

Eight water pollution incidents have been investigated in the Current River Watershed since 1990 (Table Wq05) (MDC 2001a). The stream impacts associated with these incidents ranged from 100 yards to greater than one mile, with the impacts of two incidents unknown. No known fish kills were observed in relation to any of the eight incidences.

Water Use

Water use data for the Current River Watershed (including the Jacks Fork) obtained from the USGS National Water Use Database (1998d) indicate that total water withdrawn from the Current River Watershed in 1995 was 34.99 million gallons per day (mgd). Most of the water withdrawn from the watershed was from the groundwater system. Groundwater withdrawn from the watershed was 29.46

mgd while surface water withdrawn was 5.53 mgd.

Estimated water withdrawal for irrigation purposes was the most prevalent use within the Current River Watershed in 1995 (USGS 1998d). Combined groundwater and surface withdrawals for irrigation equaled 30.38 mgd. Domestic (household) use was the second most prevalent within the Current River Watershed with domestic deliveries equaling 2.51 mgd. Self-supplied water withdrawn in 1995 for domestic use equaled 1.08 mgd.

Major water use information for the Current River Watershed was obtained from the MDNR, Division of Geology and Land Survey. The MDNR maintains records of "major" (those facilities capable of withdrawing 100,000 gallons/day or more) surface and ground water users throughout the state. Recent records (1997) indicate there were a total of 40 major water users withdrawing over 4 billion gallons of water from 125 groundwater and surface water wells and/or intakes combined (Table Wq06)(MDNR 1997). The majority of water (68.5%) was acquired from ground water withdrawals. The remaining 31.5%, comprising surface water withdrawals, all came from the Little Black River. Of the 40 permitted major water users, 5 were public entities with total withdrawals (all groundwater) totaling 218,813,900 gallons or 4.6% of total withdrawals for 1997.

Recreational Use

The Current River Watershed, and specifically the Current River, receives a high amount of recreational use. In 1982, the recreational value of the Current River Watershed was ranked 1 out of 37 major watersheds in Missouri (MDC and MDNR 1982). Results were obtained by surveying professional staff from six state and federal agencies. The main threat to the Current River, which was expected to result in a lower ranking in the future, was intensive recreational use.

Much of the recreational use within the watershed is associated with the Current River and specifically the ONSR. Recreational use estimates indicate that total annual visits to the ONSR averaged 1,546,299 between the years 1996 and 2000 (Table Wq07) (NPS 2001). Apart from bus tours, driving tours, etc. The top three activities were angling, canoeing, and camping. Of these three activities, angling was the most prevalent; accounting for an estimated average of 148,983 visitors annually.

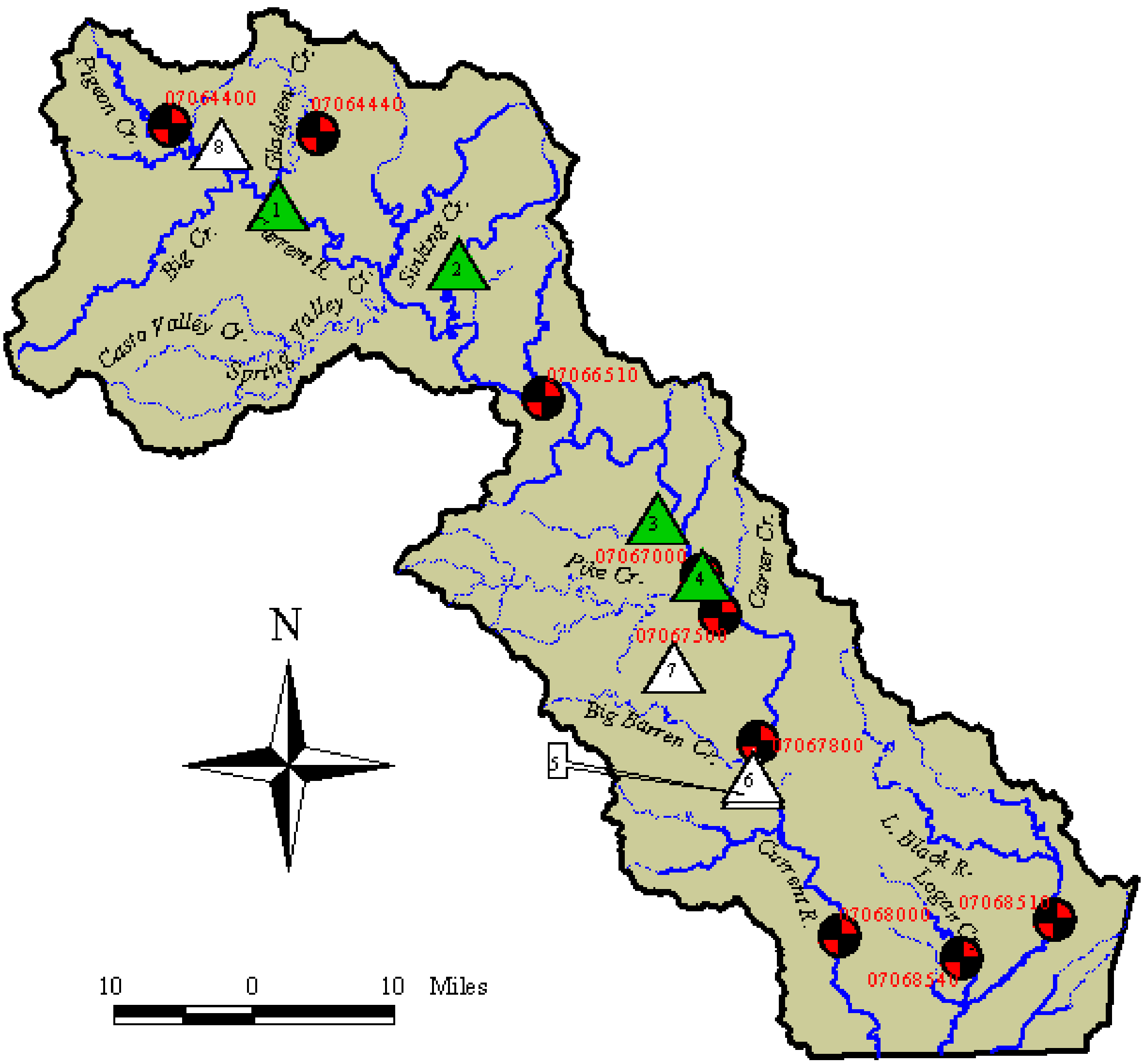
In 1985, The National Park Service initiated a River Use Management Plan in order to help insure that the Current River, as well as the Jacks Fork, would continue to provide quality and diverse recreational opportunities to the public. This plan was designed, in part to “protect the river environment and provide a variety of quality recreational experiences for visitors” (NPS 1989). Canoe use and motorboat use were addressed as part of this plan.

As part of the River Use Management Plan, the Jacks Fork and the Current River were divided into zones with the establishment of maximum levels of canoe use designated as low (up to 10 canoes per mile), medium (11-40 canoes per mile), and high (41-70 canoes per mile)(Figure Wq03). In some zones, the established maximum level of canoe use was different between weekends (Friday-Sunday)/holidays and weekdays (Monday-Thursday). The Current River was divided into 8 zones with zone 7 being divided into sub-zones “A” and “B” as listed in Table Wq08. Zones 5,6,7a, were designated for low canoe use at all times. Zones 1, 4, and 7b were designated for medium canoe use at all times. While zones 2 and 3 were designated for medium canoe use on the weekdays and high canoe use on during weekend and holiday periods. According to the River Use Management Plan, over 85% of the canoeists floating the rivers obtain canoes from concessionaires Thus, the primary method of the NPS for attaining target levels of canoe use is by limiting the number and distribution of canoes to each concessionaire by zones and districts (NPS 1989).

Figure Wq01.

Current River Watershed

Water Quality Stations



Legend

- USGS Water Quality Station
- USGS Pesticide Sampling Site (Ground Water)*
- USGS Pesticide Sampling Site (Surface)*

*See table Wq03.

Figure Wq02.

Current River Watershed
Point Source Discharges

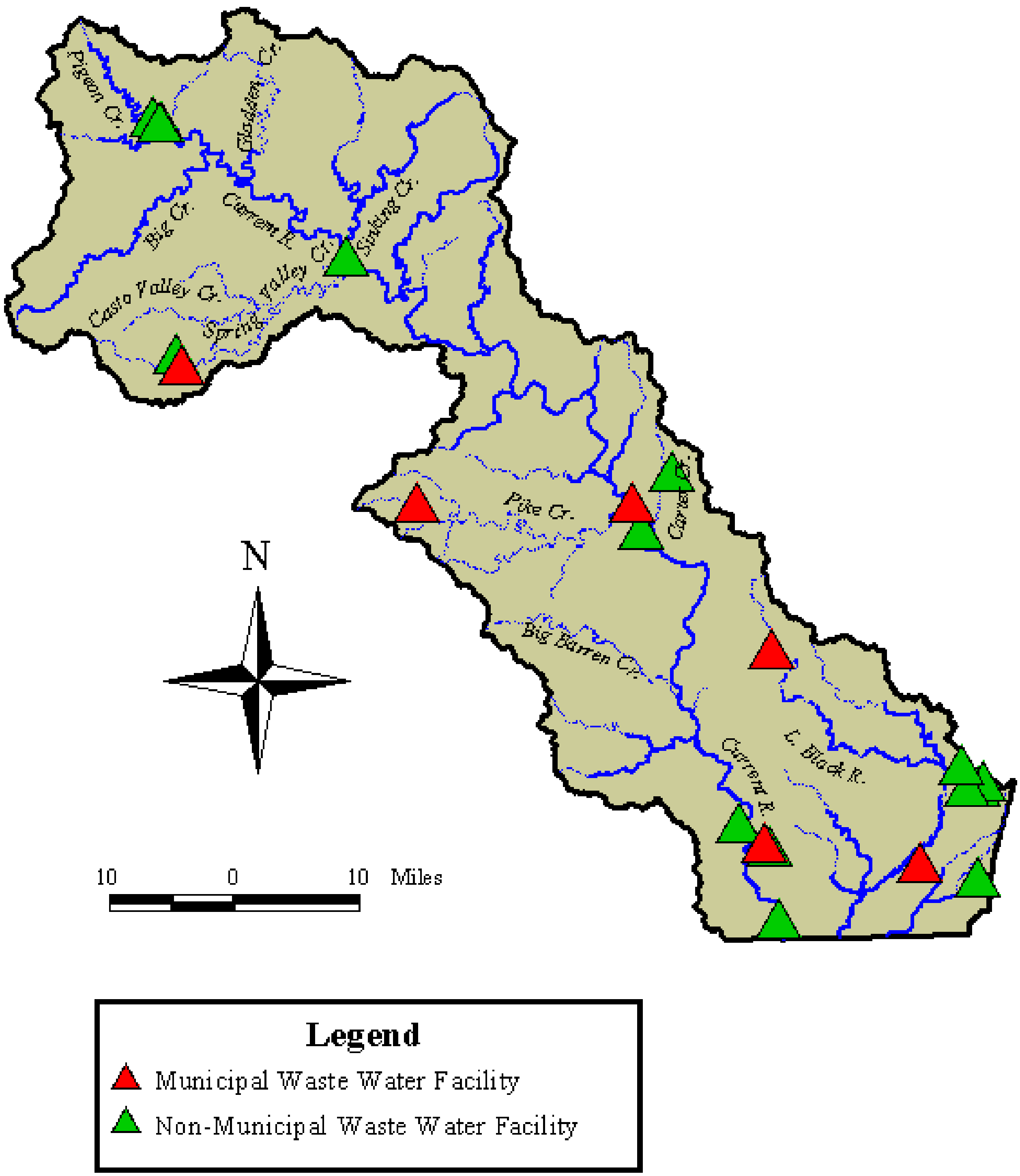


Figure Wq03.

Current River Watershed

Accesses and National Park Service Canoe Density Zones

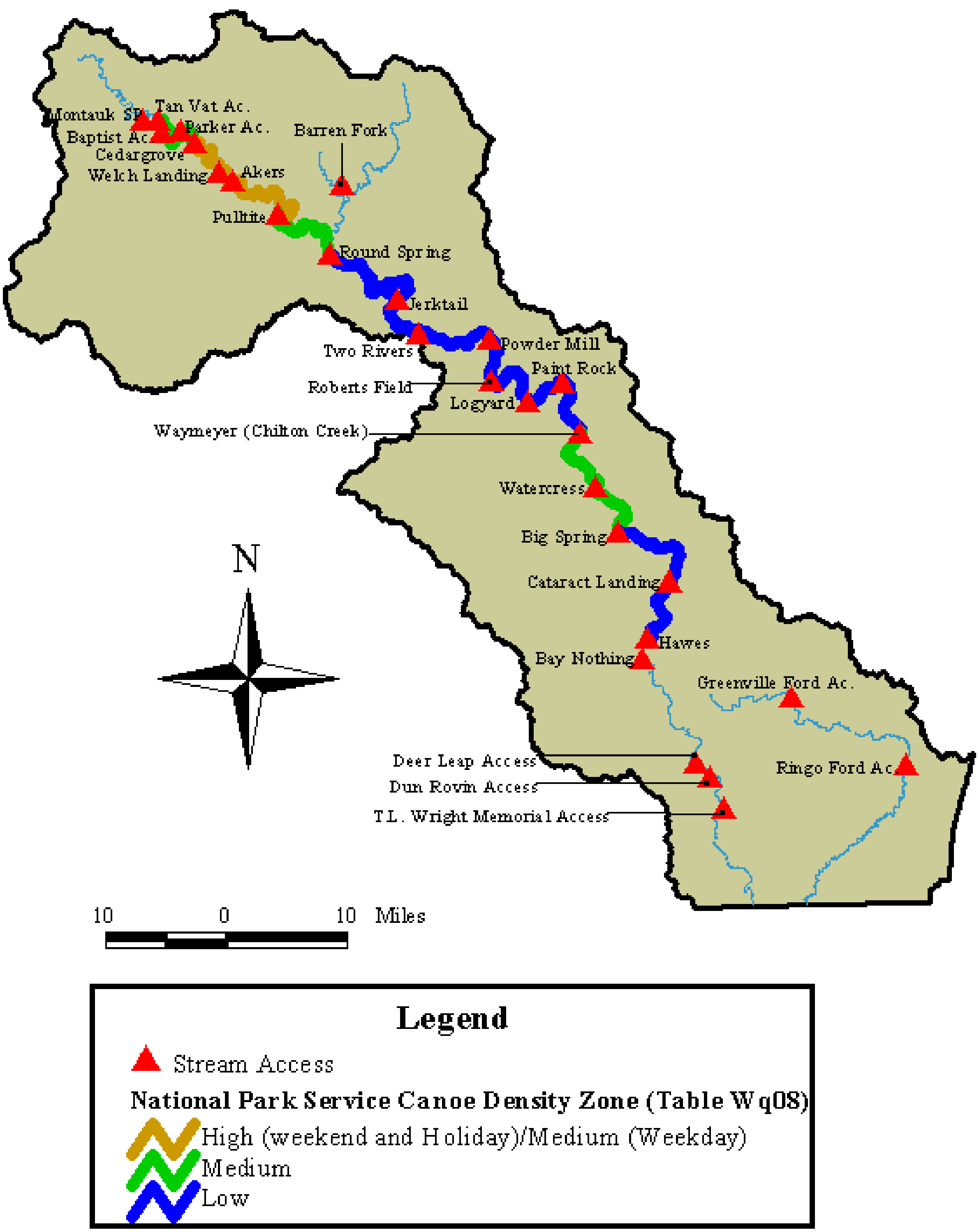


Table Wq01. Missouri Department of Natural Resources use designations for selected streams and impoundments within the Current River Watershed (MDNR 2000c). Locations are given in section, township, range format.

[1] **L1-**Lakes used primarily for public drinking water supply.

L2-Major reservoirs.

L3-Other lakes which are waters of the state. For effluent regulation purposes, publicly owned lakes are those for which a subtantial portion of the surrounding lands are publicly owned or managed.

P-Streams that maintain permanent flow even in drought periods.

C-Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.

[2] **lww-**livestock & wildlife watering

aql-protection of warm water aquatic life and human health-fish consumption.

cdf-cold water fishery

clf-cool water fishery

wbc-whole body contact recreation

btg-boating & canoeing

irr-Irrigation

Stream Name	Class[1]	Miles acres*	From	To	Designated Use[2]
Ashley Cr.	P	2.5	Mouth	35,32n,7w	lww,aql
Barren Fork	P	2.0	Mouth	20,31n,4w	lww,aql,cdf
Barren Fork	P	7.0	20,31n,4w	32,32n,4w	lww,aql
Bean Cr.	C	6.0	Mouth	9,32n,8w	lww,aql
Bear Camp Cr.	C	4.5	Mouth	31,26n,1e	lww,aql
Bear Claw Spr.	P	0.2	Mouth	33,30n,08w	lww,aql
Beaver Dam Cr.	P	8.0	Mouth	9,24n,4e	irr,lww,aql,wbc
Beaver Dam Cr.	C	2.0	9,24n,4e	5,24n,4e	lww,aql
Bee Rock Hollow	C	1.4	Mouth	3,31n,7w	lww,aql
Big Barren Cr.	C	19.0	Mouth	32,26n,2w	lww,aql,clf,wbc
Big Cr.	C	27.0	Mouth	5,29n,8w	lww,aql,clf
Big Cr.	P	18.0	Mouth	5,31n,2w	lww,aql,wbc
Blair Cr.	C	4.0	31,30n,2w	18,30n,2w	lww,aql
Blair Cr.	P	8.0	Mouth	31,30n,2w	lww,aql
Briar Cr.	C	6.0	Mouth	13,23n,1e	lww,aql
Buffalo Cr.	P	5.0	Mouth	20,24n,1e	irr,lww,aql
Cave Fork Cr.	C	3.0	Mouth	10,24n,1w	lww,aql
Current R.	P	118.0	State Line	24,31n,6w	irr,lww,aql,clf,wbc, btg

Current R.	P	19.0	24,31n,6w	Montauk Spr.	lww,aql,cdf,wbc,btg
Cypress Ditch #1	C	9.0	State Line	1,22n,4e	lww,aql
Cypress Cr.	C	3.0	Mouth	24,23n,3e	lww,aql
Dew Pond Hol.	C	3.2	Mouth	15,30n,7w	lww,aql
Dirt House Hol.	C	1.9	Mouth	28,29n,07w	lww,aql
Ditch #2	P	2.0	State Line	30,22n,4e	lww,aql
Ditch to Ditch #2	P	1.5	Mouth	24,22n,3e	lww,aql
Ditch #2	C	8.0	30,22n,4e	2,22n,4e	lww,aql
Dry Bone Cr.	C	1.0	Mouth	20,30n,7w	lww,aql
Flat Cr.	C	6.0	Mouth	20,24n,3e	lww,aql
Gladden Cr.	C	13.5	13,31n,6w	5,32n,5w	lww,aql
Gladden Cr.	P	2.0	Mouth	13,31n,6w	lww,aql
Gordon Cr.	P	2.0	Mouth	15,32n,3w	lww,aql
Gordon Cr.	C	0.5	15,32n,3w	11,32n,3w	lww,aql
Harris Cr.	C	4.5	Mouth	Hwy. 142	lww,aql
Harviell Ditch (#3)	C	16.0	State Line	14,23n,5e	irr,lww,aql
Hodge Cr.	C	2.0	28,32n,4w	16,32n,4w	lww,aql
Huldy Hol.	C	2.0	Mouth	28,31n,7w	lww,aql
Hurricane Cr.	C	6.0	Mouth	Hwy. 21	lww,aql
L. Rocky Cr.	C	1.0	12,28n,3w	1,28n,3w	lww,aql
L. Rocky Cr.	P	1.0	Mouth	12,28n,3w	lww,aql
L. Blair Cr.	C	2.0	Mouth	6,29n,2w	lww,aql
L. Pike Cr.	C	2.0	Mouth	3,26n,2w	lww,aql
L. Black R.	P	25.0	State Line	31,24n,5e	irr,lww,aql,wbc,btg
L. Black R.	P	16.0	31,24n,5e	9,24n,3e	irr,lww,aql,clf,wbc btg
L. Sinking Cr.	C	1.0	26,32n,3w	26,32n,3w	lww,aql
L. Sinking Cr.	P	4.0	Mouth	26,32n,3w	lww,aql
Little Cr.	C	4.0	Mouth	26,32n,4w	lww,aql
Logan Cr.	P	5.5	Mouth	36,23n,3e	lww,aql
Logan Cr.	C	6.0	36,23n,3e	9,23n,3e	lww,aql
Loggers Lake	L3	25*	10,15,31n,3w		lww,aql,wbc,btg
Mash Cr.	C	2.0	12,30n,4w	35,31n,4w	lww,aql
Mash Cr.	P	0.5	Mouth	12,30n,4w	lww,aql
Middle Prong	C	1.0	Mouth	29,30n,3w	lww,aql
Mill Cr.	P	2.0	Mouth	8,27n,1w	lww,aql
Mill Cr.	C	2.0	8,27n,1w	1,27n,2w	lww,aql
N. Prong L. Black R.	C	10.0	32,25n,3e	35,26n,2e	lww,aql
N. Fk. Buffalo Cr.	C	4.5	18,24n,1e	21,24n,1w	lww,aql
N. Fk. Buffalo Cr.	P	2.0	20,24n,1e	18,24n,1e	lww,aql
N. Prong L. Black R.	P	3.0	9,24n,3e	32,25n,3e	lww,aql
N. Ashley Cr.	P	0.5	35,32n,7w	34,32n,7w	lww,aql
N. Ashley Cr.	C	8.0	34,32n,7w	34,32n,8w	lww,aql
N. Pr. Beaverdam Cr.	C	3.0	5,24n,4e	19,25n,4e	lww,aql

Parker Hol.	P	2.0	Mouth	20,32n,6w	lww,aql,cdf
Pigeon Cr.	C	6.0	8,32n,7w	34,33n,8w	lww,aql
Pigeon Cr.	P	6.0	Montauk Spr.	8,32n,7w	lww,aql,cdf
Pike Cr.	P	3.0	Mouth	34,27n,1w	lww,aql,clf
Pike Cr.	C	22.0	34,27n,1w	27,27n,3w	lww,aql
Pine Valley Cr.	C	6.5	Mouth	13,28n,1w	lww,aql
Pond Spring Br.	P	1.9	Mouth	15,30n,8w	lww,aql
Ripley Co. Lake	L3	20*	10,23n,1e		lww,aql,wbc,btg
Rocky Cr.	P	2.0	Mouth	6,28n,2w	lww,aql
Rogers Cr.	C	9.4	Mouth	28,28n,2w	lww,aql
S. Prong L. Black R.	C	6.0	Hwy. 21	33,25n,2e	lww,aql
S. Prong L. Black R.	P	5.5	9,24n,3e	Hwy. 21	lww,aql
S. Prong Beaverdam Cr.	C	6.5	5,24n,4e	27,25n,3e	lww,aql
S. Fk. Buffalo Cr.	C	4.0	30,24n,1e	34,24n,1w	lww,aql,clf
S. Ashley Cr.	P	5.0	Mouth	9,31n,7w	lww,aql
S. Ashley Cr.	C	2.0	9,31n,7w	18,31n,7w	lww,aql
S. Fk. Buffalo Cr.	P	2.0	20,24n,1e	30,24n,1e	lww,aql,clf
Sinking Cr.	P	21.0	Mouth	8,32n,3w	lww,aql,clf,wbc
Spring Valley Cr.	P	7.5	Mouth	35,30n,5w	lww,aql
Spring Valley Cr.	C	10.0	35,30n,5w	6,29n,5w	lww,aql
Spring Alec Hol.	P	1.5	Mouth	29,30n,2w	lww,aql
Spring Alec Hol.	C	1.0	29,30n,2w	21,30n,2w	lww,aql
Sutton's Cr.	P	1.0	Mouth	12,29n,4w	lww,aql
Sycamore Cr.	C	1.0	Mouth	15,27n,3w	lww,aql
Trib to L. Rocky Cr.	C.	1.0	Mouth	1,28n,3w	lww,aql
Trib. to Big Cr.	C	3.0	Mouth	4,29n,8w	lww,aql
Trib. to Big Cr.	C	2.0	Mouth	2,29n,8w	lww,aql
Trib. to N. Pr. Beaverdam Cr.	C	1.0	Mouth	19,25n,4e	lww,aql
White Oak Hol.	C	2.0	Mouth	28,32n,5w	lww,aql
Yoga Spring	P	0.1	Mouth	29,30n,7w	lww,aql

[1] **L1-**Lakes used primarily for public drinking water supply.

L2-Major reservoirs.

L3-Other lakes which are waters of the state. For effluent regulation purposes, publicly owned lakes are those for which a subtantial portion of the surrounding lands are publicly owned or managed.

P-Streams that maintain permanent flow even in drought periods.

C-Streams that may cease flow in dry periods but maintain permanent pools which support aquatic life.

[2] **lww-**livestock & wildlife watering

aql-protection of warm water aquatic life and human health-fish consumption.

cdf-cold water fishery

clf-cool water fishery

wbc-whole body contact recreation

btg-boating & canoeing

irr-Irrigation

*****Acres given for Impoundments.

Note: This table is not presented as a final authority.

Table Wq02 (1 of 6). Water quality data for selected stations and parameters within the Current River Watershed (MDNR 2000c, USGS 2001b). Selection of state standards used for comparison of values at each site are based on the MDNR use designations corresponding to the section of stream sampled and include the following: I Protection of aquatic life, II Human Health Protection-Fish Consumption, IV Irrigation, V Livestock and Wildlife Watering, VI Whole-body-contact recreation, VII Groundwater.

N/O No observations **N/A** Not Available **e** Laboratory estimated value.

k Non-ideal count of colonies (too large a sample, colonies merged)

[1] Based on maximum chronic and acute standards for cold-water fishery. Levels are pH and temperature dependent. For specific criteria at varying pH and temperatures consult Table B of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

[2] Based on maximum chronic and acute standards for general warm-water fishery. Levels are pH and temperature dependent. For specific criteria at varying pH and temperatures consult Table B of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

[3] State standard for phosphorus is currently unavailable. The Environmental Protection Agency currently recommends a maximum of 0.1mg/L for rivers (Christensen and Pope 1997).

[4] Based on maximum chronic and acute standards for all waters. Levels are hardness dependent. For specific criteria at varying hardness consult Table A of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

[5] Based on maximum chronic and acute standards for cold water fishery. Levels are hardness dependent. For specific criteria at varying hardness consult Table A of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

Station: 07064400 (Montauk Springs at Montauk, MO) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	V	VI	VII	Min-Max	
Temperature (ºF) (cold water fishery)	68.0 Max					55.2-61.34	0/9
pH	------------6.5-9.0---------					7.17-8.05	0/9
Oxygen, dissolved (mg/L) (cool water fishery)	6.0 Min					7.9-10.0	0/9
Coliform, fecal (colonies / 100 ml)				200		1-115	0/9
Hardness (mg/L as $CaCO_3$)						N/O	N/A
Nitrate-N (mg/L)					10	N/O	N/A
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					<0.012-0.024	0/5
Phosophorus, Total[3] (mg/L as P)						<0.02-<0.03	N/A

Lead, Dissolved (ug/L)	9-150[4]					N/O	N/A
Lead, Total Recoverable					15	N/O	N/A
Zinc, Dissolved (ug/L)	172-337[5]					N/O	N/A
Zinc, Total Recoverable (ug/L)					5000	N/O	N/A

Table Wq02. (2 of 6)

Station: 07064440 (Current River below Montauk State Park) Period: 1995-1999

Parameter	State Standard				Measure	Exceedence
	I	II	V	VI	Min-Max	
Temperature (°F) (cold water fishery)	68.0 Max				56.3-60.26	0/9
pH	------------6.5-9.0---------				7.3-7.8	0/9
Oxygen, dissolved (mg/L) (cool water fishery)	6.0 Min				8.9-12.4	0/9
Coliform, fecal (colonies/100 ml)				200	4-560k	1/10
Hardness (mg/L as $CaCO_3$)					N/O	N/A
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]				0.024-0.060	0/9
Phosphorus, Total[3] (mg/L as P)					<0.02	0.07
Lead, Dissolved (ug/L)	9-150[4]				N/O	N/A
Zinc, Dissolved (ug/L)	172-337[5]				N/O	N/A

Station: 07067500 (Big Spring near Van Buren , MO) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	V	VI	VII	Min-Max	
Temperature (°F) (cold water fishery)	68.0 Max					54.7-59.72	0/29
pH	------------6.5-9.0---------					6.8-7.8	0/29
Oxygen, dissolved (mg/L) (cool water fishery)	6.0 Min					8.0-11.5	0/29
Coliform, fecal (colonies / 100 ml)				200		1-67k	0/28
Hardness (mg/L as $CaCO_3$)						113-186	
Nitrate-N (mg/L)					10	N/O	N/A
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					<0.012-0.024	0/21
Phosphorus, Total[3] (mg/L as P)						<0.02-<0.05	0/24
Lead, Dissolved (ug/L)	9-150[4]					<1.0-<100.0	?/10
Lead, Total Recoverable					15	<1.0-1.4	0/13

Zinc, Dissolved (ug/L)	172-337[5]				<1.0-<20.0	0/10
Zinc, Total Recoverable (ug/L)				5000	<1.0-<40.0	0/13

Table Wq02 (3 of 6).

Station: 07066510 (Current River above Powder Mill) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (ºF) (cool water fishery)	84.0 Max					61.2-68.5	0/8
pH	------------6.5-9.0---------					7.5-8.4	0/8
Oxygen, dissolved (mg/L) (cool water fishery)	5.0 Min					9.3-10.7	0/8
Coliform, fecal (colonies / 100 ml)					200	4-470k	1/8
Hardness (mg/L as $CaCO_3$)						N/O	N/A
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					<0.012-0.036	0/5
Phosphorus, Total[3] (mg/L as P)						0.02-0.05	0/5
Lead, Dissolved (ug/L)	9-150[4]					N/O	N/A
Zinc, Dissolved (ug/L)	172-337[5]					N/O	N/A

Station: 07067000 (Current at Van Buren , MO) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (ºF) (cool water fishery)	84.0 Max					36.3-75.2	0/19
pH	------------6.5-9.0---------					7.7-8.4	0/19
Oxygen, dissolved (mg/L) (cool water fishery)	5.0 Min					8.7-14.0	0/19
Coliform, fecal (colonies / 100 ml)					200	2.0-1600k	2/19
Hardness (mg/L as $CaCO_3$)							84-180
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					0.018-0.067	
Phosphorus, Total[3] (mg/L as P)						<0.01-0.09	
Lead, Dissolved (ug/L)	9-150[4]					<1.0-<1.0	0/7
Zinc, Dissolved (ug/L)	172-337[5]					<1.0-14.0	0/7

Table Wq02 (4 of 6).

Station: 07067800 (Current River below Hawes Campground) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (ºF) (cool water fishery)	84.0 Max					61.3-70.7	0/8
pH	------------6.5-9.0---------					7.5-8.2	0/8
Oxygen, dissolved (mg/L) (cool water fishery)	5.0 Min					9.0-11.1	0/8
Coliform, fecal (colonies / 100 ml)					200	2-28k	0/8
Hardness (mg/L as $CaCO_3$)						N/O	N/A
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					0.012-0.048	0/4
Phosphorus, Total[3] (mg/L as P)						<0.02-0.02	0/4
Lead, Dissolved (ug/L)	9-150[4]					N/O	N/A
Zinc, Dissolved (ug/L)	172-337[5]					N/O	N/A

Station: 07068000 (Current River at Doniphan, Mo) Period: 1995-1999

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (ºF) (cool water fishery)	84.0 Max					38.1-83.3	0/58
pH	------------6.5-9.0---------					7.2-8.4	0/58
Oxygen, dissolved (mg/L) (cool water fishery)	5.0 Min					6.8-13.4	0/57
Coliform, fecal (colonies / 100 ml)					200	1-5700k	2/57
Hardness (mg/L as $CaCO_3$)						133-176	
Nitrogen, Total Ammonia (mg/L as N)	0.1-32.1[1]					0.012-0.036	0/34
Phosphorus, Total[3] (mg/L as P)						0.02-0.05	0/34
Lead, Dissolved (ug/L)	9-150[4]					<1.0-<100.0	?/18
Zinc, Dissolved (ug/L)	172-337[5]					<1.0-<20.0	0/18

Table Wq02 (5 of 6).

Station: 07068510 (Little Black River below Fairdealing, Mo) Period: 2000-2001

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (°F) (warm water fishery)	90.0 Max					33.9-80.6	0/12
pH	------------7.1-7.9---------					7.1-7.9	0/12
Oxygen, dissolved (mg/L) (warm water fishery)	5.0 Min					4.5-12.0	1/12
Coliform, fecal (colonies / 100 ml)					200	1k-310	3/12
Hardness (mg/L as $CaCO_3$)						113-160	
Nitrogen, Total Ammonia (mg/L as N)	0.1-50.6[2]					e0.10-1.8	0/12
Phosophorus, Total[3] (mg/L as P)						<0.02-0.96	2/12
Lead, Dissolved (ug/L)	9-150[4]					0.09-<100	N/A
Zinc, Dissolved (ug/L)	172-337[5]					51-39	0/2

Station: 07068540 (Logan Creek at Oxly, Mo) Period: 1980-1984

Parameter	State Standard					Measure	Exceedence
	I	II	IV	V	VI	Min-Max	
Temperature (°F) (warm water fishery)	90.0 Max					35.6-80.6	0/26
pH	------------6.5-9.0---------					6.3-8.0	1/26
Oxygen, dissolved (mg/L) (warm water fishery)	5.0 Min					3.0-11.8	3/26
Coliform, fecal (colonies / 100 ml)					200	7-1100	4/25
Hardness (mg/L as $CaCO_3$)						N/O	
Nitrogen, Total Ammonia (mg/L as N)	0.1-50.6[2]					0.001-0.132	0/26
Phosophorus, Total[3] (mg/L as P)						<0.01-0.1	0/26
Lead, Dissolved (ug/L)	9-150[4]					N/O	N/A
Zinc, Dissolved (ug/L)	172-337[5]					N/O	N/A

N/O No observations **N/A** Not Available **e** Laboratory estimated value.

k Non-ideal count of colonies (too large a sample, colonies merged)

1 Based on maximum chronic and acute standards for cold-water fishery. Levels are pH and temperature dependent. For specific criteria at varying pH and temperatures consult Table B of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

2 Based on maximum chronic and acute standards for general warm-water fishery. Levels are pH and temperature dependent. For specific criteria at varying pH and temperatures consult Table B of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

3 State standard for phosphorus is currently unavailable. The Environmental Protection Agency currently recommends a maximum of 0.1mg/L for rivers (Christensen and Pope 1997).

4 Based on maximum chronic and acute standards for all waters. Levels are hardness dependent. For specific criteria at varying hardness consult Table A of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

5 Based on maximum chronic and acute standards for cold water fishery. Levels are hardness dependent. For specific criteria at varying hardness consult Table A of the Rules of the Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality.

Table Wq03. Results of Pesticides National Synthesis Project water quality sampling for pesticide compounds within the Current River Watershed (USGS 1998c and 2000d).

Station	Name	Type	Pesticide Compound Detected
1	Current R. below Akers	S	Cis-Permethrin, Deethyl Atrazine, P,P'DDE, Propanil,Tebuthiuron
2	Big Creek @ Mauser Mill	S	Deethyl Atrazine, P,P'DDE,
3	Rogers Cr. near Van Buren	S	Deethyl Atrazine, Atrazine
4	Current R. @ Van Buren	S	Cis-Permethrin, Deethyl Atrazine, P,P'DDE, Tebuthiuron, Atrazine, Metolachlor, Molinate, Propanil,Thiobencarb
5	N/A	GW	P,P'DDE, Propanil
6	N/A	GW	Non Detection
7	N/A	GW	Non Detection
8	N/A	GW	Non Detection

Type: **S-**Surface **GW-**Ground Water

Pesticide	Pesticide Type
Cis-Permethrin	Insecticide
Deethyl Atrazine	Degradation Product
P,P'DDE	Degradation Product (DDT)
Propanil	Herbicide
Tebuthiuron	Herbicide
Atrazine	Herbicide
Metolachlor	Herbicide
Molinate	Herbicide
Thiobencarb	Herbicide

Table Wq04. Municipal and non-municipal waste water facilities within the Current River Watershed (MDNR 1998a, 2000e).

Facility Name	County	Facility[1] Type	Receiving Stream	Flow[2]
Doniphan Municipal WWTF	Ripley	POTW	Trib. to Current R.	0.456
Dorris Plumbing & Septic	Butler	SLDGE	Trib. L. Black R.	ND
Grandin Sewer Lagoon	Carter	POTW	N. Prong L. Black R.	0.035
Hillview Elem School WWTF	Butler	SKL	Trib. to Ditch No.3	0.002
J B's Store	Butler	CAR W	Trib. L. Black R.	ND
Lone Star School	Ripley	SKL	Trib. to Current R.	0.002
MDC, Montauk Fish Hatchery	Dent	TROUT	Spring Br/current R.	23.250
MDNR, Montauk State Park	Dent	STROF	Trib. Current R.	ND
MDNR, Montauk State Park	Dent	PARKS	Current R.	0.033
Mm, Van Buren Quarry	Carter	QUAR	Carter Cr.	ND
Naylor Municipal WWTF	Ripley	POTW	Ditch No 2	0.075
Rideout Custom Backhoe	Ripley	GRAVW	Current R	ND
River House	Ripley	HEAL	Beasley Cr./Current R.	0.009
Shands Country Inn Station	Butler	SER S	Trib. L. Black R.	0.002
Summersville WWTP	Shannon	POTW	Trib. Spring Valley Cr.	0.09
Twilight Club, Inc	Butler	CLUB	Trib. L. Black R.	0.006
USNPS, Round Sprgs WWTP	Shannon		Jacks Fork to Current	ND
USNPS, Big Springs WWTP	Carter		Current R	ND
Van Buren WWTF	Carter	POTW	Trib to Current R.	0.131
Vaughn Const & Redi Mix	Texas	LIM Q	Trib. Spring Valley Cr.	ND
Winona WWTF	Shannon	POTW	Pike Cr.	0.175

Note: Table is not a final authority. Data subject to change.

1 Facility Type: POTW-Publicly Owned Treatment Works, CAR W-Car/Truck Wash, SLDGE-Sludge disposal/haulers, SKL-School, Trout-Trout Fish Hatcheries, STROF-Stormwater runoff, PARKS-State Park, QUAR-Quarry, GRAVW-Gravel Washing, HEAL-Health Care (Private),

SER S-Service/Gas Stations, CLUB-Country Club, LIM Q-Limestone Quarry

2 Flow units in millions of gallons per day.

ND= No DATA

Table Wq05. Fish kill and water pollution impacts investigated within the Current River Watershed from 1990-2000 (MDC 2001a).

Date	County	Stream	Cause	Fish Kill	Damage
07/01/1996	Ripley	Little Black R.	?	No	<1/4 mile
12/15/1996	Texas	Tributary to Big Cr.	Yellow paint (latex based)	No	1+ miles
02/22/1997	Carter	Aldrich Valley Cr.	Unleaded gasoline	No	<1/4 mile
03/04/1997	Reynolds	Big Cr.	?	No	<1/8 mile
08/27/1998	Dent	Gordon Cr.	Siltation.	No	100 yards.
02/22/1994	Shannon	Barren Fork	Gasoline	No	0 miles
07/07/1995	Ripley	Little Black R.	Roofing Cement	No	Unknown

?=No data given

Table Wq06. Major water users within the Current River Watershed (MDNR 1997).

Owner	Source	Total Gallons Pumped in 1997	Acres Irrigated
City of Grandin	Ground Water	10,463,100	0
City of Doniphan	Ground Water	59,900,000	0
	Ground Water	59,900,000	0
City of Winona	Ground Water	20,963,000	0
	Ground Water	17,326,700	0
	Ground Water	6,038,900	0
Ozark National Scenic Riverways	Ground Water	3,289,300	0
PWSD #4	Ground Water	8,457,400	0
	Ground Water	32,475,500	0
Total Public		218,813,900	0
Total Private	Ground Water	3,021,218,720	5,114
Total Private	Little Black River	1,490,483,146	1,636
Watershed Total		4,730,515,766	6,750

Table Wq07. Recreational use for selected activities within the Ozark National Scenic Riverways, Current River (NPS 2001).

Activity	1996	1997	1998	1999	2000	Average
Anglers	121,558	153,384	163,777	157,193	149,003	148,983
Hunters	42,830	31,576	32,645	37,203	33,679	35,587
Canoeists	131,848	139,606	119,555	125,681	121,606	127,659
Tubers	35,771	32,017	35,199	39,244	44,196	37,285
Boaters	56,729	75,769	70,633	67,528	82,221	70,576
Picknickers	75,862	74,897	70,551	71,880	76,601	73,958
Camping (Campground)	106,872	121,824	97,160	107,284	103,528	107,334
Camping (Backcountry)	11,778	14,137	15,721	27,231	21,621	18,098
Group Campers	11,920	11,859	10,750	10,870	8,414	10,763
Riders	11,514	33,014	21,383	17,439	22,726	21,215
Total Visits*	1,475,942	1,602,504	1,547,989	1,536,301	1,568,758	1,546,299

*Includes tour busses, driving tours, etc.

Table Wq08. Maximum canoe densities for the Current River, Ozark National Scenic Riverways (NPS 1989).

Zone	Name	River Miles	Maximum Level of Use	
			Weekends/ Holidays	Weekdays
1	Tan Vat-Cedar Grove	7.3	Medium	Medium
2	Cedar Grove-Akers	7.7	High	Medium
3	Akers-Pulltite	9.1	High	Medium
4	Pulltite-Round Spring	9.7	Medium	Medium
5	Round Spring-Two Rivers	18.1	Low	Low
6	Two Rivers-Powder Mill	6.9	Low	Low
7a	Powder Mill-Chilton Cr.	19.8	Low	Low
7b	Chilton Cr.-Big Spring	11.9	Medium	Medium
8	Big Spring-Hawes	15.7	Low	Low

Low (up to 10 canoes per mile)

Medium (11-40 canoes per mile)

High (41-70 canoes per mile)

HABITAT CONDITIONS

Dam and Hydropower Influences

Section 236.400 of the Missouri Revised Statutes defines a dam as "any artificial or manmade barrier which does or may impound water, and which impoundment has or may have a surface area of fifteen or more acres of water at the water storage elevation, or which is thirty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or dam, if it is not across a streambed or watercourse, together with appurtenant works" (MGA 2000a).

The Dam Safety Law of 1979 established a "Dam and Reservoir Safety Council" associated with the Missouri Department of Natural Resources (MDNR 2000f and MGA 2000a). The responsibility of this council is to "...carry out a state program of inspection of dams and reservoirs in accordance with regulations adopted by the council" (MGA 2000b). The MDNR Dam and Reservoir Safety Program operates under the guidance of the council. The program is responsible for regulating all new and existing non-federal, non-agricultural dams which have a height of 35 feet or greater in order to ensure that these structures meet minimum safety standards. In order to facilitate this, the program maintains a database on over 4,000 dams within the state to be used by private owners, professional engineers, mining companies, emergency management officials, educational institutions, other government agencies as well as private individuals (MDNR 2000g). This database includes permitted dams as well as some dams which don't require a permit.

Within the Current River Watershed there are currently 29 dams which have records within the Dam and Reservoir Safety Program Database (Figure Hc01) (MDNR 2000h). All are reinforced earth structures with heights ranging from 5 to 73 feet. Impoundment areas range from 3 to 121 acres.

In an effort to further determine the presence of significant dam and reservoir structures within the watershed, analysis was performed on National Wetlands Inventory (NWI) GIS data for the watershed. Data was analyzed based on all diked/impounded waters within 100 feet of third order (Strahler) and larger stream segments. This method yielded 36 potentially significant diked/impounded sites. The largest of these sites was 26.1 acres; with the smallest being 0.08 acres (Table Hc01). It is estimated that 17 of these structures are in-stream, based on analysis of their spatial relationship to the 1:24,000 hydrography layer.

Channel Alterations

Alterations of stream channels by human activity can take several forms including channelization, channel constriction through bridge construction, raising of the base level of the stream by improper construction of low-water bridges sand and gravel removal, etc. All of these activities can adversely affect stream habitat as well as water quality and thus the health of riparian and aquatic communities.

Channelization of a stream involves the straightening, deepening, and/or widening of the stream channel. Frequently, stream channels, in their natural states, have a complex morphology composed of meanders, riffles, and pools. The meanders of a stream help to dissipate the streams energy. A meandering stream also allows surface and ground water within a drainage to be released gradually relative to a straight stream thus allowing for better maintained base flows during dry periods. Channelizing can have several direct and indirect negative effects. These include shortening of the stream, increasing channel gradient of the channelized segment, loss of well defined riffles and pools, increased erosion including headcutting upstream of the channelized segment, increased deposition and flooding downstream of the channelized segment, lowering of the flood plain water table, and a loss of habitat diversity to name a few (Bolton and Shellberg 2001).

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These impacts can spread to other streams within the respective watershed as well. The aforementioned impacts not only negatively effect aquatic habitats and biotic communities, but can also be damaging to property both up and downstream due to the potential for increased erosion and flooding in these areas respectively. Estimates based on analysis of National Wetlands Inventory data indicate that approximately 98 miles of channelized stream exist within the Current River Watershed (Figure Hc01). The majority of these streams are located in the southeastern corner of the watershed including many in the Little Black River Hydrologic Unit. Smaller channelization projects have probably occurred on private property and also from road and bridge construction elsewhere in the watershed.

Improper bridge design which alters the normal flow pattern of a stream can also negatively impact a stream. Bridges can restrict stream flow especially at high flows, reducing flow velocities upstream of the bridge, thus increasing sedimentation. They can also increase velocities downstream of the bridge, thus increasing scour/erosion. Improperly designed low-water bridges can alter the base level (that level below which a stream cannot erode) of a stream, thus altering the stream gradient. They can also act as a dam, backing up water behind them and increasing sedimentation on the upstream side. Improperly constructed low-water bridges can also act as a barrier to fish movement. According to the U.S. Corps of Engineers Regulatory Program Database, 8 permits were issued for culvert construction, bridge construction, bridge removal, or bridge replacement in the Current River Watershed between 1996 and 2000 (USACOE 2001) (Figure Hc01). It is important to note that no work type or location was entered in the database for some permits, so the actual number of permits related to bridge activity may be higher. According to the Missouri Department of Transportation Highway and Bridge Construction Schedule, there are currently (2001) four state highway projects which involve drainage and/or bridge construction or maintenance scheduled within the watershed from 2001-2003 (MDT 1998).

Gravel mining can also directly and indirectly contribute to channel alterations as well as water quality problems. The negative impacts of improper gravel mining have been shown to include channel deepening, sedimentation of downstream habitats, accelerated bank erosion, channel shift , the lowering of the flood plain water table, and the formation of a wider and shallower channel which can result in increased temperature extremes (Roell 1999). Since 1984, there have been 42 permitted sand and gravel removal operation sites (including instream and pit operations) within the Current River Watershed (MDNR 2001b). Figure Hc02 shows the general location and relative level of activity of permitted gravel mining within the watershed. Much of the permitted sand and gravel removal activity has occurred on the Lower Current River below Doniphan and on Big Creek. Other streams which have experienced activity on a lesser scale include Bean Creek, Gladden Creek, Pigeon Creek, Pike Creek, Mulberry Creek (flood plain), Barren Fork, Big Barren Creek, Hamilton Creek, and Swan Creek

Approximately 137 miles of streams within the Current River Watershed have seasonal restrictions placed on sand and gravel mining activities (Figure Hc02). Currently approximately 131 miles of the Current River are closed to sand and gravel mining from March 15 to June 15 (MDC 2000). This closing is based on the following criteria: “Designated Outstanding National or State Resource Waters as defined by the Missouri Department of Natural Resources when these waters support significant biological resources that may be impacted by sand and gravel excavation during periods of spawning, incubation, or rearing” (MDC 1997b). In addition, approximately 6 miles of Barren Fork (Sinking Creek.) are closed to sand and gravel mining from November 15 to February 15 (MDC 2000). The criteria for listing is the presence of “stream reaches which support seasonal concentrations of spawning, incubating, or rearing fishes or mussels of management interest” (MDC 1997b).

Many types of activities such as the filling of wetlands, placement of roadfills, construction of dams and the construction of cable or pipeline crossing, just to name a few, require permitting from the

COE when they involve “waters of the United States”. In the 5 year period between 1996 and 2000, approximately 49 permits were issued by the COE for activities within the Current River Watershed (Figure Hc01) (USACOE 2001). The most common activity for which permits were issued was gravel removal. Additional information regarding the COE Regulatory Program, as well as activities requiring COE permits can be found at http://www.swl.usace.army.mil/regulatory/index.html.

Natural Features

The MDC inventoried counties within the Current River Watershed between 1986 and 1995 for unique natural features (Nigh 1988; Ryan and Smith 1991, Ryan 1993, and Rowan 1995). The inventories recognized seven categories of natural features: examples of undisturbed natural communities, habitat of rare or endangered species, habitat of relict species, outstanding geological formations, areas for nature studies, other unique features, and special aquatic areas having good water quality, flora, and fauna.

In tandem with the initial natural features inventories, the Missouri Natural Heritage Database (NHD) was created. The NHD lists many of the features which were included in the Missouri Natural Features Inventory. The database, which is updated frequently, is a dynamic representation of the occurrence of many natural features in Missouri. Currently the database contains 878 features for the Current River Watershed (MDC 2001b). These include 193 examples of 35 types of natural communities (Table Hc02). Dolomite glades are the most commonly recorded community of the watershed within the database accounting for 30 records. Fens are the second most commonly recorded community with 25 records. Table Hc03 lists 20 inventoried aquatic communities located within the Current River Watershed. These include examples of 4 types of aquatic communities including Ozark Creeks and Small Rivers, Ozark Headwater Streams, Ozark Oxbows and Sloughs, and Ozark Springs and Spring Branches.

A detailed description of the previously mentioned terrestrial natural communities can be found in The Terrestrial Natural Communities of Missouri by Nelson (1987), while a detailed description of Missouri’s aquatic communities can be found in Aquatic Community Classification System for Missouri by Pflieger (1989).

Undoubtedly more examples of natural features exist within the watershed. However, due to many circumstances including the limited access to private land and the large land area, many features may be as yet unrecorded. Therefore, the previous listing of features should not be regarded as final or comprehensive. However, this listing does provide a good cross section of the types of communities which can be found within the watershed.

Improvement Projects

There are 8 stream improvement projects within the Current River Watershed (Gossett, personal communication and Mayers, personal communication). Most of these have focused on stream bank stabilization and riparian revegetation. However two projects include in-stream habitat improvement primarily through the placement and anchoring of boulders and/or rootwads in the stream. The most extensive of these habitat projects is located within Montauk State Park. Table Hc04 lists stream improvement projects in the watershed.

Stream Habitat Assessment

Perhaps one of the more difficult attributes of a watershed to attempt to quantify is stream habitat. This is due to the fact that there are several dynamic characteristics which make up stream habitat. To evaluate all of these characteristics individually and accurately for an entire watershed, is a monumental task and beyond the scope of this document. Thus, the next best thing is to evaluate a characteristic that has the most impact on all aspects of stream habitat. This is, arguably, riparian corridor land cover/land use. Riparian corridor land cover affects many aspects of stream habitat. These include, but are not limited to water temperature, turbidity, nutrient loading, sand/gravel deposition, in-stream cover, flow, channel width, and channel stability. These in turn have effects on still other characteristics of stream habitat such as dissolved oxygen, cover, spawning areas, etc.

Evaluation of riparian corridor land cover/land use within the Current River Watershed was accomplished using Missouri Resource Assessment Partnership Land Cover Data . A buffer zone 3 pixels (90 meters) wide was created which corresponded to a 1:24,000 hydrography coverage for the watershed. This was split into segments no longer than 0.25 miles long (Caldwell, personal communication). Percent land use for each segment was then calculated. Land cover/land use categories included forest, wetland, grassland, cropland, urban, and water. Percentages of these categories were then calculated for riparian corridors within each drainage unit as well as for the whole watershed.

Results from the Current River Watershed indicate that riparian corridor land cover consists of more forest/wetland (78.9%) than grassland/cropland (20.2%). Percentages for the remaining categories of urban and water are 0.1% and 0.7% respectively. Of the 8 eleven digit hydrologic units within the watershed, the Current River-Sinking Creek Unit has the highest combined percentage of forest/wetland corridor land cover/land use at 92.0%. It also ranks as having the second lowest combined percentage of grassland/cropland corridor land use at 7.7%. Table Hc05 gives riparian corridor land cover/land use percentages for all eleven digit hydrologic units within the watershed as well as percentages for the total watershed. Figure Hc03 presents a graphic representation of riparian corridor land cover/land use for all drainage units within the watershed.

In addition to analysis of riparian corridor within hydrologic units, riparian corridor land cover/land use was analyzed for all fourth order (Horton) and larger streams within the watershed in order to determine those specific streams having a substantial amount of unforested riparian corridor. Analysis was based on stream miles as well as percentage of total stream miles with combined grassland, cropland, and urban categories equal to or exceeding 25% of total riparian land cover use (referred to as non forested for the purposes of this document) (Table Hc06 and Figure Hc04). Results indicate that the Little Black River has the highest percentage of stream miles (fourth order streams) with non-forested riparian corridor at 60.9% (32.2 miles). Two streams within the watershed have no stream miles with non-forested corridor equal to or greater than 25%. These are Cedar Creek and Brushy Creek. An estimated 13.7% (19.4 miles) of the Current River riparian corridor is non-forested.

An aerial stream survey of selected streams in the Current River Watershed was conducted in March, 1992. The survey included portions of Mill Creek, Rogers Creek, Sinking Creek, and Barren Fork. In 1993, another aerial survey was conducted on Current River from Two Rivers to Van Buren in order to document flooding. Both surveys included video of selected streams and still photographs of selected sites. Information from these surveys will be useful for a variety of projects such as future habitat assessment, assisting landowners with problems associated with stream bank erosion and deposition, reviewing gravel mining permits, selection of aquatic biota sampling sites, etc.

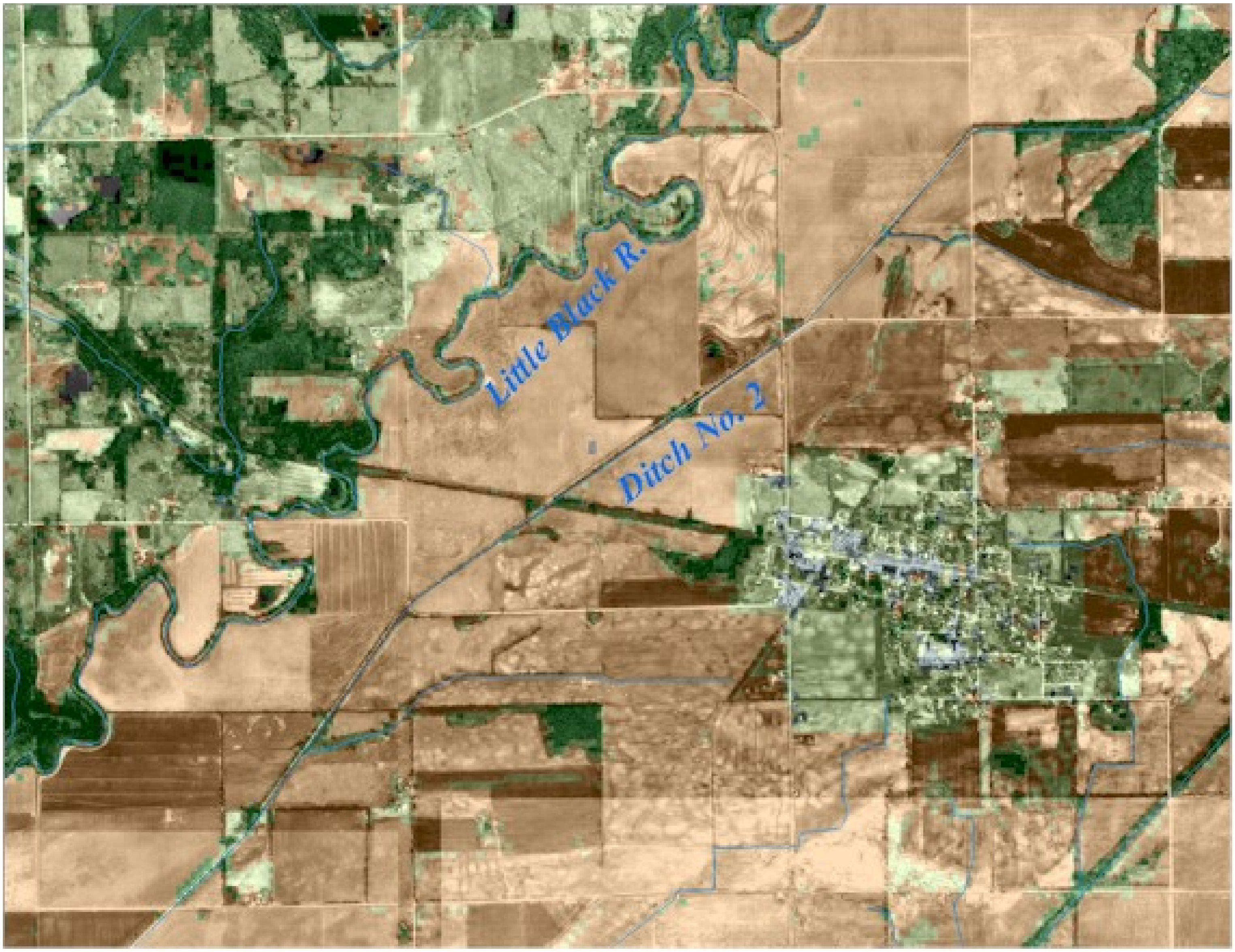

Little Black R.
Ditch No. 2

Figure Hc01

Current River Watershed
Impoundments and Channel Alterations

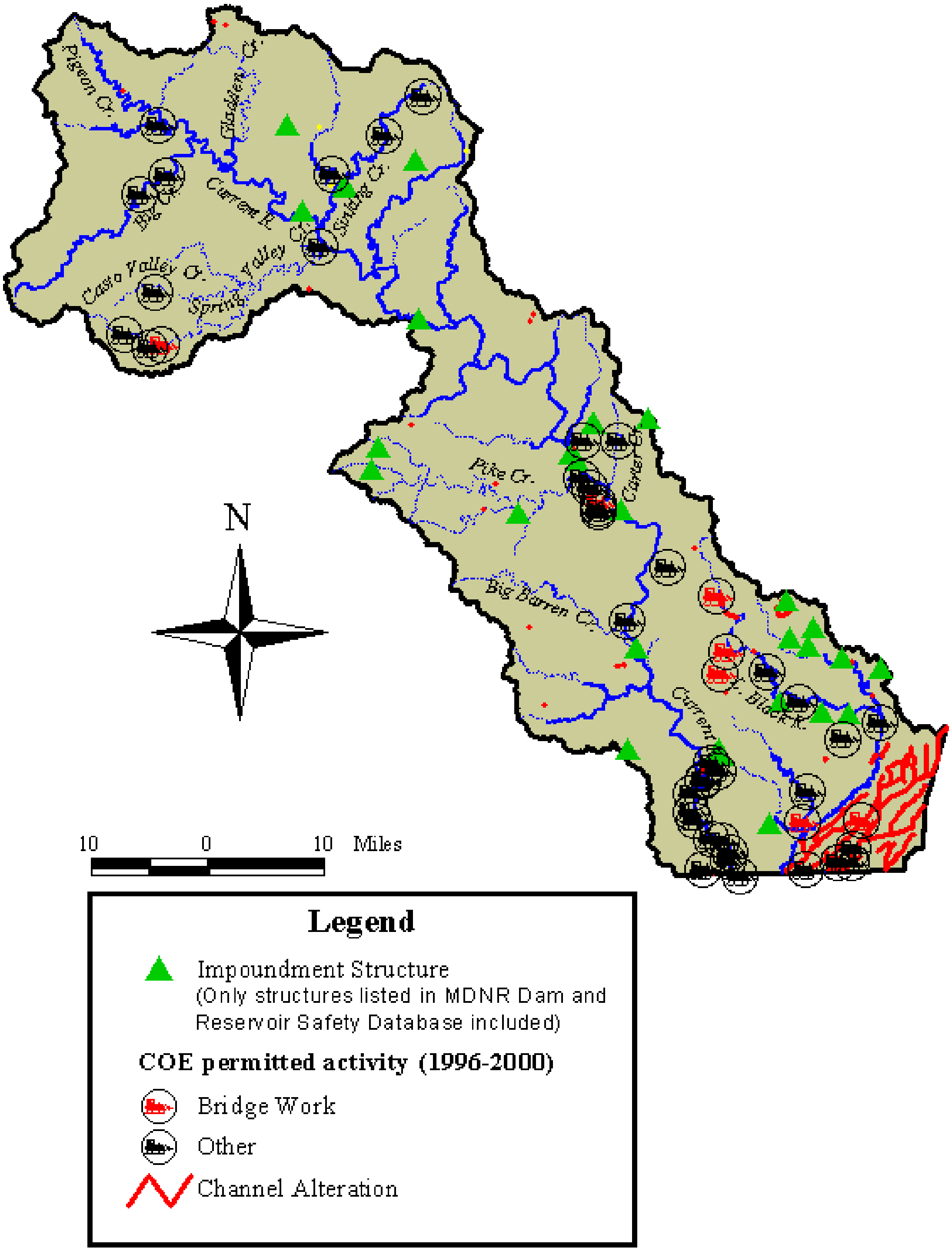


Figure Hc02.

Current River Watershed
Gravel Mining Activity

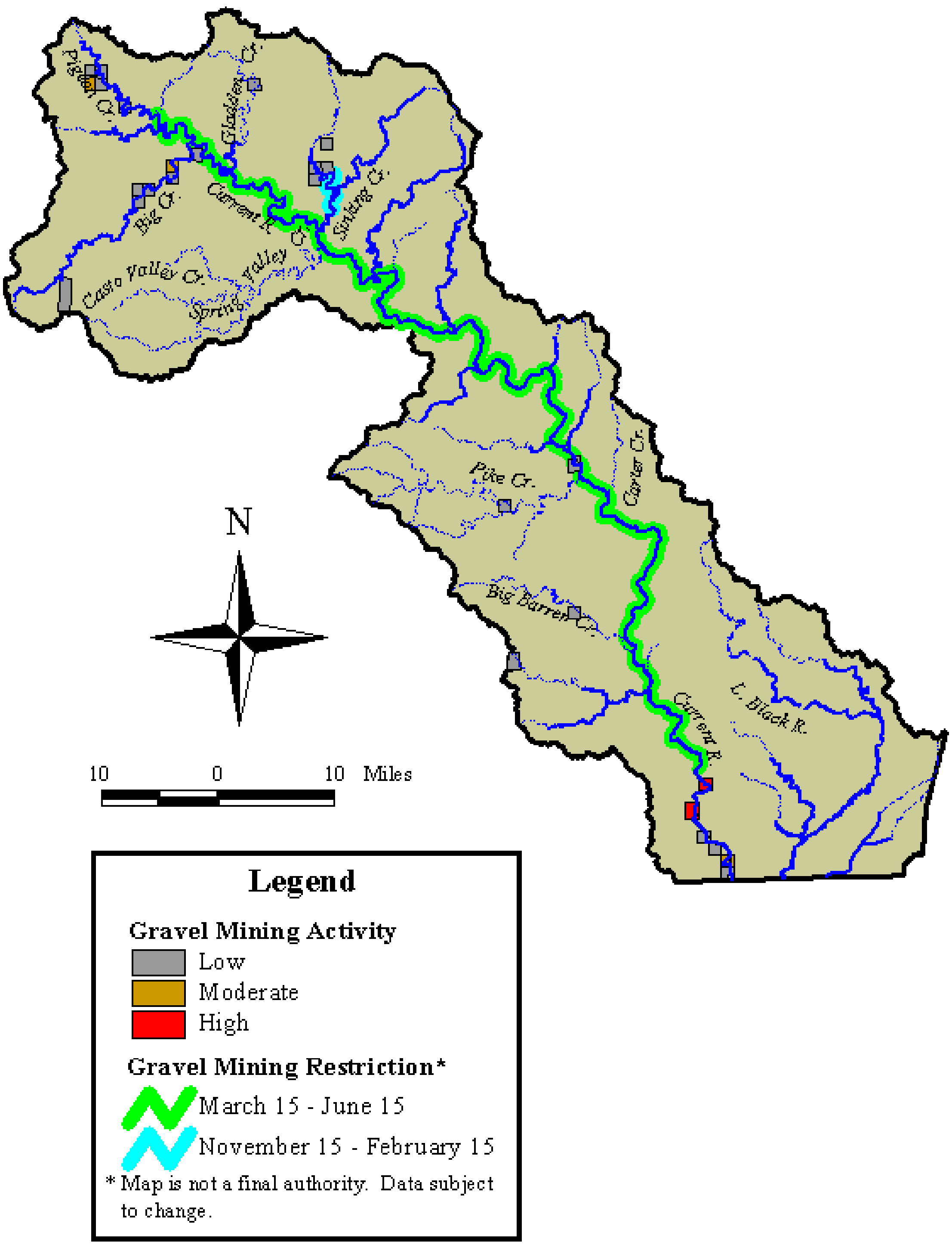


Figure Hc03.

Current River Watershed
Eleven Digit Hydrologic Unit
Riparian Corridor Land Cover

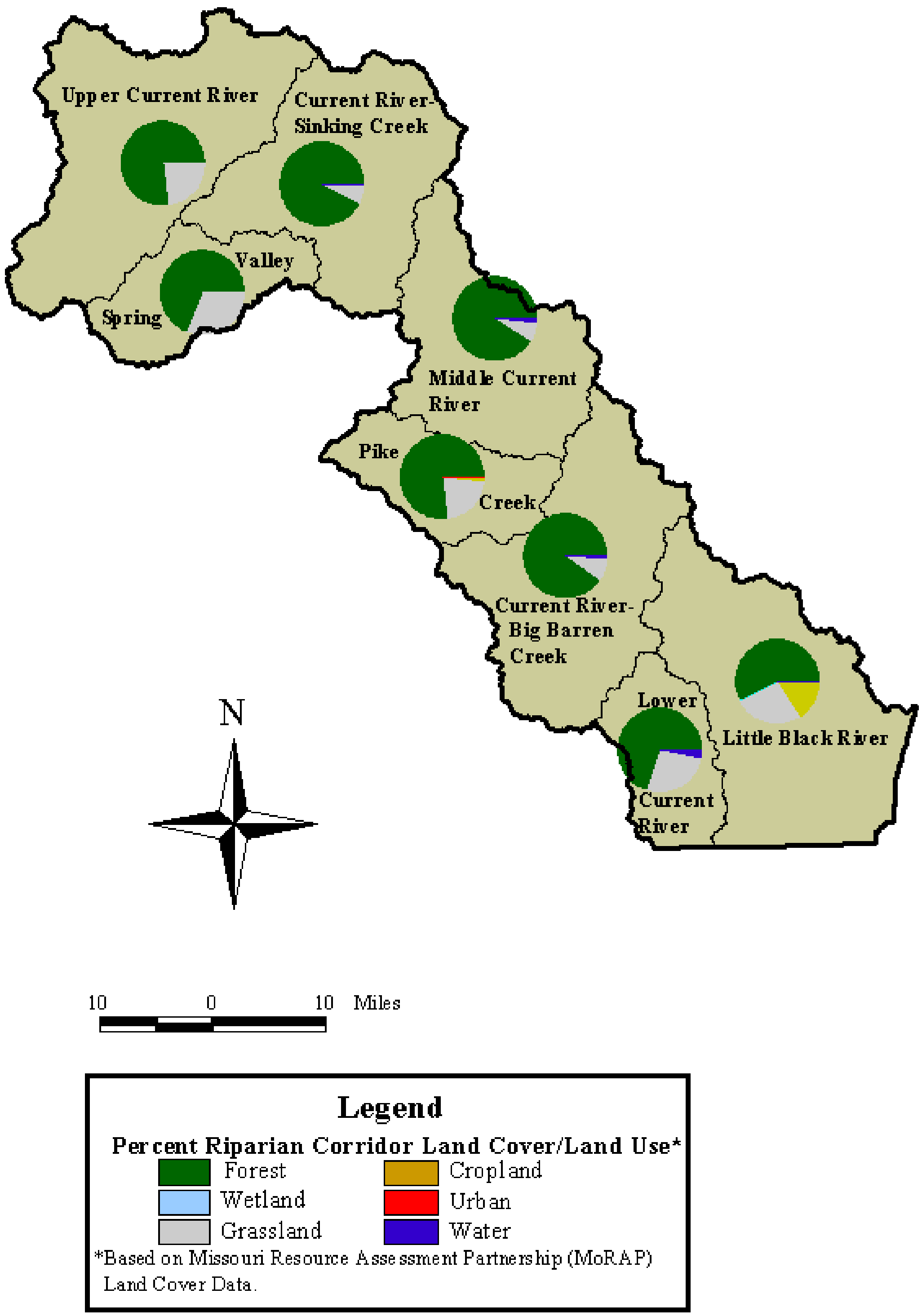
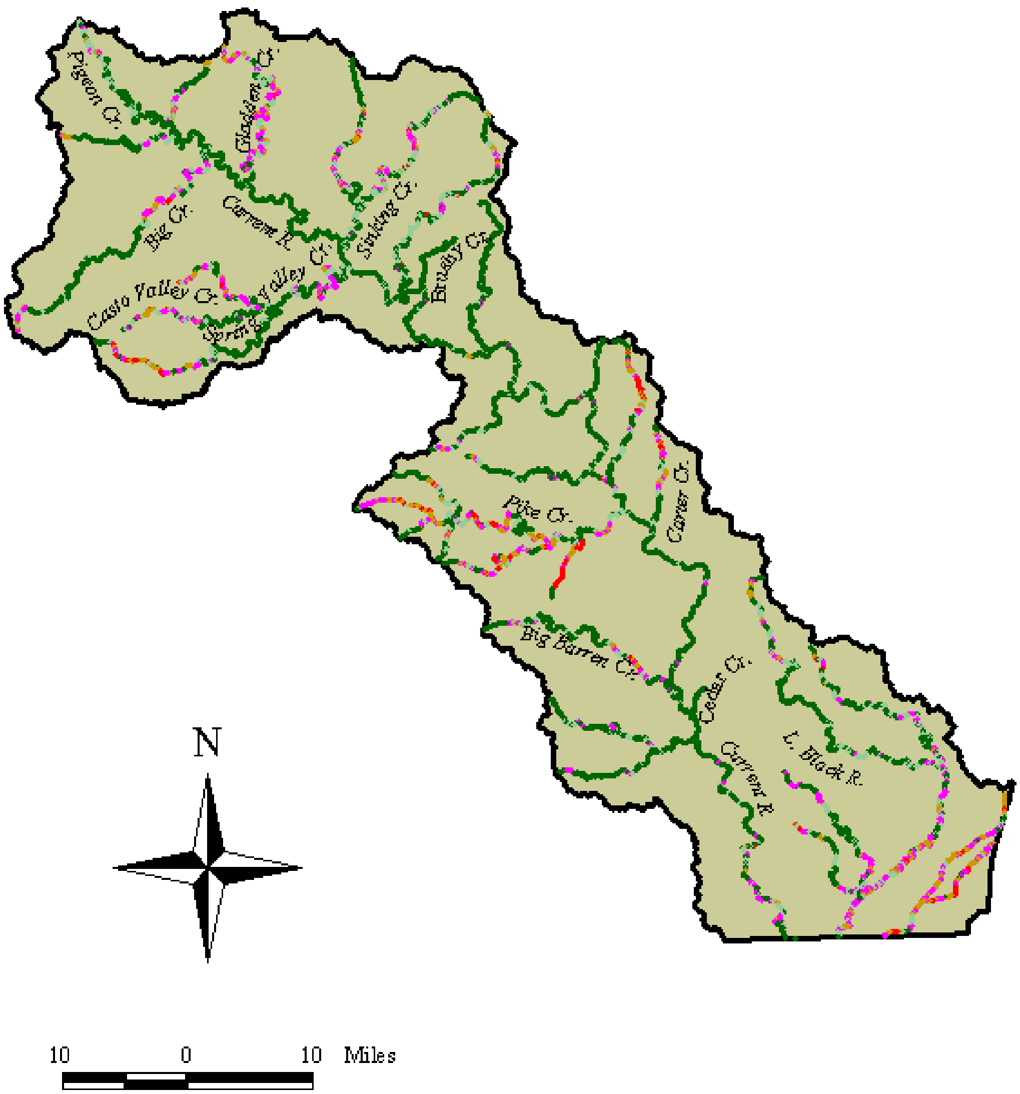


Figure Hc04.

Current River Watershed
Riparian Corridor Land Cover of Fourth Order and Larger Streams



Legend

Percent Combined Grassland, Cropland, and Urban Riparian Land Cover*

- 0 - 24.999
- 25 - 49.999
- 50 - 74.999
- 75 - 99.999
- 100

*Based on Missouri Resource Assessment Partnership (MoRAP) Land Cover Data.

Table Hc01. Diked/impounded wetlands within 100 feet of third order or larger (strahler) stream segment within the Current River Watershed based on analysis of National Wetlands Inventory (NWI) Data.

Stream Name	Impoundment Size (Acres)	Instream
Trib to CRW013	0.527	Yes
Trib to PineValley Cr.	1.319	Yes
Trib to Current River.	2.843	No
Barren Fork	0.099	No
Barren Fork	0.574	Yes
Barren Fork	0.110	No
Beaverdam Creek	0.835	Yes
Beaverdam Creek	3.859	Yes
Big Creek	0.249	Yes
Carter Creek	0.603	No
Case Bolt Branch	1.036	No
CRW006	1.123	Yes
CRW012	0.093	No
CRW012	8.866	Yes
CRW012	0.182	No
Current River	3.187	Yes
Deep Pond Hollow	0.083	No
Deep Pond Hollow	0.193	No
Dooley Hollow	0.281	Yes
Dry Valley	0.113	No
Glaze Creek	0.515	No
Little Black River	0.204	No
Little Sinking Creek	0.295	No
Little Barren Creek	0.212	No
Matthews Branch	26.097	Yes
North Prong Beaverdam Creek	7.220	Yes
North Fork Buffalo Creek	0.094	No
Pike Creek	0.179	No
Schafer Spring	0.604	Yes
Schafer Spring	1.093	Yes
Sinking Creek	0.079	No
Sinking Creek	2.076	No
South Fork Little Barren Creek	1.006	Yes
South Ashley Creek	0.150	No
Sugar Tree Grove Spring	0.444	Yes
Welch Spring	0.247	Yes

Table Hc02. Inventoried natural communities within the Current River Watershed (MDC 2001b).

Community	Number of Records in Watershed
Acid Seep	1
Caves	18
Creeks and Small Rivers (Ozark)	3
Deep Muck Fen	11
Dolomite Glade	30
Dry Chert Forest	6
Dry Igneous Cliff	1
Dry Limestone/Dolomite Cliff	2
Dry Limestone/Dolomite Forest	1
Dry-Mesic Bottomland Forest	1
Dry-Mesic Chert Forest	8
Dry-Mesic Forest	1
Dry-Mesic Igneous Forest	4
Dry-Mesic Limestone/Dolomite Forest	2
Effluent Cave	3
Fen	25
Flatwoods	4
Forested Acid Seep	1
Forested Fen	3
Headwater Streams (Ozark)	5
Igneous Glade	9
Mesic Bottomland Forest	6
Mesic Limestone/Dolomite Forest	1
Mesic Sand Forest	1
Moist Limestone Dolomite Cliff	1
Oxbows & Sloughs (Ozark)	7
Pond Marsh	5
Pond Shrub Swamp	10
Pond Swamp	2
Prairie Fen	4
Springs and Spring Branches (Ozark)	6
Wet Bottomland Forest	1
Wet-Mesic Bottomland Forest	4
Xeric Igneous Forest	3

Table Hc03. Inventoried aquatic natural communities within the Current River Watershed (MDC 2001b)

Significance: S=Significant, **E**=Exceptional, **N**=Notable, **ND**=No Data

Aquatic Community Type	Name	Significance
Creeks and Small Rivers (Ozark)	Big Barren Creek Natural Area	S
Creeks and Small Rivers (Ozark)	Little Black River - Hwy 160	E
Creeks and Small Rivers (Ozark)	Mudpuppy Conservation Area - Little Black River	E
Headwater Streams (Ozark)	Barren Fork	E
Headwater Streams (Ozark)	Chilton Creek Preserve - Aurel Hollow, Rogers Creek	ND
Headwater Streams (Ozark)	Sinking Creek	E
Headwater Streams (Ozark)	Stegall Mountain Natural Area - Rogers Creek	S
Oxbows and Sloughs (Ozark)	Big Spring Slough	E
Oxbows and Sloughs (Ozark)	Dugan Hollow Slough	E
Oxbows and Sloughs (Ozark)	Hickory Hollow	E
Oxbows and Sloughs (Ozark)	Little Black River Oxbow	ND
Oxbows and Sloughs (Ozark)	Railroad Slough	E
Oxbows and Sloughs (Ozark)	Rocky Creek Conservation Area	E
Oxbows and Sloughs (Ozark)	Rogers Creek Slough	E
Springs and Spring Branches (Ozark)	Blue Spring Natural Area	S
Springs and Spring Branches (Ozark)	Medley Hollow	S
Springs and Spring Branches (Ozark)	Old Schoolhouse Hollow	E
Springs and Spring Branches (Ozark)	Pulltite Spring	ND
Springs and Spring Branches (Ozark)	Railroad Spring	N
Springs and Spring Branches (Ozark)	Rocky Creek Conservation Area	E

Significance: S=Significant, **E**=Exceptional, **N**=Notable, **ND**=No Data

Table Hc04. Stream improvement projects within the Current River Watershed (Gossett, personal communication and Mayers, personal communication).

Affected Stream	Project Type
Current River-Baptist Access	Cedar tree revetment, riparian planting, willow poles, and willow stakes
Current River-Tan Vat	Willow and Riparian Planting
Current River-Two Rivers	Willow Planting
Big Spring	Bio-revetment
Current River-Big Spring Access	Bio-revetment
Current River-Gooseneck	Willow and riparian planting
Current River-Montauk State Park	Cedar tree revetments, willow staking, boulder and rootwad placement.
Barren Fork	Willow wattles, rootwads

Table Hc05. Percent riparian corridor land cover for eleven digit hydrologic units within the Current River Watershed. Data is based on MoRAP Missouri Land Cover Data (1999) as analyzed by Caldwell (2001).

Unit Name	FOR	WET	GRS	CRP	URB	WAT
Upper Current R.	76.8	0.0	22.8	0.4	<0.1	<0.1
Spring Valley	68.9	0.0	30.8	<0.1	0.2	<0.1
Current R.-Sinking Creek	92.0	0.0	7.3	0.4	<0.1	0.2
Middle Current R.	91.3	0.0	7.3	0.3	<0.1	1.1
Pike Cr.	77.7	0.0	20.9	0.7	0.7	0.9
Current R.-Big Barren Cr.	89.8	0.0	8.7	0.4	0.2	1.0
Lower Current R.	70.3	0.0	26.7	<0.1	0.1	2.8
Little Black R.	57.5	1.3	25.6	14.8	<0.1	0.8
Current River Watershed	78.7	0.2	17.4	2.8	0.1	0.7

FOR = Forest , **WET**=Wetland, **GRS**=Grassland, **CRP**=Cropland, **URB**=Urban, **WAT**=Water

Table Hc06. Stream miles and percentage of total stream miles (in parenthesis) for fourth order (Horton) and larger streams with combined grassland, cropland, and urban (non-forested for the purposes of this document) land cover categories equaling 25% or greater of total riparian land cover/land use. Results given by order (Strahler) as well as total stream length. Data is based on 1:24,000 hydrography layer combined with Missouri Resource Assessment Partnership (MoRAP) Land Use/Land Cover Data (1997).

Stream	Order							Total
	1st	2nd	3rd	4th	5th	6th	7th	
Current R.				0.2 (6.1)	1.0 (3.1)	2.0 (10.0)	16.3 (18.90	19.4 (13.7)
Little Black R.	0.3 (100)	3.9 (99.6)	0.9 (100)	6.5 (38.9)	19.2 (82.9)	1.5 (96.3)		32.2 (60.9)
Indian Cr. Ditch	No Data							
Ditch No. 3				3.2 (99.1)	4.3 (90.8)			7.5 (94.2)
Lateral No. 1	0.4 (48.1)			1.6 (100)				2.0 (83.3)
Neelyville Ditch				0.8 (77.9)				0.8 (77.9)
Logan Cr.	0.2 (27.8)	0.7 (29.5)	1.7 (66.0)	5.8 (45.8)				8.4 (45.7)
Harris Cr.	1.2 (77.0)	0.6 (100)	1.9 (35.8)	2.4 (60.5)				6.1 (54.0)
Beaverdam Cr.				6.6 (57.4)				6.6 (57.4)
N.P. Little Black R.	0.0 (0.0)	1.4 (75.1)	2.7 (54.5)	3.2 (25.6)				7.3 (35.9)
Buffalo Cr.					0.2 (5.1)			0.2 (3.8)
S.F. Buffalo Cr.	0.2 (22.9)	0.5 (62.7)	0.0 (0.0)	0.6 (12.2)				1.3 (11.9)
N.F. Buffalo Cr.	0.0 (0.0)	1.5 (33.9)	0.0 (0.0)	1.5 (39.7)				3.0 (25.4)

Cedar Cr.		0.0 (0.0)	0.0 (0.0)	0.0 (0.0)				0.0
Big Barren Cr.	0.0 (0.0)	0.4 (100)	2.4 (28.0)	5.4 (39.3)				8.2 (33.6)
Carter Cr.	0.0 (0.0)	0.8 (100)	1.3 (100)	3.1 (48.9)				5.2 (57.8)
Pike Cr.	1.2 (82.7)	0.4 (92.8)	2.7 (99.3)	2.8 (100)	19.4 (63.3)			26.5 (69.7)
Dry Valley	0.0	0.5 (99.2)	2.3 (99.5)	2.0 (99.5)				4.8 (86.4)
Little Pike Cr.	0.0 (0.0)	0.2 (9.5)	0.1 (23.1)	7.5 (85.5)				7.8 (67.7)
Deep Pond Hol.	<0.1 (12.0)	0.0	0.7 (73.4)	1.4 (59.3)				2.1) (43.0)
Sycamore Cr.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	3.0 (61.9)				3.0 (37.2)
Seaman Cr.	0.0 (0.0)	0.0 (0.0)	0.3 (29.8)	1.1 (100)				1.3 (40.6)
Pine Valley Cr.	0.0 (0.0)	2.4 (72.9)	1.9 (0.0)	3.5 (40.7)				7.8 (52.7)
Mill Cr.	0.5 (49.5)	0.7 (49.9)	2.0 (21.2)	0.7 (27.2)				3.9 (27.1)
Paint Rock Cr.	0.0 (0.0)	0.0 (0.0)	0.2 (6.7)	0.0 (0.0)				0.2 (3.9)
Blair Cr.	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	1.0 (7.7)				1.0 (5.3)
Brushy Cr.	0.0	0.0	0.0	0.0				0.0
Big Cr.	0.7 (54.7)	0.0 (0.0)	3.3 (49.5)	8.9 (46.0)				12.9 (46.5)
Spring Valley Cr.	<0.1 (3.5)	0.1 (34.2)	5.3 (85.2)	2.8 (80.4)	8.6 (57.6)			16.9 (64.2)
Casto Valley Cr.	0.4 (62.8)		1.3 (100)	3.8 (30.5)	1.2 (56.4)			6.7 (40.7)

Black Valley Cr.			1.3 (43.2)	3.3 (63.6)				4.6 (56.2)
Sinking Cr.	0.0 (0.0)	1.4 (94.6)	2.4 (83.7)	12.3 (74.4)	2.4 (48.0)			18.4 (67.9)
Barren Fork	0.1 (9.5)	0.3 (30.3)	2.2 (59.4)	9.3 (62.9)				11.9 (58.0)
Gordon Cr.	0.0 (0.0)	0.0 (0.0)	<0.1 (4.5)	1.3 (60.7)				1.3 (24.7)
Gladden Cr.	1.0 (100)	<0.1 (100)	2.2 (58.2)	14.4 (81.5)				17.7 (78.4)
Gladden Br.	1.0 (100)	1.3 (90.7)	2.8 (66.9)	2.0 (85.8)				7.1 (79.4)
Big Cr.	0.6 (100)	1.0 (100)	0.1 (6.9)	12.3 (41.7)				13.9 (43.3)
Ashley Cr.				1.8 (60.9)				1.8 (60.9)
North Ashley Cr.	0.9 (41.7)		0.0 (0.0)	1.3 (19.2)				2.2 (21.9)
Inman Hol.	0.0 (0.0)	0.0 (0.0)	0.5 (24.4)	2.8 (80.6)				3.3 (50.2)

BIOTIC COMMUNITIES

Stream Fish Distribution and Abundance

Historical records of fish community collections within the Current River Watershed date back to 1 August, 1930 (MDC 1998a and MoRAP 2000a). Fish community collection sites are presented in Figure Bc01. From 1930 to 2000, 124 fish species (not including hybrids or larval lamprey) in 24 families have been collected within the watershed (Table Bc01) (MDC Ozark Regional Fish Community Collection and Sport Fish Sample Files; MNHP 2001a; Pflieger 1989; Pflieger 1997; MDC 1998a; MoRAP 2000a). Fish community sampling sites are presented in Figure Bc01.

Table Bc02 shows fish species distribution by modified 14 digit hydrologic unit. While this information provides insight into areas of the watershed where species have been collected in the past, it is important to note that the number of fish sampling sites as well as collections vary greatly between drainage units (no data is available for some units), thus negating the use of this data for any quantitative analysis.

Analysis of temporal distribution of species within the watershed was accomplished by dividing the examined period of record for fish community collections into three periods: Period 1 (1930-1957), Period 2 (1958-1979), and Period 3 (1980-2000). This analysis revealed that the number of species within the watershed between periods 1 and 2 remained similar with 111 and 117 species collected respectively. Period 3 saw a substantial decrease in the number of species collected within the watershed at 82. Of the species not observed in the latter time period, 1 is state endangered and 9 are considered species of conservation concern (MNHP 2001b). Possible reasons for the absence of species from collections of this time period vary. A difference in the number and spatial distribution pattern of sampling locations during period 3 may have a substantial role in the absence of some species in collections. During period 1, approximately 53 locations were sampled with multiple collections from different times of year in the same time period being combined from a small number of these locations. During period 2, 84 locations were sampled. During period 3, 61 locations were sampled. A difference in spatial distribution of sample locations could be another possible explanation. Four of the 11 locations at which the species in question were collected in period 1 were not sampled in period 3. In addition, based on quantitative data available in the MDC fish collection database (MDC 1998a), many of the species in question generally appear to have never been collected in large numbers. Twenty-three species had fewer than 10 specimens collected. An inconsistency between the time periods in the types of sample gear used is perhaps another explanation; however, this was not comprehensively analyzed because sample methodology data was not readily available for all samples.

The previously discussed factors make it difficult to determine actual species decline within the Current River Watershed. Future additional sampling efforts focusing on historic fish collection locations at which the species in question have been collected in the past will be important in determining the extent, if any, of the spatial and temporal shift in the fish community composition of the watershed.

The fish community of the Current River Watershed is composed of a diverse assemblage of fish species representing all four aquatic faunal regions of Missouri as defined by Pflieger (1989 and 1997). While species characteristic of the Ozark faunal region account for a dominating 42.1% of total species in the watershed, species characteristic of the River, Lowland, and Prairie faunal regions comprise 7.9%, 15.1%, and 2.4% respectively of total species in the watershed (Table Bc01, Table Bc03). The remaining species (32.5%) occurring within the watershed are either widely distributed in Missouri, or are characteristic of more than one faunal region (Table Bct03). One species, the common carp is a nuisance exotic species.

Game Fish

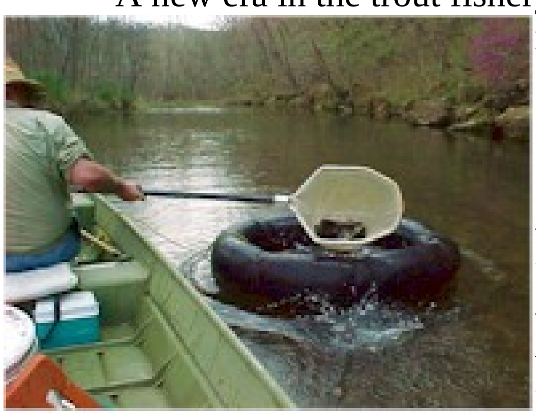
The Current River and its tributaries offer a variety of angling opportunities. A total of 9 species of gamefish (as defined as game fish in MDC 2001c) are known to occur within the watershed (MDC Ozark Regional Fish Collection Files; MoRAP 2000a; MDC 1998a Pflieger 1997). These include brown trout, chain pickerel, grass pickerel, largemouth bass, rainbow trout, shadow bass, smallmouth bass, walleye, and warmouth. Other game fish species including black crappie, channel catfish, flathead catfish, paddlefish, sauger, spotted bass, white bass, and white crappie, have been observed in the watershed in the past. However, these are not considered to be significant fisheries (the last collections in which these species occurred, with the exception of flathead catfish and paddlefish, were made prior to 1980).

The Current River supports a significant trout fishery in its upper reaches located in southern Dent and northern Shannon Counties. Montauk State Park, one of the Missouri's four trout parks, is located in Dent County at the head of the Current River. Approximately 3 miles of trout stream exist within the park. An additional 16.7 miles of the Current River below the park is also managed for trout. Rainbow trout are the primary species within the park while both rainbows and browns can be found downstream of the park. (Please refer to current copy of the Missouri Wildlife Code)

Fish Stocking

Due to the existence of a significant cold water fishery within the Current River Watershed, fish stocking efforts have primarily focused on salmonid species. The first recorded introduction of salmonids within the watershed was in 1891 at which time rainbow and brown trout from the federal hatchery at Neosho were stocked in the Current River (Turner 1979). In the years following the initial stocking, salmonids continued to be stocked in the Current River. While rainbow and brown trout were the species stocked on the most consistent basis, introductions of brook trout and grayling also occurred. However, no records of these latter species exist within MDC fish community collections. This would appear to indicate the lack of success of this effort. In 1928, the coldwater resources at Montauk, Missouri were purchased by the Missouri Game and Fish Commission for use as a trout hatchery and fishing area (Turner 1979). The hatchery began operation four years later in 1932.

A new era in the trout fishery of the Current River began in 1937 under the management of the newly created Missouri Department of Conservation. The stocking of Salmonids in the Current River was limited to rainbow trout (Turner 1979). Stocking of brown trout resumed in 1966 (Turner 1974).



Currently, the MDC stocks both rainbow and brown trout in the upper Current River (MDC 2001d). Within the Montauk State Park Boundary, rainbow trout are stocked on a daily basis. Brown trout are stocked each spring in the section of the Current River from the state park to Cedargrove Bridge. From Cedargrove to Akers Ferry, rainbow trout are stocked every few weeks from February to mid-October.

Limited availability of historic stocking records for warm water species, the potential of "bait bucket" introductions and the availability of fish from commercial dealers, makes it difficult to address the entire scope of warm water stocking which has or may have occurred in the Current River Watershed. However, examination of various sources reveals some past stocking efforts within the watershed. The common carp, a species native to Asia, was widely stocked in Missouri by the Missouri

Fish Commission between 1879 and 1895 at which time the program was discontinued (Pflieger 1997). Earliest observations of common carp from MDC fish community collection files are from 1947 (MDC 1998a). While common carp are a component of the commercial fishing industry in Missouri (Barnes and Riggert 2000), common carp can also be a nuisance species. They take space in rivers, streams, and lakes away from native species. They can increase stream and lake turbidity, destroy spawning habitat, while eating the eggs of native species of fish (Barnes and Riggert 2000). MDC annual reports (1937-1942 and 1946-1992) indicate that, historically, warm-water fish stocked or "rescued" (removing fish from intermittent pools of water and redistributing to areas deemed more suitable) by the MDC in the watershed included largemouth bass, smallmouth bass, crappie, bluegill, green sunfish, catfish, shadow bass, and "minnows". The practice of "fish rescue" has been discontinued.

Nearly 6 million walleye fry less than one inch in length were stocked in the Current River in 1967 and 1968 (Mayers 2000). Evaluations of this stocking effort determined that survival of the fry was poor (Mayers 2000). Arkansas has stocked 1-2 inch walleye fingerlings in Arkansas section of the Current River since 1986, however as of late 1999 the effect of these stockings had not been evaluated (Mayers 2000).

A 1986 United States Forest Service (USFS) report indicates that Loggers Lake, a USFS lake located in the northeast portion of the watershed, was restocked following refilling after being drained by vandals in 1976. The lake was initially stocked with adult fathead minnows in the spring of 1976. This was followed by largemouth bass, bluegill, and redear sunfish. Channel catfish were later stocked in the fall. In addition, Loggers Lake received stockings of grass carp in 1985 and 1989 (USFS 1986). Currently the MDC provides supplemental channel catfish stockings to Loggers Lake and Ripley Lake, both USFS lake within the watershed, on an annual basis (MDC 2001d). Loggers lake generally receives 375 catfish annually. Ripley Lake generally receives 300 channel catfish annually.

Undoubtedly, farm ponds within the watershed have been stocked with largemouth bass, bluegill, and channel catfish by private individuals who obtained fish from the MDC, commercial dealers, and/or other water bodies. The availability of grass carp from commercial fish dealers also increases the probability of this species having been stocked in water bodies within the watershed. The potential of these fish being washed into streams exists during major precipitation events.

A lack of historical records, plus the occurrence of undocumented introductions makes it difficult to determine, with any reliability, all species which may have been introduced into the watershed. Effects of introductions vary. While the introduction of species already present in the watershed may have minimal to no effect, the introduction of exotic (non-native) species can, in many instances, have disastrous consequences.

Mussels

A total of 43 species and subspecies of mussels are known to occur within the Current River Watershed (Table Bc04 and Figure Bc02) (MDC 1998b, MoRAP 2000b and MNHP 2001a). Of these, 2 species are both Federally as well as State listed as endangered. These species are the Curtis Pearlymussel (Epioblasma florentina) and the pink mucket (Lampsilis abrupta). The ebonyshell (Fusconaia ebena), elephantear (Elliptio crassidens), and snuffbox (Epioblasma florentina) are state listed as endangered. An additional 8 mussel species within the watershed are currently listed as species of conservation concern (Table Bc08). The Asian clam (Corbicula flumina) is an exotic (non-native) species of mussel which occurs in the watershed. This mollusk is a native of southern and eastern Asia . The Asian clam can alter lake and stream substrates, compete with native mussels for food and space, and cause biofouling problems in irrigation systems, power plants, and other industrial water systems (USGS 2002b).

An examination of mussel species distribution by eleven digit hydrologic units in the watershed reveals that the Little Black River Unit has the highest number of species at 39. The Lower Current Unit is a distant second in number of species at 18. However, a quantitative comparison between units is not sound. The intensity of mussel sampling within the Current River Watershed exhibits a large amount of spatial variation. The Little Black River Unit has been sampled the most intensively with approximately 66% of referenced sampling sites for the watershed occurring within its boundary. Two units, the Pike Creek and Spring Valley Units, lack mussel sampling data. Due to an inequity in sampling intensity between the eleven digit hydrologic units, quantitative comparisons of mussel diversity between these units would be inaccurate.

Snails

Twenty-five species of snails have been identified within the Current River Watershed (Table Bc05) (Wu etal. 1997). One species, the rough hornsnail (Pleurocera alveare) is included in the state list of species of conservation concern (MNHP 2001b). It is currently considered to be rare and uncommon to imperiled in the state.

Crayfish

Fourteen species of crayfish are known to occur within the Current River Watershed (Table Bc06 and Figure Bc03) (MDC 1998c and MoRAP 2000c). Most species have distributions in or closely associated with the Ozark and/or Lowland faunal Region (Pflieger 1996). Exceptions to this include the devil crayfish (Cambarus diogenes), northern crayfish (Orconectes virilis), and golden crayfish (Orconectes Luteus). The devil crayfish is nearly statewide in distribution being absent only from the White and Neosho River Drainages of the southwestern Ozarks (Pflieger 1996). The northern crayfish is the most widely distributed crayfish in Missouri. It occurs in all areas of the state with the exception of the southeastern Lowlands and portions of the central Ozarks (Pflieger 1996). The golden crayfish can be found primarily in portions of the Prairie and Ozark Faunal Region. In the Ozarks, it is absent from the Black, Eleven Point, White, and Neosho stream drainages (Pflieger 1996).

Within the Current River Watershed, the golden crayfish appears to be the most widespread. It occurs in all 7 eleven digit hydrologic units that have been sampled. The spothanded crayfish (Orconectes punctimanus) is the second most widespread in the watershed occurring in 6 out of 7 units sampled. Six species of crayfish have a distribution in the watershed limited to the Little Black River Hydrologic Unit. These include the cajun dwarf crayfish (Cambarellus puer), digger crayfish (Fallicambarus fodiens), shield crayfish (Faxonella clypeata), gray-speckled crayfish (Orconectes palmeri), red swamp crayfish (Procambarus clarkii), and vernal crayfish (Procambarus viaeviridus).

Five species of crayfish found within the Current River Watershed are currently listed as species of conservation concern (MNHD 2001b). These include the cajun dwarf crayfish, Salem cave crayfish (Cambarus hubrichti), digger Crayfish (Fallicambarus fodiens), shield crayfish (Faxonella clypeata), and vernal crayfish (Procambarus viaeviridus). Within the watershed, all of these species, with the exception of the Salem cave crayfish (Cambarus hubrichti), have only been found in the Little Black River Hydrologic Unit.

Benthic Invertebrates

Three hundred taxa of aquatic invertebrates have been collected within the Current River Watershed since 1961 (MDC 1998d) (Table Bc07). From 1961-1979, 194 taxa were collected within the watershed. Since and including 1980, 228 taxa of aquatic invertebrates have been collected. Figure Bc04 displays benthic invertebrate collection sites within the watershed. Five species are listed as Missouri species of conservation concern (MDNHP 2001b). These include Stenonema bednariki (a heptageniid mayfly), Allocapnia pymaea (a winter stonefly), Hydropsyche piatrix (a net-spinning caddisfly), Ophiogomphus westfalli (Westfall's snaketail, a dragonfly), and Tachopteryx thoreyi (gray petaltail, a dragonfly) (Pennak 1978).

Species of Conservation Concern

Within the Current River Watershed, 169 species of conservation concern have been identified (Table Bc08) (MDC Ozark Regional Fish Community Collection and Sport Fish Sample Files; Pflieger 1997; Wu et al. 1997; MDC 1998a; MDC 1998b; MDC 1998c; MDC 1998d; MoRAP 2000a ;MoRAP 2000b; MoRAP 2000c; MNHP 2001a; MNHP 2001b). These include 117 species of plants (flowering plants, ferns, fern allies, and mosses); 7 species of insects; 5 species of crayfish; 10 species of mussels; 1 snail species; 17 species of fish; 4 species of amphibians, 7 species of birds; and 6 species of mammals. Six species within the watershed are federally and state listed as endangered. These include the gray bat, Indiana bat, Curtis pearlymussel, pink mucket, pondberry, and running buffalo clover. The red-cockaded wood pecker is also federally listed as endangered; however it is currently considered extirpated from the state. These include the last observation of the species in the watershed was 1946. An additional 8 species are currently state listed as endangered. These include Swainson's warbler, harlequin darter, taillight shiner, plains spotted skunk, elephantear, snuffbox, ebonyshell, and the eastern prairie fringed orchid. It is important to note that the status of the above mentioned species are based on the 2001 Missouri Species of Conservation Concern Checklist (MNHP 2001b).

The following is a brief description of state and/or federally listed endangered aquatic oriented animal species within the Current River Watershed:

Fish

Harlequin Darter (Etheostoma histrio)

Within the Current River Watershed, The harlequin darter, being a characteristic lowland species, has only been found within the Little Black River drainage (MDC 1998a, MoRAP 2000a, and MNHP 2001a) the lower portions of which more closely resemble streams and ditches of the Lowland Faunal Region. The first MDC record for a collection of the harlequin darter within the Current River Watershed occurred in 1941 at which time one individual was found (MDC 1998a). Five other individuals collected in the watershed are recorded in the MDC fish collection database. These were collected from a single site in the late 1970s. The Missouri Natural Heritage database contains records for observations of the harlequin darter in the watershed as recently as 1998.

Taillight Shiner (Notropis maculatus)

Pflieger (1997) states that the taillight shiner is "one of the rarest Missouri minnows". Indeed, the taillight shiner has only been collected from 6 locations in Missouri (MDC 1998a, MoRAP 2000a, and MNHP 2001a). All of these are in or border the Lowland Faunal Region. This shiner has only been found at one location in the Current River Watershed (Little Black River Drainage). Pflieger (1997) states that the taillight shiner "seems on the verge of extirpation from the state".

Mussels

Elephant Ear (Elliptio crassidens)

The elephant ear is state listed as endangered (MNHP 2001b). It was found at two sites within the Current River Watershed in the early 1980s (MNHP 2001a). Both sites are within the Little Black River Drainage.

Curtis pearlymussel (Epioblasma florentina curtisii)

The Curtis Pearlymussel is state and federally listed as endangered (MNHP 2001b). Within the Current River Watershed, the Curtis pearlymussel has only been found in the Little Black River Drainage. This species was last found in the watershed in 1993 (MNHP 2001a).

Snuffbox (Epioblasma triquetra)

The snuffbox is state listed as endangered (MNHP 2001b). The only record of this species within the watershed is from a single site in the Little Black River Drainage at which 2 live specimens were observed in 1984 (MNHP 2001a).

Ebonyshell (Fusconaia ebena)

The ebonyshell is state listed as endangered (MNHP 2001b). Within the watershed, this species appears to have only been found at a single site within the Little Black River Drainage (MDC 1998b, MoRAP 2000b, and MNHP 2001a). The one and only specimen of this species found within the watershed was observed in 1979 (MNHP 2001a). Bruenderman et al. (2001) states that mussel surveys conducted in 1997 and 1998 in the Little Black drainage showed no evidence that this species still exists within the drainage.

Pink Mucket (Lampsilis abrupta)

The pink mucket is state and federally listed as endangered (MNHP 2001b). Within the Current River Watershed, this species has been found at two sites located in the Little Black River Drainage (MDC 1998b, MoRAP 2000b, and MNHP 2001a). The last observation of this species within the watershed was in 1979 (MNHP 2001a).

Figure Bc01

Current River Watershed
Fish Community Sampling Sites

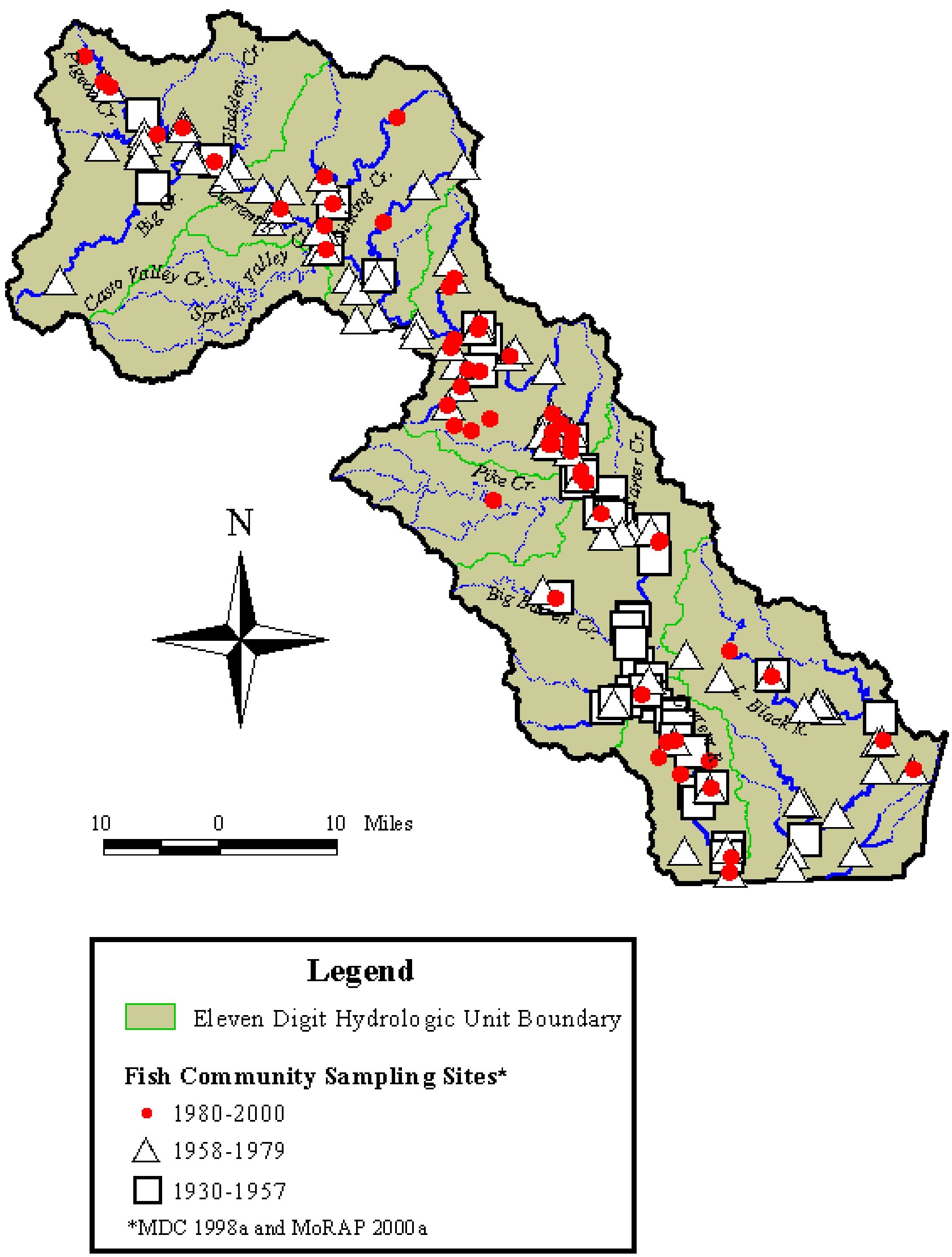


Figure Bc02.

Current River Watershed

Mussel Community Sampling Sites

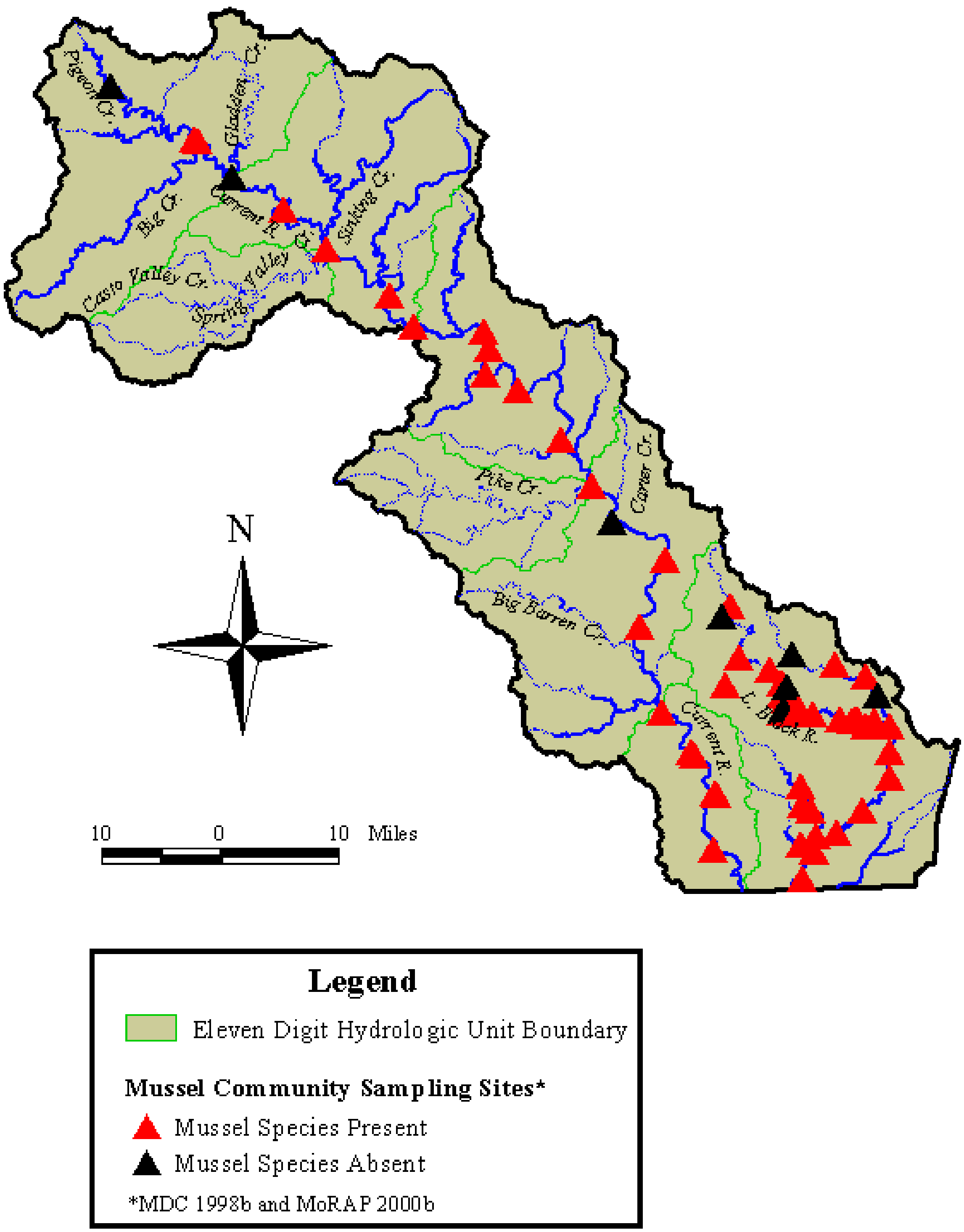


Figure Bc03.

Current River Watershed

Crayfish Community Sampling Sites

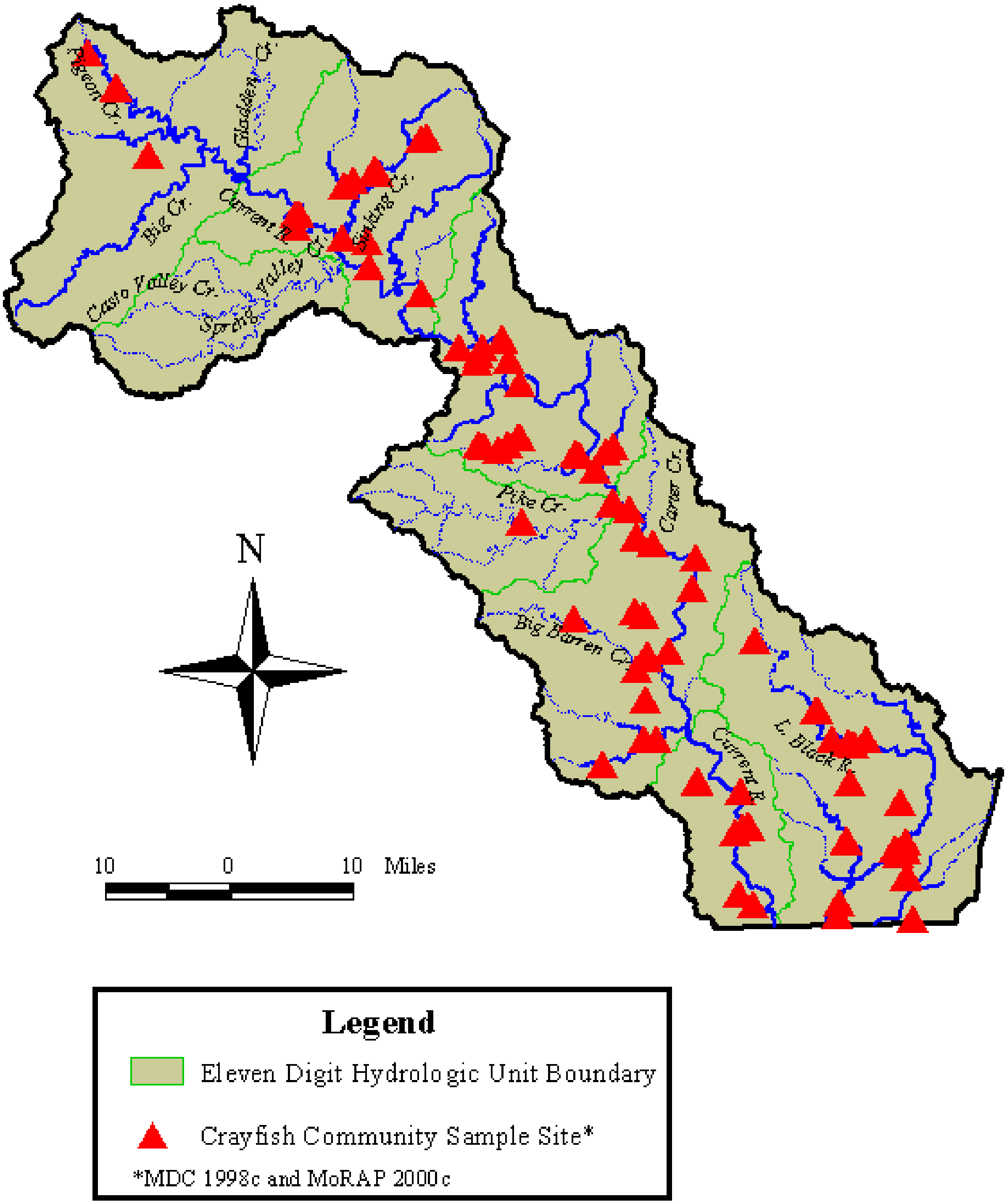
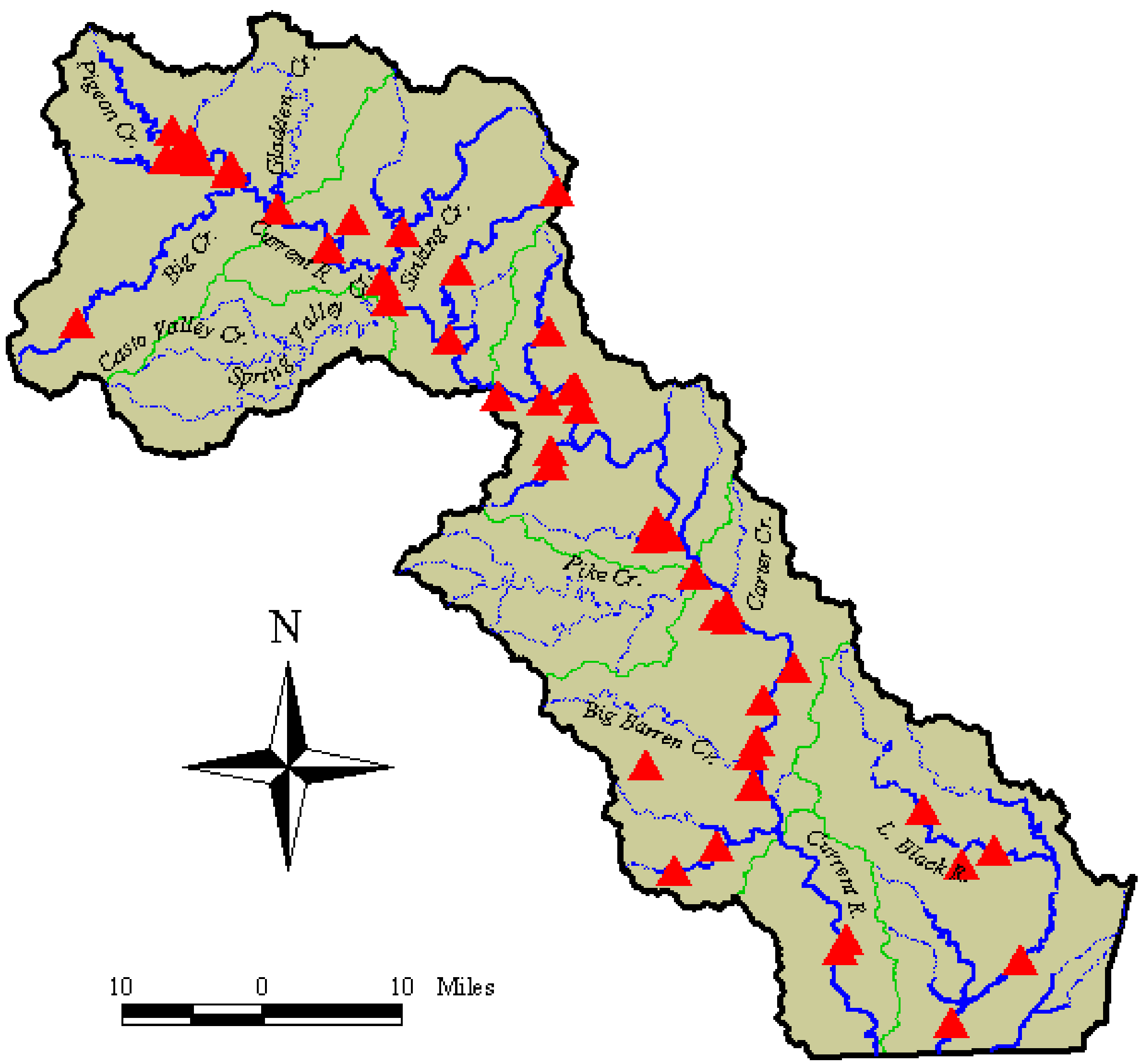


Figure Bc04.

Current River Watershed
Benthic Invertebrate Community Sampling Sites



Legend

Eleven Digit Hydrologic Unit Boundary

Benthic Invertebrate Collections (MDC 1998d)

Table Bc01 (1 of 7). Fish species (and subspecies) whose distribution range includes the Current River Watershed (MDC Ozark Regional Fish Community and Sport Fish Sample Files; Pflieger 1989; Pflieger 1997; MDC 1998a; MNHP 2001a; MoRAP 2000a).

Common Name	Scientific Name	Geographic Affinity	Period		
			1	2	3
Family: Petromyzontidae (Lampreys) Total Species: 4			3	3	1
American Brook Lamprey	*Lampetra appendix*	O	X	X	
Chestnut Lamprey	*Ichthyomyzon castaneus*	O,R	X	X	
Least Brook Lamprey	*Lampetra aepyptera*	O	X	X	X
Family: Acipenseridae (Sturgeons) Total Species: 1			1	1	0
Shovelnose Sturgeon	*Scaphirhychus platorynchus*		X	X	
Family: Polyodontidae (Paddlefishes) Total Species: 1			1	1	1
Paddlefish	*Polyodon spathula*	R	X	X	X
Family: Lepisosteidae (Gars) Total Species: 4			3	4	1
Alligator Gar	*Lepisosteus spatula*	R		X	
Longnose Gar	*Lepisosteus ossues*	WIDE	X	X	X
Shortnose Gar	*Lepisosteus platostomus*	R	X	X	
Spotted Gar	*Lepisosteus oculatus*	L	X	X	
Family: Amiidae (Bowfins) Total Species: 1			1	1	0
Bowfin	*Amia calva*	L,R	X	X	
Family: Hiodontidae (Mooneyes) Total Species: 1			1	1	0
Mooneye	*Hiodon tergisus*	WIDE	X	X	
Family: Anguillidae (Freshwater Eels) Total Species: 1			1	1	0
American Eel	*Anguilla rostrata*	R,O	X	X	
Family: Clupeidae (Herrings) Total Species: 3			2	3	1
Gizzard Shad	*Dorosoma cepedianum*	WIDE	X	X	X
Skipjack Herring	*Alosa chrysochloris*	R	X	X	
Threadfin Shad	*Dorsoma petenense*	R		X	
Family: Cyprinidae (Minnows) Total Species: 31			28	28	24
Bigeye Chub	*Notropis amblops*	O	X	X	X
Bigeye Shiner	*Notropis boops*	O	X	X	X
Blacktail Shiner	*Cyprinella venusta*	L	X	X	X
Bleeding Shiner	*Luxilus zonatus*	O	X	X	X
Bluntnose Minnow	*Pimephales notatus*	WIDE	X	X	X
Bullhead Minnow	*Pimephales vigilax*	L, R	X	X	
Central Stoneroller	*Campostoma pullum*	O,P	X	X	X
Common Carp	*Cyprinus carpio*	WIDE	X	X	X
Creek Chub	*Semotilus atromaculatus*	P,O	X	X	X
Eastern Redfin Shiner	*Lythrurus u. cyanocephalus*	O,L	X	X	X
Emerald Shiner	*Notropis atherinoides*	R	X	X	X
Fathead Minnow	*Pimephales promelas*	P	X		
Golden Shiner	*Notemigonus crysoleucas*	WIDE	X	X	X

Gravel Chub	*Erimystax x-punctatus*	O		X	X
Hornyhead Chub	*Nocomis biguttatus*	O	X	X	X
Largescale Stoneroller	*Campostoma oligolepis*	O	X	X	X
Mississippi Silvery Minnow	*Hybognathus nuchalis*	R	X	X	X
Ozark Chub	*Erimystax harryi*	O	X	X	X
Ozark Minnow	*Notropis nubilus*	O	X	X	X
Ozark Shiner	*Notropis ozarcanus*	O	X	X	X
Pallid Shiner	*Notropis amnis*	L	X		
Pugnose Minnow	*Opsopoeodus emiliae*	L	X	X	
Ribbon Shiner	*Lythrurus fumeus*	L	X	X	X
Rosyface Shiner	*Notropis rubellus*	O	X	X	X
Southern Redbelly Dace	*Phoxinus erythrogaster*	O	X	X	X
Steelcolor Shiner	*Cyprinella whipplei*	O	X		
Striped Shiner	*Luxilus chrysocephalus*	O	X	X	X
Taillight Shiner	*Notropis maculatus*	L		X	
Telescope Shiner	*Notropis telescopus*	O	X	X	X
Wedgespot Shiner	*Notropis greenei*	O	X	X	X
Weed Shiner	*Notropis texanus*	L	X	X	
Family: Catostomidae (Suckers) Total Species: 17			16	16	14
Bigmouth Buffalo	*Ictiobus cyprinellus*	R	X	X	
Black Buffalo	*Ictiobus niger*	WIDE	X	X	X
Black Redhorse	*Moxostoma duquesnei*	O	X	X	X
Blue Sucker	*Cycleptus elongatus*	R, O	X	X	
Creek Chubscker	*Erimyzon oblongus*	O	X	X	X
Golden Redhorse	*Moxostoma erythrurum*	O,P	X	X	X
Highfin Carpsucker	*Carpiodes velifer*	O		X	X
Lake Chubsucker	*Erimyzon sucetta*	L	X		X
Northern Hog Sucker	*Hypentelium nigricans*	O	X	X	X
River Carpsucker	*Carpiodes carpio*	R,P	X	X	
River Redhorse	*Moxostoma carinatum*	O	X	X	X
Shorthead Redhorse	*Moxostoma macrolepidotum*	O	X	X	X
Silver Redhorse	*Moxostoma anisurum*	O	X	X	X
Smallmouth Buffalo	*Ictiobus bubalus*	R	X	X	X
Spotted Sucker	*Minytrema melanops*	L,O	X	X	X
Whitetail Shiner	*Cyprinella galactura*	O	X	X	X
White Sucker	*Catostomus commersoni*	P,O	X	X	X
Family: Ictaluridae (Catfishes) Total Species: 10			9	10	5
Black Bullhead	*Ameiurus melas*	P	X	X	
Brindled Madtom	*Noturus miurus*	O,L	X	X	
Channel Catfish	*Ictalurus punctatus*	WIDE	X	X	
Checkered Madtom	*Noturus flavater*	O	X	X	X
Flathead Catfish	*Pylodictis olivaris*	WIDE	X	X	X
Freckled Madtom	*Noturus nocturnus*	L,P	X	X	
Ozark Madtom	*Noturus albater*	O	X	X	X

Tadpole Madtom	*Noturus gyrinus*	L,P	X	X	
Yellow Bullhead	*Ameiurus natalis*	P,O	X	X	X
Slender Madtom	*Noturus exilis*	O		X	X
Family: Esocidae (Pikes) Total Species: 2			1	1	2
Chain Pickerel	*Esox niger*	O	X	X	X
Grass Pickerel	*Esox americanus*	O			X
Family: Salmonidae (Trouts) Total Species: 2			1	1	2
Brown Trout	*Salmo trutta*	O			X
Rainbow Trout	*Oncorhychus mykiss*	O	X	X	X
Family: Aphredoderidae (Pirate Perches) Total Species: 1			1	1	1
Pirate Perch	*Aphredoderus sayanus*	L	X	X	X
Family: Amblyopsidae (Cavefishes) Total Species: 1			1	0	1
Southern Cavefish	*Typhlichthys subterraneus*	O	X		X
Family: Fundulidae (Killfishes) Total Species: 3			2	3	2
Blackspotted Topminnow	*Fundulus olivaceous*	L,O	X	X	X
Starhead Topminnow	*Fundulus dispar*	L		X	
Studfish	*Fundulus catenatus*	O	X	X	X
Family: Poecilliidae (Livebearers) Total Species: 1			1	1	1
Western Mosquitofish	*Gambusia affinis*	WIDE	X	X	X
Family: Atherinidae (Silversides) Total Species: 1			1	1	1
Brook Silverside	*Labidesthes sicculus*	O	X	X	X
Family: Cottidae (Sculpins) Total Species: 2			2	2	2
Banded Sculpin	*Cottus carolinae*	O	X	X	X
Ozark Sculpin	*Cottus hypselurus*	O	X	X	X
Family: Percichthyidae (Temperate Basses) Total Species: 1			1	1	0
White Bass	*Morone chrysops*	O,P	X	X	
Family: Elassomatidae (Pygmy Sunfishes) Total Species: 1			0	1	1
Banded Pigmy Sunfish	*Elassoma zonatum*	L		X	X
Family: Centrarchidae (Sunfishes) Total Species: 14			13	14	9
Black Crappie	*Pomoxis nigromaculatus*	WIDE	X	X	
Bluegill	*Lepomis macrochirus*	WIDE	X	X	X
Flier	*Centrarchus macropterus*	L		X	
Green Sunfish	*Lepomis cyanellus*	WIDE	X	X	X
Largemouth Bass	*Micropterus salmoides*	WIDE	X	X	X
Longear Sunfish	*Lepomis megalotis*	O,L	X	X	X
Orange Spotted Sunfish	*Lepomis humilis*	WIDE	X	X	
Redear Sunfish	*Lepomis microlophus*	O	X	X	X
Red Spotted Sunfish	*Lepomis miniatus*	L,O	X	X	X
Shadow Bass	*Amploplites ariommus*	O	X	X	X
Smallmouth Bass	*Micropterus dolomieu*	O	X	X	X
Spotted Bass	*Micropterus punctulatus*	L,O	X	X	
Warmouth	*Lepomis gulosus*	L	X	X	X
White Crappie	*Pomoxis annuularis*	WIDE	X	X	
Family: Percidae (Perches) Total Species: 23			19	21	12

Banded Darter	*Etheostoma zonale*	O	X	X	X
Barred Fantail Darter	*Etheostoma f. flabellare*	O	X	X	X
Blackside Darter	*Percina maculata*	P,L	X	X	
Bluntnose Darter	*Etheostoma chlorosomum*	L	X	X	
Current Darter	*Etheostomas. Uniporum*	O	X	X	X
Current River Saddled Darter	*Etheostoma e. erizonum*	O	X	X	X
Cypress Darter	*Etheostoma proeliare*	L	X	X	
Dusky Darter	*Percina sciera*	L	X	X	
Gilt Darter	*Percina evides*	O	X	X	X
Greenside Darter	*Etheostoma blennioides*	O	X	X	X
Harlequin Darter	*Etheostoma histrio*	L	X	X	X
Johnny Darter	*Etheostoma nigrum*	P	X	X	X
Ohio Logperch	*Percina c. caprodes*	O	X	X	X
Rainbow Darter	*Etheostoma caeruleum*	O	X	X	X
Saddleback Darter	*Percina vigil*	L		X	
Sauger	*Stizostedion canadense*	R		X	
Slough Darter	*Etheostoma gracile*	L	X	X	
Speckeld Darter	*Etheostoma stigmaeum*	O,L	X	X	
Stargazing Darter	*Percina uraidea*	O	X	X	X
Stippled Darter	*Etheostoma punctulatum*	O	X	X	
Walleye	*Stizostedion vitreum*	O,R	X	X	X
Family: Sciaenidae (Drums) Total Species: 1			1		
Freshwater Drum	*Aplodinotus grunniens*	WIDE	X	X	X
Watershed Species Total: 124			111	117	82

Period: 1=collected 1930 to 1957; 2=collected 1958 to 1979; 3=collected 1980 to 2000 Geographic Affinity (based on aquatic faunal regions of Missouri): L=Lowland, O=Ozark, P=Prairie, R=Big River, WIDE=Widely Distributed

Table Bc02 (1 of 6). Fish species distribution within eleven digit hydrologic units of the Current River Watershed (MDC Ozark Regional Fish Community and Sport Fish Sample Files; Pflieger 1997; MDC 1998a; MoRAP 2000a). Note: List does not include species of conservation concern.

UCR= Upper Current River **SV**= Spring Valley **CRSC**=Current River-Sinking Creek **LCR**= Lower Current River

MCR= Middle Current River **PC**=Pike Creek **CRBC**=Current River-Buffalo Creek **LBR**=Little Black River

Common Name	*Scientific Name*	UCR	SV	CRSC	MCR	PC	CRBC	LCR	LBR
American Eel	*Anguilla rostrata*			X	X		X	X	
Banded Darter	*Etheostoma zonale*	X		X	X		X	X	X
Banded Pigmy Sunfish	*Elassoma zonatum*								X
Banded Sculpin	*Cottus carolinae*	X		X	X	X	X	X	
Barred Fantail Darter	*Etheostoma f. flabellare*	X		X	X		X		X
Bigeye Chub	*Notropis amblops*	X		X	X	X	X	X	X
Bigeye Shiner	*Notropis boops*			X	X	X	X	X	X
Bigmouth Buffalo	*Ictiobus cyprinellus*			X	X		X	X	X
Black Buffalo	*Ictiobus niger*			X			X	X	X
Black Bullhead	*Ameiurus melas*	X		X	X		X	X	X
Black Crappie	*Pomoxis nigromaculatus*			X	X		X	X	X
Black Redhorse	*Moxostoma duquesnei*	X		X	X	X	X	X	X
Blackside Darter	*Percina maculata*							X	X
Blackspotted Topminnow	*Fundulus olivaceous*	X		X	X	X	X	X	X
Blacktail Shiner	*Cyprinella venusta*							X	X
Bleeding Shiner	*Luxilus zonatus*	X	X	X	X	X	X	X	X
Bluegill	*Lepomis macrochirus*	X	X	X	X	X	X	X	X
Bluntnose Darter	*Etheostoma chlorosomum*								X
Bluntnose Minnow	*Pimephales notatus*	X			X	X	X	X	X
Bowfin	*Amia calva*							X	X
Brindled Madtom	*Noturus miurus*								X
Brook Silverside	*Labidesthes sicculus*			X	X	X	X	X	X
Brown Trout	*Salmo trutta*	X							
Bullhead Minnow	*Pimephales vigilax*								X
Central Stoneroller	*Campostoma pullum*	X		X	X	X	X	X	X
Chain Pickerel	*Esox niger*	X		X	X	X	X	X	X
Channel Catfish	*Ictalurus punctatus*						X	X	X
Chestnut Lamprey	*Ichthyomyzon castaneus*						X	X	X
Common Carp	*Cyprinus carpio*	X		X	X		X	X	X

Creek Chub	*Semotilus atromaculatus*	X		X	X	X	X	X	X
Creek Chubsucker	*Erimyzon oblongus*	X		X	X		X	X	X
Current Darter	*Etheostoma uniporum*	X		X	X	X	X	X	X
Current River Saddled Darter	*Etheostoma e. erizonum*			X	X		X	X	
Cypress Darter	*Etheostoma proeliare*							X	X
Dusky Darter	*Percina sciera*								X
Eastern Redfin Shiner	*Lythrurus u. cyanocephalus*	X		X	X	X	X	X	X
Emerald Shiner	*Notropis atherinoides*							X	X
Fathead Minnow	*Pimephales promelas*	X							
Flathead Catfish	*Pylodictis olivaris*				X			X	X
Freckled Madtom	*Noturus nocturnus*						X	X	
Freshwater Drum	*Aplodinotus grunniens*			X	X		X	X	X
Gilt Darter	*Percina evides*			X	X		X	X	
Gizzard Shad	*Dorosoma cepedianum*	X		X	X	X	X	X	X
Golden Redhorse	*Moxostoma erythrurum*	X		X	X	X	X	X	X
Golden Shiner	*Notemigonus crysoleucas*	X		X	X		X	X	X
Grass Pickerel	*Esox americanus*							X	
Gravel Chub	*Erimystax x-punctatus*							X	
Green Sunfish	*Lepomis cyanellus*	X		X	X	X	X	X	X
Greenside Darter	*Etheostoma blennioides*	X		X	X	X	X	X	X
Hornyhead Chub	*Nocomis biguttatus*	X	X	X	X	X	X	X	X
Johnny Darter	*Etheostoma nigrum*						X	X	X
Largemouth Bass	*Micropterus salmoides*	X		X	X	X	X	X	X
Largescale Stoneroller	*Campostoma oligolepis*	X		X	X	X	X	X	X
Larval Lamprey	*Ichthyomyzon ammocoete*				X		X	X	X
Least Brook Lamprey	*Lampetra aepyptera*	X		X	X				X
Longear Sunfish	*Lepomis megalotis*	X	X	X	X	X	X	X	X
Longnose Gar	*Lepisosteus osseus*			X	X		X	X	X
Northern Hog Sucker	*Hypentelium nigricans*	X		X	X	X	X	X	X
Ohio Logperch	*Percina c. caprodes*			X	X		X	X	X
Orange Spotted Sunfish	*Lepomis humilis*							X	X
Ozark Chub	*Erimystax harryi*	X		X	X		X	X	
Ozark Madtom	*Noturus albater*	X		X	X		X	X	X
Ozark Minnow	*Notropis nubilus*	X	X	X	X	X	X	X	X
Ozark Sculpin	*Cottus hypselurus*	X		X	X	X	X	X	X
Pirate Perch	*Aphredoderus sayanus*						X	X	X
Rainbow Darter	*Etheostoma caeruleum*	X		X	X	X	X	X	X
Rainbow Trout	*Oncorhynchus mykiss*	X		X					
Red Spotted Sunfish	*Lepomis miniatus*			X	X	X	X	X	X
Redear Sunfish	*Lepomis microlophus*				X		X	X	

Ribbon Shiner	***Lythrurus fumeus***	**X**						**X**	**X**
River Carpsucker	***Carpiodes carpio***							**X**	
River Redhorse	***Moxostoma carinatum***	**X**			**X**		**X**	**X**	**X**
Rosyface Shiner	***Notropis rubellus***	**X**		**X**	**X**		**X**	**X**	
Saddleback Darter	***Percina vigil***								**X**
Sauger	***Stizostedion canadense***			**X**	**X**			**X**	
Shadow Bass	***Ambloplites ariommus***	**X**		**X**	**X**	**X**	**X**	**X**	**X**
Shorthead Redhorse	***Moxostoma macrolepidotum***	**X**		**X**	**X**		**X**	**X**	**X**
Shortnose Gar	***Lepisosteus platostomus***							**X**	**X**
Shovelnose Sturgeon	***Scaphirhynchus platorynchus***							**X**	
Silver Redhorse	***Moxostoma anisurum***				**X**		**X**	**X**	
Wedgespot Shiner	***Notropis greenei***	**X**		**X**	**X**		**X**	**X**	
Weed Shiner	***Notropis texanus***							**X**	**X**
Western Mosquitofish	***Gambusia affinis***						**X**	**X**	**X**
White Bass	***Morone chrysops***							**X**	
White Crappie	***Pomoxis annularis***						**X**	**X**	**X**
White Sucker	***Catostomus commersonni***	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Whitetail Shiner	***Cyprinella galactura***			**X**	**X**	**X**	**X**	**X**	**X**
Yellow Bullhead	***Ameiurus natalis***	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

UCR= Upper Current River **SV**= Spring Valley **CRSC**=Current River-Sinking Creek **LCR**= Lower Current River

MCR= Middle Current River **PC**=Pike Creek **CRBC**=Current River-Buffalo Creek **LBR**=Little Black River

Table Bc03. Missouri aquatic faunal region representation by fish species within the Current River Watershed (MDC Ozark Regional Fish Community and Sport Fish Sample Files; Pflieger 1989; Pflieger 1997; MDC 1998a; MNHP 2001a; MoRAP 2000a)

Faunal Region(s)	Number of Species	Percent of Species
Ozark	53	42.1
Ozark, River	2	1.6
Ozark, Prairie	3	2.4
Ozark, Lowland	4	3.2
River	10	7.9
River, Ozark	2	1.6
River, Prairie	1	0.8
Lowland	19	15.1
Lowland, River	2	1.6
Lowland, Ozark	4	3.2
Lowland, Prairie	2	1.6
Prairie	3	2.4
Prairie, Ozark	3	2.4
Prairie, Lowland	1	0.8
Wide	17	13.5

Table Bc04. Mussel species distribution within the Current River Watershed (MDC 1998b, MoRAP 2000b, MNHP 2001a). Note: Location data not given for species of conservation concern.

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MCR= Middle Current River

PC=Pike Creek

CRBC=Current River-Buffalo Creek

LBR=Little Black River

Common Name	*Scientific Name*	UCR	SV	CRSC	MCR	PC	CRBC	LCR	LBR
Mucket	*Actinonaias ligamentina*								X
Elktoe	*Alasmidonta marginata*								
Slippershell Mussel	*Alasmidonta viridis*								
Threeridge	*Amblema plicata*							X	X
Asiatic Clam	*Corbicula fluminea*				X		X	X	X
Purple Wartyback	*Cyclonaias tuberculata*				X		X	X	X
Western Fanshell	*Cyprogenia aberti*								
Spike	*Elliptio dilatata*			X	X			X	X
Elephantear	*Elliptio crassidens*								
Curtis Pearlymussel	*Epioblasma florentina curtisi*								
Snuffbox	*Epioblasma triquetra*								
Ebonyshell	*Fusconaia ebena*								
Wabash Pigtoe	*Fusconaia flava*							X	X
Ozark Pigtoe	*Fusconaia ozarkensis*	X		X	X		X	X	
Pink Mucket	*Lampsilis abrupta*								
Ozark Broken-ray	*Lampsilis r. brevicula*	X			X		X	X	X
Northern Broken-ray	*Lampsilis r. brittsi*						X	X	X
Pocketbook	*Lampsilis cardium*				X			X	X
Arkansas Broken-ray	*Lampsilis r. reeviana*	X		X	X				X
Fatmucket	*Lampsilis siliquoidea*							X	X
Yellow Sandshell	*Lampsilis teres*							X	X
Fluted Shell	*Lasmigona costata*				X		X	X	X
White Heelsplitter	*Lasmigona c. complanata*								X
Black Sandshell	*Ligumia recta*								
Pondmussel	*Ligumia subrostrata*								X
Washboard	*Megalonaias nervosa*								X
Threehorn Wartyback	*Obliquaria reflexa*								X
Bankclimber	*Plectomerus dombeyanus*								
Round Pigtoe	*Pleurobema sintoxia*			X	X		X	X	X

Bleufer	***Potamilus purpuratus***								**X**
Ouachita Kidneyshell	***Ptychobranchus occidentalis***								
Giant Floater	***Pyganodon grandis grandis***								**X**
Pimpleback	***Quadrula pustulosa***								**X**
Squawfoot	***Strophitus undulatus***				**X**				**X**
Purple Lilliput	***Toxolasma lividus***								
Lilliput	***Toxolasma parvus***								**X**
Pistolgrip	***Tritogonia verrucosa***							**X**	**X**
Deertoe	***Truncilla truncata***								**X**
Fawnsfoot	***Truncilla donaciformis***								**X**
Paper Pondshell	***Utterbackia imbecillis***			**X**					**X**
Ellipse	***Venustaconcha ellipsiformis***								**X**
Rainbow	***Villosa iris***	**X**		**X**	**X**		**X**		**X**
Little Spectaclecase	***Villosa lienosa***								**X**

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Table Bc05. Snail Species of the Current River Watershed (Wu etal. 1997).

Common Name	*Scientific Name*
Ash Gyro	*Gyraulus parvus*
Bugle Sprite	*Menetus dilatatus*
Creeping Ancylid	*Ferrisia rivularis*
Duck Physa	*Physa (Physodon) anatina*
Dusky Ancylid	*Laevapex fuscus*
Glossy Physa	*Physa (Physodon) pomilia*
Golden Fossaria	*Lymnaea (Fossaria) obrussa*
Goodrich's Physa	*Physa (Physella) goodrichi*
Hale's Physa	*Physa (Physodon) halei*
Highland Campeloma	*Campeloma subsolidum*
Marsh Ramshorn	*Helisoma trivolvis*
Marsh Fossaria	*Lymnaea (Fossaria) humilis*
Midland Siltsnail	*Cincinnatia integra*
Mimic Lymnaea	*Pseudosuccinea columella*
Ozark Springsnail	*Fontigens aldrichi*
Pewter Physa	*Physa (Physella) heterostropha*
Pygmy Fossaria	*Lymnaea (Fossaria) parva*
Pyramid Elimia	*Elimia potosiensis*
Rock Fossaria	*Lymnaea (Fossaria) modicella*
Rough Rams-Horn	*Helisoma subcrenatum*
Rough Hornsnail	*Pleurocera alveare*
Sharp Hornsnail	*Pleurocera acuta*
Slender Walker	*Pomatiopsis lapidaria*
Tadpole Physa	*Physa (Physella) gyrina*
Two-Ridge Rams-Horn	*Helisoma anceps*

Table Bc06. Crayfish species occurring in the Current River Watershed (MNHP 2001a, MoRAP 2000c, MDC 1998c). Note: Location data not given for species of conservation concern.

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MCR= Middle Current River **PC**= Pike Creek **CRBC**= Current River-Buffalo Creek

LCR= Lower Current River **LBR**= Little Black River

Common Name	*Scientific Name*	UCR	SV	CRSC	MCR	PC	CRBC	LCR	LBR
Cajun dwarf crayfish	*Cambarellus pueur*								
Devil crayfish	*Cambarus diogenes*						X	X	X
Salem cave crayfish	*Cambarus hubrichti*								
Hubbs' crayfish	*Cambarus hubbsi*			X	X				
Digger crayfish	*Fallicambarus fodiens*								
Shield crayfish	*Faxonella clypeata*								
Golden crayfish	*Orconectes luteus*	X		X	X	X	X	X	X
Gray-speckled crayfish	*Orconectes palmeri*								X
Northern crayfish	*Orconectes virilis*			X					X
Ozark crayfish	*Orconectes ozarkae*			X	X		X	X	X
Spothanded crayfish	*Orconectes punctimanus*	X		X	X	X	X	X	
Red swamp crayfish	*Procambarus clarkii*								X
Vernal crayfish	*Procambarus viaeviridus*								
White River crayfish	*Procambarus acutus*							X	X

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Table Bc07. Benthic invertebrate taxa of the Current River Watershed (MDC 1998d and Trial, personal communication).

Order	Family	Species
Amphipoda	Crangonyctidae	Crangonyx Minor (Bousefield)
Amphipoda	Crangonycitdae	Crangonyx Sp.
Amphipoda	Gammaridae	
Amphipoda	Gammaridae	Gammarus Fasciatus (Say)
Amphipoda	Gammaridae	Gammarus Pseudolimnaeus (Bousfield)
Amphipoda	Gammaridae	Gammarus Sp.
Amphipoda	Talitridae	Hyalella Azteca (Sassure)
Coleoptera	Curculionidae	Stenopelmus Rufinosus (Gyllenhal)
Coleoptera	Dryopidae	Helichus Lithophilus (Germar)
Coleoptera	Dryopidae	Helichus Sp.
Coleoptera	Dytiscidae	
Coleoptera	Dytiscidae	Coptotomus Interrogatus (Fabricius)
Coleoptera	Dytiscidae	Cybister Sp.
Coleoptera	Dytiscidae	Deronectes/oreodytes
Coleoptera	Dytiscidae	Graphoderus Liberus (Say)
Coleoptera	Dytiscidae	Hydaticus Piceus (Leconte)
Coleoptera	Dytiscidae	Hydroporus Niger (Say)
Coleoptera	Dytiscidae	Hydroporus Undulatus (Say)
Coleoptera	Dytiscidae	Illyius Biguttulus (Germar)
Coleoptera	Dytiscidae	Laccophilus Fasciatus (Aube)
Coleoptera	Dytiscidae	Rhantus Tostus (Lenconte)
Coleoptera	Dytiscidae	Uvarus Lacustris (Say)
Coleoptera	Elmidae	Dubiraphia Bivittata (Leconte)
Coleoptera	Elmidae	Dubiraphia Sp.
Coleoptera	Elmidae	Macronychus Glabratus (Say)
Coleoptera	Elmidae	Optioservus Sandersoni (Collier)
Coleoptera	Elmidae	Stenelmis Beameri (Sanderson)
coleopteran	Elmidae	Stenelmis Sp.
Coleoptera	Grynidae	Dineutus Sp.
Coleoptera	Gyrinidae	Gyretes Sp.
Coleoptera	Haliplidae	Peltodytes Edentulus (Leconte)
Coleoptera	Haliplidae	Peltodytes Lengi (Roberts)
Coleoptera	Haliplidae	Peltodytes Sp.
Coleoptera	Haliplidae	Peltodytes Tortulosus (Roberts)
Coleoptera	Heteroceridae	
Coleoptera	Hydrophilidae	
Coleoptera	Hydrophilidae	Berosus Sp.

Coleoptera	Hydrophilidae	Chaeterthria Sp.
Coleoptera	Hydrophilidae	Cymbiodyta Sp.
Coleoptera	Hydrophilidaeq	Helochares Sp.
Coleoptera	Hydrophilidae	Hydrobius Sp.
Coleoptera	Hydrophilidae	Hydrochus Sp.
Coleoptera	Hydrophilidae	Hydrophilus Sp.
Coleoptera	Hydrophilidae	Laccobius Sp.
Coleoptera	Hydrophilidae	Tropisternus Batchleyi Blatchleyi (D'orchymont)
Coleoptera	Hydrophilidae	Tropisternus Lateralis Nimbatus (Say)
Coleoptera	Limnicidae	Lutrochus Laticeps (Casey)
Coleoptera	Psephinidae	Ectopria Nervosa (Milsheimer)
Coleoptera	Psephinidae	Psephenus Herricki (Dekay)
Coleoptera	Staphylinidae	
Coleoptera	Unkown	Unidentified Coleoptera
Decapoda	Cambaridae	Orconectes Luteus (Creaser)
Decapoda	Cambaridae	Orconectes Marchandi (Hobbs)
Decapoda	Cambaridae	Orconectes Sp.
Diptera	Athericidae	Atherix Lantha (Webb)
Diptera	Ceratopogonidae	
Diptera	Ceratopogonidae	Atrichopogon Sp.
Diptera	Ceratopogonidae	Bezzia/probezzia…
Diptera	Ceratopogonidae	Forcipomyia Sp.
Diptera	Chaoboridae	
Diptera	Chaoboridae	Chaoborus Sp.
Diptera	Chironomidae	
Diptera	Culicidae	Aedes Sp.
Diptera	Dixidae	
Diptera	Empididae	
Diptera	Ephydridae	
Diptera	Musicidae	
Diptera	Psychodidae	Pericoma Sp.
Diptera	Simuliidae	
Diptera	Stratiomyidae	
Diptera	Stratiomyidae	Euparyphus sp.
Diptera	Stratiomyidae	Nemotelus Sp.
Diptera	Stratiomyidae	OxyceraSp.
Diptera	Tabanidae	
Diptera	Tabanidae	Chrysops Sp.
Diptera	Tabanidae	Silvius Sp.
Diptera	Tanyderidae	Protoplasa fitchii (Osten-sacken)

Diptera	Tipulidae	Antocha Sp.
Diptera	Tipulidae	Erioptera Sp.
Diptera	Tipulidae	Hexatoma Sp.
Diptera	Tipulidae	Limonia Sp.
Diptera	Tipulidae	Tipula Sp.
Diptera	Tipulidae	Tipulidae
Ephemeroptera	Baetidae	
Ephemeroptera	Baetidae	Accentrella Sp.
Ephemeroptera	Baetidae	Baetis Brunneicolor (Mcdunnough)
Ephemeroptera	Baetidae	Baetis Sp.
Ephemeroptera	Baetidae	Baetis Tricaudatus (Dodds)
Ephemeroptera	Baetidae	Callibaetis Sp.
Ephemeroptera	Baetiscidae	Baetisca Lacustris (Mcdunnough)
Ephemeroptera	Caenidae	Caenis Sp.
Ephemeroptera	Ephemerellidae	Ephemerella (Invaria Grp.)
Ephemeroptera	Ephemerellidae	Ephemerella Aurivillii (Bengtsson)
Ephemeroptera	Ephemerellidae	Ephemerella Dorothea (Needham)
Ephemeroptera	Ephemerellidae	Ephemerella Invaria (Walker)
Ephemeroptera	Ephemerellidae	Ephemerella Sp.
Ephemeroptera	Ephemerellidae	Ephemerella Subvaria (Mcdunnough
Ephemeroptera	Ephemerellidae	Eurylophella (Bicolor Grp.)
Ephemeroptera	Ephemerellidae	Eurylophella Lutulenta (Clemens)
Ephemeroptera	Ephemerellidae	Eurylophella sp.
Ephemeroptera	Ephemerellidae	Serratella (Serrata Grp.)
Ephemeroptera	Ephemerellidae	Serratella Deficiens (Morgan)
Ephemeroptera	Ephemerellidae	Serratella Sp.
Ephemeroptera	Ephimeridae	Ephemera Guttulata (Pictet)
Ephemeroptera	Ephimeridae	Ephemera Sp.
Ephemeroptera	Ephimeridae	Hexagenia Limbata (Serville)
Ephemeroptera	Ephimeridae	Hexagenia Sp.
Ephemeroptera	Heptageniidae	Heptagenia Sp.
Ephemeroptera	Heptageniidae	Rhithrogena Pellucida (Daggy)
Ephemeroptera	Heptageniidae	Stenacron Gildersleevei (Traver)
Ephemeroptera	Hepttageniidae	Stenacron Sp.
Ephemeroptera	Heptageniidae	Stenonema Bednariki (Mccafferty
Ephemeroptera	Heptageniidae	Stenonema Femoratum (Say)
Ephemeroptera	Heptageniidae	Stenonema Mediopunctatum (Mcdunnnough)
Ephemeroptera	Heptageniidae	Stenonema Pulchellum (Walsh)
Ephemeroptera	Heptageniidae	Stenonema Terminatum (Walsh)

Ephemeroptera	Heptageniidae	Stenonema Vicarium (Walker)
Ephemeroptera	Isonychiidae	Isonychia Sp.
Ephemeroptera	Leptophlebiidae	
Ephemeroptera	Leptophlebiidae	Choroterpes Basalis (Banks)
Ephemeroptera	Leptophlebiidae	Choroterpes Sp.
Ephemeroptera	Leptophlebiidae	Leptophlebia Cupida (Say)
Ephemeroptera	Leptophlebiidae	Leptophlebia Sp.
Ephemeroptera	Leptophlebiidae	Paraleptophlebia Moerens (Mcdunnough)
Ephemeropter	Potamanthidae	Anthopotamus sp.
Ephemeroptera	Tricorythidae	Tricorythodes Sp.
Gordiida		
Hemiptera	Belostomatidae	Belostoma Sp.
Hemiptera	Corixidae	
Hemiptera	Corixidae	Hesperocorixa Nitida (Fieber)
Hemiptera	Corixidae	Hesperocorixa Sp.
Hemiptera	Corixidae	Sigara Mathesoni (HungerFord)
Hemiptera	Corixidae	Gerris Canaliculatus (Say)
Hemiptera	Gerridae	Gerris Canaliculatus (Say)
Hemiptera	Gerridae	Gerris Remigis (Say)
Hemiptera	Gerridae	Gerris Sp.
Hemiptera	Gerridae	Metrobates Hesperius (Uhler)
Hemiptera	Gerridae	Rheumatobates Sp.
Hemiptera	Hebridae	Hebrus Sp.
Hemiptera	Notonectidae	Buenoa Sp.
Hemiptera	Notonectidae	Notonecta Undulata (Say)
Hemiptera	Pleidae	Neoplea Striola (Fieber)
Hemiptera	Salidae	
Hemiptera	Veliidae	
Hemiptera	Veliidae	Microvelia Americana (Uhler)
Hemiptera	Veliidae	Rhagovelia Sp.
Hirudinea[2]		
Hirudinea[2]	Branchiobdellidae[1]	
Hydracarina	Acari	
Isopoda	Asellidae	Caecidotea Sp.
Isopoda	Asellidae	Lirceus Sp.
Lepidoptera	Pyralidae	Petrophila Sp.
Lymnophila	Ancylidae	Ferrissia Fragilis (Tryon)
Lymnophila	Ancylidae	Ferrissia Sp.
Lymnophila	Lymnaeidae	
Lymnophila	Lymnaeidae	Lymnaea (Stagnicola) Sp.

Lymnophila	Physidae	
Lymnophila	Physidae	Physa (Physella) Sp.
Lymnophila	Planorbidae	
Megagastropoda	Pleuroceridae	Elimia Potosiensis Plebeius (Gould)
Megagastropoda	Pleuroceridae	Elimia Potosiensis Potosiensis (Lea)
Megagastropoda	Pleuroceridae	Elimia Sp.
Megagastropoda	Viviparidae	
Megaloptera	Corydalidae	Chauliodes Sp.
Megaloptera	Corydalidae	Corydalus Cornutus (Linnaeus)
Megaloptera	Corydalidae	Nigronia Serricornus (Say)
Megaloptera	Sialidae	Sialis Sp.
Nemata[3]		
Neuroptera	Sisyridae	Sisyra Sp.
Odonata	Aeshnidae	
Odonata	Aeshnidae	Anax Junius (Drury)
Odonata	Aeshinidae	Basiaeschna Janata (Say)
Odonata	Aeshinidae	Boyeria Vinosa (Say)
Odonata	Calopterygidae	Calopteryx Sp.
Odonata	Calopterygidae	Hetaerina Americana (Fabricius)
Odonata	Coenagrionidae	
Odonata	Coenagrionidae	Argia Moesta (Gagen)
Odonata	Gomphidae	Ophigomphus westfalli (Cook & Daigle)
Odonata	Gomphidae	Erpetogomphus Designatus (Hagen)
Odonata	Gomphidae	Stylogomphus Albistylus (Hagen)
Odonata	Lestidae	Lestes Dryas (Kirby)
Odonata	Libellulidae	
Odonata	Libellulidae	Erythemis Simplicicollis (Say)
Odonata	Libellulidae	Erythrodiplax Sp.
Odonata	Libellulidae	Libellula Lydia (Drury)
Odonata	Libellulidae	Pachydiplax Longipennis (Burmeister)
Odonata	Libellulidae	Tramea Carolina (Linnaeus)
Odonata	Macromiidae	Didymops Sp.
Odonata	Petaluridae	Tachopteryx thoreyi (Hagen)
Oligocheata		
Plecoptera	Capniidae	
Plecoptera	Capniidae	Allocapnia pygmaea
Plecoptera	Capniidae	Paracapnia Sp.
Plecoptera	Chloroperlidae	Haploperla Brevis (Banks)
Plecoptera	Leuctridae	
Plecoptera	Leuctridae	Leuctra Sp.

Plecoptera	Nemouridae	
Plecoptera	Nemouridae	Nemoura Sp.
Plecoptera	Perlidae	
Plecoptera	Perlidae	Acroneruia Internata (Walker)
Plecoptera	Perlidae	Acroneruia Sp.
Plecoptera	Perlidae	Agnetia Capitata (Pictet)
Plecoptera	Perlidae	Neoperla Sp.
Plecoptera	Perlidae	Paragnetina Media (Walker)
Plecoptera	Perlidae	Paragnetina Sp.
Plecoptera	Perlidae	Perlesta Sp.
Plecoptera	Perlidae	Perlinella Drymo (Newman)
Plecoptera	Perlidae	Perlinella Sp.
Plecoptera	Perlodidae	
Plecoptera	Perlodidae	Clioperla Clio (Newman)
Plecoptera	Perlodidae	Hydroperla Crosbyi (Needham & Classen)
Plecoptera	Perlodidae	Hydorperla Sp.
Plecoptera	Perlodidae	Hydroperla Sp.
Plecoptera	Perlodidae	Isoperla Bilineata (Say)
Plecoptera	Perlodidae	Isoperla Mohri (Frison)
Plecoptera	Pteronarcyidae	Pteronarcys Pictetii (Hagen)
Plecoptera	Pteronarcyidae	Pteronarcys Sp.
Plecoptera	Taeniopterygidae	Strophopteryx Fasciata (Brumeister)
Plecoptera	Taeniopterygidae	Strophopteryx Sp.
Plecoptera	Taeniopterygidae	Taeniopteryx Metequi (Ricker & Ross)
Plecoptera	Unknown	Unidentified Plecoptera
Trichoptera	Brachycentridae	Brachycentrus Americanus (Banks)
Trichoptera	Brachycentridae	Brachycentrus Sp.
Trichoptera	Brachycentridae	Micrasema Rusticum (Hagen)
Trichoptera	Glossosomatidae	
Trichoptera	Glossosomatidae	Agapetus Sp.
Trichoptera	Glossosomatidae	Glossosoma Intermedium (Klapalek)
Trichoptera	Glossosomatidae	Glossosoma Sp.
Trichoptera	Glossosomatidae	Protoptila Lega (ross)
Trichoptera	Helicopsychidae	Helocopsyche Borealis (Hagen)
Trichoptera	Hydropsychidae	
Trichoptera	Hydropsychidae	Ceratopsyche (Morosa Grp.)
Trichoptera	Hydropsychidae	Ceratopsyche Morosa (Hagen)
Trichoptera	Hydropsychidae	Ceratopsyche Piatrix (Ross)
Trichoptera	Hydropsychidae	Ceratopsyche Slossonae (Banks)
Trichoptera	Hydropsychidae	Cheumatopsyche Sp.

Trichoptera	Hydropsychidae	Hydropsyche Betteni (Ross)
Trichoptera	Hydropsychidae	Hydropsyche Cuanis (Ross)
Trichoptera	Hydropsychidae	Hydropsyche piatrix
Trichoptera	Hydropsychidae	Hydropsyche Simulans/incommada
Trichoptera	Hydropsychidae	Macrostemum Carolina (Banks)
Trichoptera	Hydropsychidae	Potamyia Flava (Hagen)
Trichoptera	Hydroptilidae	
Trichoptera	Hydroptilidae	Agraylea Multipunctata (Curtis)
Trichoptera	Hydroptilidae	Agraylea Sp.
Trichoptera	Hydroptilidae	Hydroptila Sp.
Trichoptera	Hydroptilidae	Ochrotrichia Sp.
Trichoptera	Hydroptilidae	Oxyethira Sp.
Trichoptera	Lepidostomatidae	
Trichoptera	Lepidostomatidae	Lepidostoma Sp.
Trichoptera	Leptoceridae	
Trichoptera	Leptoceridae	Oecetis Inconspicua (Walker)
Trichoptera	Leptoceridae	Oecitis Sp.
Trichoptera	Leptoceridae	Setodes Sp.
Trichoptera	Limnephilidae	
Trichoptera	Limnephilidae	Limnephilus Sp.
Trichoptera	Limnephilidae	Neophylax Fuscus (Banks)
Trichoptera	Limnephilidae	Pseudostenophylax Uniformis (Betten)
Trichoptera	Limnephilidae	Pycnopsyche (Lepida Gp)
Trichoptera	Limnephilidae	Pycnopsyche Sp.
Trichoptera	Philopotamidae	Chimarra Aterrima (Hagen)
Trichoptera	Philopotamidae	Chimarra Obscura (Walker)
Trichoptera	Philopotamidae	Chimarra Sp.
Trichoptera	Philopotamidae	Wormaldia Moesta (Banks)
Trichoptera	Phryganeidae	
Trichoptera	Polycentropodidae	
Trichoptera	Polycentropodidae	Neureclipsis Sp.
Trichoptera	Polycentropodidae	Paranyctiophylax Sp.
Trichoptera	Polycentropodidae	Phylocentropus Sp.
Trichoptera	Psychomyiidae	Psychomyia Flavida (Hagen)
Trichoptera	Rhyacophilidae	
Trichoptera	Rhyacophilidae	Rhyacophila Sp.
Tricladida	Planariidae	
Tricladida	Planariidae	Dugesia Sp.
Unionoida	Unionidae	Amblema Plicata Plicata (Say)
Unionoida	Unionidae	Elliptio Dilata (Rafinesque)

Unionoida	**Unionidae**	**Fusconaia Ozarkensis (Call)**
Unionoida	**Unionidae**	**Lampsilis Reeviana Brevicula (call)**
Unionoida	**Unionidae**	**Lampsilis Teres Teres (Rafinesque)**
Unionoida	**Unionidae**	**Ptychobranchus Occidentalis (Conrad)**
Veneroida	**Corbiculidae**	**Corbicula Fluminea (Muller)**
Veneroida	**Corbiculidae**	**Corbicula Sp.**
Veneroida	**Sphaeriidae**	

[1] Subclass, [2] Class, [3] Phylum

Table Bc08 (1 of 10). Species of conservation concern within the Current River Watershed (MDC Ozark Regional Fish Community Collection and Sport Fish Sample Files; Pflieger 1997; Wu et al. 1997; MDC 1998a; MDC 1998b; MDC 1998c; MDC 1998d; MoRAP 2000a; MoRAP 2000b; MoRAP 2000c; MNHP 2001a; MNHP 2001b).

Year=Last year observed in watershed. E=Endangered

F=Federal Status

M= Missouri Status T=Threatened

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

SRrank

S1=Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. (typically 5 or fewer occurrences or very few remaining individuals)

S2=Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. (6 to 20 occurrences or few remaining individuals or acres)

S3=Rare and uncommon in the state. (21 to 100 occurrences)

S4=Widespread, abundant, and apparently secure in state, with many occurrences, but the species is of long-term concern. (usually more than 100 occurrences)

S5=Demonstrably widespread, abundant, and secure in the state, and essentially ineradicable under present conditions.

SU=Unrankable: Possibly in peril in the state, but status uncertain; need more information.

SE=Exotic: An exotic established in the state; may be native in nearby regions.

SH=Historical: Element occurred historically in the state (with expectation that it may be rediscovered). Perhaps having not been verified in the past 20 years, and suspected to be still extant.

SX=Extirpated: Element is believed to be extirpated from the state.

S?=Unranked: Species is not yet ranked in the state.

Qualifier:

? =Inexact or uncertain: for numeric ranks, denotes inexactness. (The ? qualifies the character immediately preceding it in Srank)

GRank

G1=Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction. (typically 5 or fewer occurrences or very few remaining individuals or acres)

G2=Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction throughout its range. (6 to 20 occurrences or few remaining individuals or acres)

G3=Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range. (21 to 100 occurrences)

G4=Widespread, abundant, and apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery. Thus, the element is of long-term concern. (usually more than 100 occurrences)

G5=Demonstrably Widespread, abundant, and secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Subrank:

T=Taxonomic subdivision: rank applies to subspecies or variety.

Qualifier:

? =Inexact: denotes inexact numeric rank.

Q=Questionable taxonomy: taxonomic status is questionable; numeric rank may change with taxonomy.

Common Name	***Scientific Name***	**S RANK**	**G RANK**	**M**	**F**	**Year**
Amphibians						
Four-toed Salamander	***Hemidactylium scutatum***	**S4**	**G5**			**1997**
Mole Salamander	***Ambystoma talpoideum***	**S2**	**G5**			**2000**
Ozark Hellbender	***Cryptobranchus alleganiensis bishopi***	**S1**	**G4T3**			**1992**
Ringed Salamander	***Ambystoma annulatum***	**S3**	**G4**			**1984**
Birds						
Cooper's Hawk	***Accipiter cooperii***	**S3**	**G5**			**1990**
Osprey	***Pandion haliaetus***	**SX**	**G5**			**1986**
Pied-billed Grebe	***Podilymbus podiceps***	**S2**	**G5**			**1989**
Red-cockaded Woodpecker	***Picoides borealis***	**SX**	**G3**		**E**	**1946**
Red-shouldered Hawk	***Buteo lineatus***	**S3**	**G5**			**1986**
Sharp-shinned Hawk	***Accipiter striatus***	**S2**	**G5**			**1986**
Swainson's Warbler	***Limnothlypis swainsonii***	**S1**	**G4**	**E**		**2000**
Fish						
Alligator Gar	***Lepisosteus spatula***	**SX**	**G3G4**			**1978**
American Brook Lamprey	***Lampetra appendix***	**S2**	**G4**			**1962**
Blue Sucker	***Cycleptus elongatus***	**S3**	**G3G4**			**1959**
Checkered Madtom	***Noturus flavater***	**S3S4**	**G3G4**			**1994**
Flier	***Centrarchus macropterus***	**S3**	**G5**			**1966**
Harlequin Darter	***Etheostoma histrio***	**S2**	**G5**	**E**		**1998**
Highfin Carpsucker	***Carpiodes velifer***	**S2**	**G4G5**			**1966**
Lake Chubsucker	***Erimyzon sucetta***	**S2**	**G5**			**1930**
Mississippi Silvery Minnow	***Hybognathus nuchalis***	**S3S4**	**G5**			**1998**
Mooneye	***Hiodon tergisus***	**S3**	**G5**			
Ozark Shiner	***Notropis ozarcanus***	**S2**	**G3**			**1992**
Pallid Shiner	***Notropis amnis***	**SX**	**G4**			**1941**
Pugnose Minnow	***Opsopoeodus emiliae***	**S4**	**G5**			**1978**

Southern Cavefish	***Typhlichthys subterraneus***	**S2S3**	**G4**			**1993**
Stargazing Darter	***Percina uranidea***	**S2**	**G3**			**1994**
Starhead Topminnow	***Fundulus dispar***	**S2**	**G4**			**1963**
Taillight Shiner	***Notropis maculatus***	**S1**	**G5**	**E**		**1978**
Mammals						
Golden Mouse	***Ochrotomys nuttalli***	**S3?**	**G5**			**1989**
Gray Bat	***Myotis grisescens***	**S3**	**G3**	**E**	**E**	**2000**
Indiana Bat	***Myotis sodalis***	**S1**	**G2**	**E**	**E**	**2001**
Northern Myotis	***Myotis septentrionalis***	**S3**	**G4**			**1999**
Plains Spotted Skunk	***Spilogale putorius interrupta***	**S1**	**G5T4**	**E**		**1982**
Swamp Rabbit	***Sylvilagus aquaticus***	**S2?**	**G5**			**2001**
Reptiles						
Alligator Snapping Turtle	***Macroclemys temminckii***	**S2**	**G3G4**			**1993**
Eastern Collared Lizard	***Crotaphytus collaris collaris***	**S4**	**G5**			**1982**
Western Mud Snake	***Farancia abacura reinwardtii***	**S2**	**G5T5**			**1985**
Crayfish						
Cajun Dwarf Crayfish	***Cambarellus puer***	**S3?**	**G4G5**			**1987**
Digger Crayfish	***Fallicambarus fodiens***	**S2S3**	**G5**			**1988**
Salem Cave Crayfish	***Cambarus hubrichti***	**S3**	**G2**			**1993**
Shield Crayfish	***Faxonella clypeata***	**S2S3**	**G5**			**1988**
Vernal crayfish	***Procambarus viaeviridis***	**S3?**	**G5**			**1988**
Insects						
A Net-spinning Caddisfly	***Hydropsyche piatrix***	**S4**	**G?**			**1988**
A Leaf Beetle	***Xenochalepus potomaca***	**SU**	**G?**			**1994**
A Winter Stonefly	***Allocapnia pygmaea***	**S3**	**G5**			**1987**
Comet Darner	***Anax longipipes***	**S3**	**G5**			**?**
Gray Petaltail	***Tachopteryx thoreyi***	**S3**	**G4**			**2000**
Hoosier Grasshopper	***Paroxya hoosieri***	**S1**	**G5**			**2000**
Westfall's Snaketail	***Ophiogomphus westfalli***	**S3**	**G3**			**2000**
Mussels						
Bankclimber	***Plectomerus dombeyanus***	**S3**	**G4**			**1979**
Black Sandshell	***Ligumia recta***	**S1S2**	**G5**			**1998**
Curtis Pearlymussel	***Epioblasma florentina curtisii***	**S1**	**G1T1**	**E**	**E**	**1993**
Ebonyshell	***Fusconaia ebena***	**S1?**	**G4G5**	**E**		**1979**
Elephantear	***Elliptio crassidens***	**S1**	**G5**	**E**		**1980**
Ouachita Kidneyshell	***Ptychobranchus occidentalis***	**S2S3**	**G3G4**			**1998**
Pink Mucket	***Lampsilis abrupta***	**S2**	**G2**	**E**	**E**	**1979**
Purple Lilliput	***Toxolasma lividus***	**S2**	**G2**			**1998**
Snuffbox	***Epioblasma triquetra***	**S1**	**G3**	**E**		**1984**
Western Fanshell	***Cyprogenia aberti***	**S1S2**	**G2**			**1998**
Snails						
Rough Hornsnail	***Pleurocera alveare***	**S1S3**	**G3G4**			
Non-vascular bryophytes						
A Liverwort	***Aneura pinguis***	**SU**	**G5**			**1990**

A Liverwort	*Metzgeria furcata*	S?	G5			1990
A Liverwort	*Nowellia curvifolia*	S?	G5			1990
A Liverwort	*Riccia stenophylla*	SU	G3G5			1999
A Liverwort	*Riccardia multifida*	S1	G5			1990
A Moss	*Barbula convoluta var. convoluta*	S?	G5T?			1959
A Moss	*Bryum cyclophyllum*	S?	G4G5			1962
A Moss	*Calliergonella cuspidata*	S?	G5			1986
A Moss	*Dichelyma capillaceum*	S1	G5			1992
A Moss	*Forsstroemia producta*	S1	G5?			1962
A Moss	*Grimmia olneyi*	S?	G3G5			1973
A Moss	*Hypnum cupressiforme var. Filiforme*	S1	G5T?			1985
A Moss	*Leskea australis*	S1	G4			1992
A Moss	*Leskea polycarpa var. polycarpa*	S?	G4G5T?			1992
A Moss	*Mnium thomsonii*	S?	G5			1961
A Moss	*Myurella sibirica*	S?	G4?			1961
Plants-dicotyledon						
A Bluet	*Hedyotis boscii*	S1	G5			1949
A Corydalis	*Corydalis micrantha ssp. australis*	S2	G5T5?			1993
A False Dragonhead	*Physostegia intermedia*	S1	G5			1937
A False Loosestrife	*Ludwigia microcarpa*	S2	G5			1992
A Thoroughwort	*Eupatorium semiserratum*	S1S2	G5			1955
A Thoroughwort	*Eupatorium rotundifolium var. Scabridum*	S1?	G5T?			1993
A Water Willow	*Justicia ovata*	S2	G5			1994
Barren Strawberry	*Waldsteinia fragarioides ssp. fragarioides*	S2	G5T5			1988
Black Snakeroot	*Sanicula smallii*	SH	G5			1900
Blunt Mountain Mint	*Pycnanthemum muticum*	S2	G5			1994
Carolina Phlox	*Phlox carolina ssp. angusta*	SH	G5?T?			1897
Carolina Phlox	*Phlox carolina ssp. carolina*	S1	G5?T3T5Q			1987
Coontail	*Ceratophyllum echinatum*	S1?	G4?			1986
Corkwood	*Leitneria floridana*	S2	G3			2000
Elliott Sida	*Sida elliottii*	S1	G4G5			1935
False Bugbane	*Trautvetteria caroliniensis*	S2	G5			1988
Featherfoil	*Hottonia inflata*	S2	G4			1996
Finger Dog-shade	*Cynosciadium digitatum*	S2	G4G5			1995
Fleabane	*Conyza canadensis var. Pusilla*	S1S2	G5T5			1946
Forked Aster	*Aster furcatus*	S2	G3			1990
Juniper-leaf	*Polypremum procumbens*	S2	G5			1994
Large-leaved Phlox	*Phlox amplifolia*	S3?	G3G5			1996
Marsh Bellflower	*Campanula aparinoides*	S1	G5			1949
Marsh St John's Wort	*Triadenum tubulosum*	S1	G4?			1995
Marsh Blue Violet	*Viola cucullata*	S3	G4G5			1995

Miterwort	*Mitreola petiolata*	S1	G5			1987
Nuttall's Oak	*Quercus texana*	S2	G4G5			1993
Ovate Fiddleleaf	*Hydrolea ovata*	S2	G5			1995
Parsley Haw	*Crataegus marshallii*	S1	G5			1993
Pinnate Dogshade	*Limnosciadium pinnatum*	S1	G5?			1951
Pondberry	*Lindera melissifolium*	S1	G2	E	E	2000
Purple False Foxglove	*Agalinis purpurea*	S2	G5			1993
Running Buffalo Clover	*Trifolium stoloniferum*	S1	G3	E	E	1997
Slender Bladderwort	*Utricularia subulata*	S1	G5			1995
Small Sundrops	*Oenothera perennis*	S1	G5			1951
Southern Monkshood	*Aconitum uncinatum*	S1	G4			2000
Strawberry Bush	*Euonymus americanus*	S2	G5			1994
Sullivantia	*Sullivantia sullivantii*	S2	G4			1965
Tall Larkspur	*Delphinium exaltatum*	S2	G3			1998
Tradescant Aster	*Aster dumosus var. Strictior*	S2	G5T4			1969
Water Oak	*Quercus nigra*	S2	G5			1994
Water Hyssop	*Mecardonia acuminata*	S1	G5			1995
Wild Sweet William	*Phlox maculata ssp. pyramidalis*	S2	G5T4T5			2001
Wood Anemone	*Anemone quinquefolia*	S1	G5			1988
Yellow False Mallow	*Malvastrum hispidum*	S3	G3G5			1934
A Brome	*Bromus nottowayanus*	S2S3	G3G4			2000
A Brome	*Bromus latiglumis*	S2S3	G5			2000
A Bulrush	*Scirpus divaricatus*	SH	G5			1935
A Panic Grass	*Panicum leibergii*	SU	G5			1993
A Sedge	*Carex vesicaria var. Monile*	S2?	G5T4			1996
A Sedge	*Carex abscondita*	S1	G4G5			1989
Plants-monocotyledon						
A Sedge	*Carex atlantica ssp. atlantica*	S1	G5T4			1981
A Sedge	*Carex sterilis*	S1	G4			1982
An Umbrella Sedge	*Cyperus flavicomus*	S1	G5			1994
Bristly Sedge	*Carex comosa*	S2	G5			1990
Broad Waterweed	*Elodea canadensis*	SU	G5			1990
Broadwing Sedge	*Carex alata*	S2S3	G5			1996
Cherokee Sedge	*Carex cherokeensis*	S2	G4G5			1999
Columbia Water-meal	*Wolffia columbiana*	SU	G5			1936
Cranefly Orchid	*Tipularia discolor*	S1	G4G5			1998
Dotted Water-meal	*Wolffia punctata*	SU	G5			1936
Eastern Blue-eyed Grass	*Sisyrinchium atlanticum*	S2	G5			1999
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	SH	G2	E	T	1951
Epiphytic Sedge	*Carex decomposita*	S3	G3			1996
Floating Foxtail Grass	*Alopecurus aequalis*	S2	G5			1980
Gaping Panic Grass	*Panicum hians*	S3	G5			1997
Green Adder's Mouth	*Malaxis unifolia*	S3	G5			1996

Green Wood Orchid	***Platanthera clavellata***	**S2**	**G5**			**1995**
Hairy-fruited Sedge	***Carex trichocarpa***	**S1**	**G4**			**1986**
Interior Wild Rice	***Zizania palustris var. Interior***	**SH**	**G4G5T4T5**			**1954**
Lance-like Spike Rush	***Eleocharis lanceolata***	**S1**	**G4G5**			**1975**
Loesel's Twayblade	***Liparis loeselii***	**S2**	**G5**			**1987**
Northern Rein Orchid	***Platanthera flava var. herbiola***	**S2**	**G4T4Q**			**1986**
Oferhollow Reed Grass	***Calamagrostis porteri ssp. insperata***	**S3**	**G4T3**			**1990**
Pale Manna Grass	***Torreyochloa pallida***	**S1**	**G5?**			**1988**
Plukenet's Cyperus	***Cyperus plukenetii***	**S1**	**G5**			**1899**
Prairie Iris	***Nemastylis geminiflora***	**S2**	**G4**			**1994**
Sharp-scale Sedge	***Carex oxylepis***	**S2**	**G5?**			**1995**
Sharp-scaled Manna Grass	***Glyceria acutiflora***	**S3**	**G5**			**1996**
Showy Lady-slipper	***Cypripedium reginae***	**S2S3**	**G4**			**1993**
Slender Spike Grass	***Chasmanthium laxum ssp. laxum***	**S1**	**G5T?**			**1997**
Snake-mouth Orchid	***Pogonia ophioglossoides***	**S1**	**G5**			**1991**
Spotted Pondweed	***Potamogeton pulcher***	**S2S3**	**G5**			**1997**
Spreading Sedge	***Carex laxiculmis***	**S2**	**G5**			**1993**
Star Duckweed	***Lemna trisulca***	**S2**	**G5**			**1987**
Straw Sedge	***Carex straminea***	**S1**	**G5**			**1996**
Tussock Sedge	***Carex stricta***	**S2?**	**G5**			**1994**
Umbrella Sedge	***Cyperus retroflexus***	**S1**	**G5**			**1997**
Water Canna	***Thalia dealbata***	**S2**	**G4**			**1997**
Weak Rush	***Juncus debilis***	**S1**	**G5**			**1986**
White-edge Sedge	***Carex debilis var. debilis***	**S1**	**G5T5**			**1951**
Wild Leek	***Allium burdickii***	**S2**	**G4G5**			**1944**
Yellow-eyed Grass	***Xyris torta***	**S1**	**G5**			**1987**
Yellow-fringed Orchid	***Platanthera ciliaris***	**S1**	**G5**			**1951**
Ferns and Fern Allies						
Few-lobed Grape Fern	***Botrychium biternatum***	**S1**	**G5**			**1986**
Goldie's Fern	***Dryopteris goldiana***	**S2**	**G4**			**1990**
Log Fern	***Dryopteris celsa***	**S1**	**G4**			**1987**
Engelmann's Quillwort	***Isoetes engelmannii var. engelmannii***	**S1?**	**G4T?**			**1996**
Missouri Cliffbrake	***Pellaea glabella var. missouriensis***	**S1S2**	**G5T1T2**			**1920**
Netted Chain Fern	***Woodwardia areolata***	**S2**	**G5**			**1999**

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

MANAGEMENT PROBLEMS AND OPPORTUNITIES

The management goals, objectives, and strategies for the Current River Watershed were developed using information collected from the Current River Watershed Inventory and Assessment (WIA) and direction provided by the Ozark Regional Management Guidelines (1998), Missouri Department of Conservation (MDC) Strategic Plan, and the Fisheries Division Five Year Strategic Plan. Objectives and strategies were written for instream and riparian habitat, water quality, aquatic biota, recreational use, and hydrography. All goals are of equal importance, with objectives listed in prioritized order whenever possible. This plan includes only those activities and results that can reasonably be expected to be achieved or influenced during the next 25 years. Completion of these objectives will depend upon their status in overall regional and division priorities and the availability of human resources and funds.

GOAL I: PROTECT AND IMPROVE RIPARIAN AND AQUATIC HABITATS IN THE CURRENT RIVER WATERSHED.

Status: Many streams in various portions of the watershed lack sufficient riparian corridors. Streams within the Little Black River Hydrologic Unit have the least percentage of forested riparian corridors. In addition, channelization has significantly altered stream habitats primarily in the Little Black River Hydrologic Unit. Other activities which can potentially cause habitat degradation without adequate attention include improper sand and gravel removal methods and improper bridge design and maintenance.

Objective 1.1: With the assistance of willing landowners, over a 25-year period, increase by 25% the proportion of streams with a sufficient forested corridor as defined in NRCS (2000).

Strategy: Referencing the riparian corridor enhancement potential ranking for eleven digit units of the Current River Watershed presented in Figure Mp01 (developed through evaluations of riparian forest cover absence, losing streams, unit size, and presence of sensitive species), direct appropriate riparian corridor improvement efforts towards the following ranked drainage units: High= Little Black River; Medium= Upper Current River, Current River-Buffalo Creek, Current River-Sinking Creek, Lower Current River; Low= Middle Current River, Spring Valley, Pike Creek.

1. Using satellite imagery, aerial photography, aerial stream survey documentation, and/or field investigations, document the conditions of riparian corridors and stream banks once every 10 years. Future projects such as the Missouri Resource Assessment Partnership Land Cover Classification should be encouraged in order to ensure that adequate data is available to allow efficient analysis of riparian corridor conditions over time.

2. Ensure all MDC Areas represent examples of proper riparian corridor stewardship by following established best management practices for riparian restoration/protection.

3. In cooperation with regional Private Land Services Division personnel, provide appropriate

agencies such as Natural Resources Conservation Service (NRCS) and Soil and Water Conservation Districts (SWCDs) as well as willing agricultural-oriented businesses such as farm centers, agricultural chemical dealers, etc. with free brochures dealing with riparian corridor issues in order to facilitate increased awareness and dissemination of this information to landowners.

4. Facilitate riparian corridor restoration/protection by willing landowners in accordance with applicable guidelines through the use of available funding and/or technical assistance.

Objective 1.2: Limit the negative impacts of sand and gravel removal within the watershed.

Strategy: Education of sand and gravel operators regarding limiting the potential negative impacts associated with sand and gravel removal, dynamic documentation of permitted sand and gravel removal sites, assisting with continued research regarding gravel removal, and encouragement of the efficient enforcement of violations associated with sand and gravel removal will be important in limiting the potential negative impacts of gravel removal.

1. Work with MDC Science Division, Outreach and Education Division, and appropriate agencies such as MDNR in the development of an educational video illustrating proper and improper sand and gravel removal methods, proper site selection, and the consequences of improper sand and gravel removal operations.

2. Work with gravel removal operators as well as willing landowners to create a geographic information system (GIS) database of appropriate potential sand and gravel removal sites (to be updated as needed).

3. Work with appropriate agencies to develop a (GIS) database (to be updated annually) of permitted sand and gravel removal sites.

4. Continue to assist appropriate state and federal agencies in the enforcement of existing water quality laws in regards to sand and gravel removal

5. Assist with additional research efforts regarding the effects of instream sand and gravel removal in order to develop measures that adequately protect aquatic resources.

6. Work with stakeholder groups such as landowners and governmental and non-governmental organizations to ensure appropriate gravel mining regulations exist to prevent damage to stream resources as well as property within the watershed due to improper gravel removal.

GOAL II: PROTECT SURFACE AND GROUND WATER QUALITY IN THE CURRENT RIVER WATERSHED.

Status: Overall water quality within the watershed appears to be relatively good based on the limited scope of analysis provided in this document. Within the watershed (excluding the Jacks Fork), there are no streams included in the 1998 303d list. However, two issues that may require further monitoring/investigation include elevated lead concentrations at various sites within the watershed as noted in a 1995 NPS commissioned water quality study and past indications of poor water quality at some sites within the Little Black River Hydrologic Unit. Other items which always have the potential to cause water quality problems in this watershed as in any other include large numbers of livestock in riparian zones for extended periods of time, private septic system failure, increased nutrients from municipal sewage treatment facilities, improper sand and gravel removal and poor land use practices such as indiscriminate land clearing. These can result in periodic high fecal coliform levels, nutrient loading, and/or increased sediment and gravel deposition.

Objective 1.1: Ensure that watershed streams meet or exceed state standards for water quality.

Strategy: Due to the connection between the surface water and ground water systems in the watershed, protection of surface waters, both permanent and intermittent, can greatly contribute to the enhancement of ground water quality. MDC lands should be managed to provide good examples of water quality protection and form the basis for MDC efforts to promote water quality protection on both public and private land. Education of the citizenry and land owners on water quality issues and land stewardship is the best hope for improving water quality. Protecting riparian corridors will help to reduce and filter surface runoff as well as provide stream bank and channel stability. Ensuring that additional water quality monitoring (including bio-monitoring), particularly in those areas that have exhibited some water quality concerns in the recent past, is conducted in order to better delineate the degree of and solution to those problems will also be important. Encouragement of appropriate agencies to enforce existing water quality laws will also be required to obtain satisfactory water quality.

1. In cooperation with field personnel from all divisions, ensure management activities on public land, as well as MDC sponsored projects on private land, follow best management practices that protect water quality.

2. Encourage the establishment of a long-term monitoring project by the MDC Science Division in order to determine the impacts of MDC land management activities on water quality.

3. Through media contacts, personal contacts, literature development, and speaking engagements to groups such as area Stream Teams and land owners, inform the public of water quality issues and problems (e.g. karst topography, excessive siltation, animal waste runoff, gravel dredging, septic system failure etc.) and best management practices to address these problems.

4. In cooperation with regional private lands services personnel, encourage limiting livestock access in riparian areas and through education and/or incentive programs for private landowners.

5. Encourage Stream Team Monitoring of bacteria levels on the Little Black River at Mudpuppy Conservation Area and the Current River at T.L. Wright Memorial Access per MDC (1998d).

6. Ensure that sites exhibiting water quality problems in the recent past continue to be monitored and solutions to any current problems which may still exist, are developed.

a. Encourage the continued monitoring by the National Park Service of sites exhibiting elevated concentrations of dissolved lead between 1973 and 1995 as noted in NPS (1995)

b. Cooperate with MDC Science Division, MDNR, NRCS and the USGS as well as local citizens groups such as Stream Teams to develop a water quality study to include those areas in the Little Black Hydrologic Unit which have been noted to have experienced water quality problems in the past as well as areas in the unit which lack baseline data. The study should as a minimum include those parameters which have been known to exceed state water quality standards e.g. dissolved oxygen, pH, and fecal coliform.

7. Encourage and assist, as needed, with additional dye tracing studies within the watershed in order to further determine intrawatershed and interwatershed ground water movement as well as recharge area

of selected springs within the watershed with an emphasis on publicly owned spring outlets and, specifically, spring outlets on lands managed by the MDC.

8. Encourage and assist with enforcement of existing water quality laws by reviewing 404 permits, cooperating with other state and federal agencies to investigate pollution and fish kill reports, collecting water quality related data, and recommending measures to protect aquatic communities.

9. Encourage the incorporation of water quality data into GIS by appropriate MDC and MDNR staff in order to facilitate effective data updating and analysis. This includes the creation of a 'Designated Use' data layer based on current Rule 10 CSR 20-7.031 of the Rules of Department of Natural Resources Division 20-Clean Water Commission Chapter 7-Water Quality, Tables G and H.

GOAL III: MAINTAIN THE ABUNDANCE, DIVERSITY, AND DISTRIBUTION OF AQUATIC BIOTA AT OR ABOVE CURRENT LEVELS WHILE IMPROVING THE QUALITY OF THE GAME FISHERY IN THE CURRENT RIVER WATERSHED.

Status: Since 1930, an assemblage of 124 fish species, 43 mussel species and subspecies, 25 species of snails, 5 crayfish species, and 300 taxa of benthic macro-invertebrates have been identified throughout the Current River Watershed. A total of 169 species and subspecies of conservation concern are known to occur in the watershed. This list includes 17 fish species, 10 species of mussels, 4 species of amphibians, 5 species of crayfish, 6 species of insects, and 1 snail species. The most prominent game fish species within the watershed include the brown trout, chain pickerel, grass pickerel, largemouth bass, rainbow trout, shadow bass, smallmouth bass, walleye, and warmouth. In addition, sucker species provide an alternative recreational opportunity. Invasive exotic aquatic species within the watershed include the Asian clam, the common carp.

Objective 1.1: Maintain the diversity, abundance, and distribution of native non-sport fish, and aquatic invertebrate communities at or above current levels.

Strategy: High priority should be placed on protecting species of conservation concern and unique aquatic community assemblages. Focusing enhancement and protective efforts on a few species can be effective in helping other species that share the same habitat. Detecting changes in aquatic community species composition can be accomplished by conducting routine surveys of fish and invertebrate communities. In cases where significant changes in diversity, abundance, and/or distribution are noted, efforts to determine factors for the changes should be determined through cooperation with MDC fisheries research as well as other appropriate agencies and institutions. Cooperation between state and federal natural resource agencies, private land owners, and, in some instances, citizen groups will be necessary to adequately address challenges to aquatic community health.

1. Assist with recovery efforts for species of conservation concern within the watershed.

2. Survey fish communities in the watershed every 10 years at historical sampling sites using standardized sampling techniques. Initial emphasis should be placed on historic sites known in the past to harbor "species of conservation concern" and sites within the Little Black River Hydrologic Unit. Establish additional sampling sites as necessary with high priority given to MDC areas. Incorporate data into GIS in order to facilitate documentation of changes in species diversity, abundance, and/or distribution.

3. Using GIS, document locations and identify unique fish assemblages associated with natural features and special habitats such as spring branches for inclusion in the Natural Heritage Database.

4. Develop a prioritized list of stream reaches on MDC areas needing instream habitat restoration using the following criteria: presence of listed species, extent of forested stream corridor, size of stream, land use, soils, presence of permanent water, presence of sport fish, natural features and critical habitat.

5. If appropriate, recommend research projects in cooperation with MDC Research Staff to investigate reasons for significant changes in faunal abundance and distribution. Recommend management changes if needed.

6. Coordinate with MDC Research Staff and other groups (i.e. National Park Service, University of Missouri, etc.) to develop a routine mussel survey schedule for the watershed.

7. Coordinate with MDC Research Staff and other groups (i.e. National Park Service, Missouri Department of Natural Resources, University of Missouri, etc.) to conduct a survey of benthic invertebrates on all fifth order and larger streams.

Objective 1.2: Maintain or improve populations of sport fish while maintaining a stable and diverse fish community.

Strategy: Proper management of game fish populations will depend on obtaining adequate surveys to determine the status of the fishery and angler attitudes as well as implementing habitat improvement projects, regulation changes, and fish stocking where needed.

1. Complete implementation of the Current River Walleye Management Plan as per Mayers (2000).

2. With approval from appropriate agencies (i.e. National Park Service, United States Army Corps of Engineers, United States Forest Service, etc.), implement instream habitat improvement projects in stream segments of heavy angler pressure which otherwise lack sufficient stream habitat with priority given to public areas.

3. Within the Current River Watershed, continue to assist with ongoing MDC efforts to comprehensively determine the extent of cold water resources in the state.

4. Maintain quality trout populations in the Special Trout Management Area (STMA) between Montauk State Park and Cedargrove, and a put-and-take Trout Management Area (TMA) between Cedargrove and Akers. Consider expanding the TMA from Akers to Pulltite.

5. Evaluate warmwater sportfish population of the Current River with emphasis on smallmouth bass and shadow bass.

Objective 1.3: Prevent detrimental impacts on native fauna of the Current River Watershed from invasive exotic aquatic species.

Strategy: Preventing the introduction of invasive exotic species into the state is the easiest way to prevent detrimental impacts to native fauna. Public education regarding the prevention of invasive exotic species introduction is the key to preventing the potentially ecologically and economically damaging effects of such introductions. Once a detrimental invasive exotic species becomes established, research will be needed to seek ways to contain or eliminate them.

1. Educate the public on the potentially damaging effects of 'bait bucket' introductions to lake and stream communities as well as through the development and use of flyers posted at accesses, newspaper articles, and the Internet.

2. Continue MDC Fisheries division participation in the Missouri Aquaculture Advisory Council (MAAC) and other organizations and advocate controlling the introduction of invasive exotic fauna into state waters.

3. Monitor for invasive exotic species (e.g. zebra mussel, Asian clams, etc.) and their potentially harmful effects. This can be performed during fish community surveys.

4. When invasive exotic species are found, participate in statewide efforts to eliminate before unacceptable levels are reached.

GOAL IV: INCREASE PUBLIC AWARENESS AND PROMOTE WISE USE OF AQUATIC RESOURCES IN THE CURRENT RIVER WATERSHED.

Status: Much of the recreational use within the watershed is associated with the Current River and specifically the Ozark National Scenic Riverways (ONSR). Recreational use estimates indicate that total annual visits to the ONSR averaged 1,546,299 between the years 1996 and 2000. The top three activities were angling, canoeing, and camping. Of these three activities, angling was the most prevalent; accounting for an estimated average of 148,983 visitors annually.

Objective 4.1: Ensure that up to date aquatic oriented recreational data is available to properly manage aquatic resources and their use.

Strategy: In addition to creel surveys conducted by MDC, encourage and assist appropriate agencies such as the National Park Service and United States Forest Service in the continued monitoring of aquatic oriented recreational activities within the watershed on a regular basis in order to provide data to be used for determining long term trends and problems which may need to be addressed through adjustments in management.

1. In cooperation with MDC Fisheries Research and Biometrics Staff, develop a routine angler survey program for the Current River Watershed to be conducted every 10 years.

2. Encourage the continued monitoring of river use on a regular basis as set forth in the Ozark National Scenic Riverways River Use Management Plan.

Objective 4.2: Increase awareness of stream recreational opportunities and appreciation of stream ecology and advocacy to a level that will encourage a widespread and diversified public interest in the Current River Watershed.

Strategy: Careful publicity which focuses on species of conservation concern, unique aquatic-oriented communities, as well as abundant recreationally valuable fish populations can promote a continued appreciation of these different types of natural resource elements. Providing opportunities for the public to learn about stream ecology will, hopefully, create stream advocates.

1. Continue to assist in providing the MDC annual fishing prospectus as well as the "Missouri Trout

Fishing” and “Ozark Smallmouth Bass Fishing” maps for public release in order to describe the specific fisheries and angling opportunities of selected waters.

2. Provide updated versions of the “Popular Public Fishing Streams in the Ozark Region” and "Popular Public Fishing Lakes in the Ozark Region" brochures in electronic form (via the MDC public Internet website) and paper form.

3. In cooperation with MDC Outreach and Education Division, provide the local and statewide media with timely "How to", "When to" articles and interviews that focus attention on places as well as both consumptive (i.e. gigging, float/wade fishing) and non-consumptive activities (i.e. snorkeling, floating, underwater photography)

4. Publicize the acquisition, development and opening of new public access and/or stream frontage sites.

5. In cooperation with regional field personnel from all divisions, emphasize stream ecology and good stream stewardship (utilizing brochures, aquaria, and stream tables where applicable) during presentations to school groups, youth organizations, and private landowner contacts.

6. Conduct outdoor youth events, such as Ecology Days at stream sites with field activities that demonstrate stream ecology and good stream stewardship.

7. Facilitate the development and activity of Stream Teams and other groups interested in adopting or otherwise promoting good stewardship and enjoyment of watershed streams.

8. Make public presentations in cooperation with regional field personnel from all divisions that focus on best management practices for private landowners.

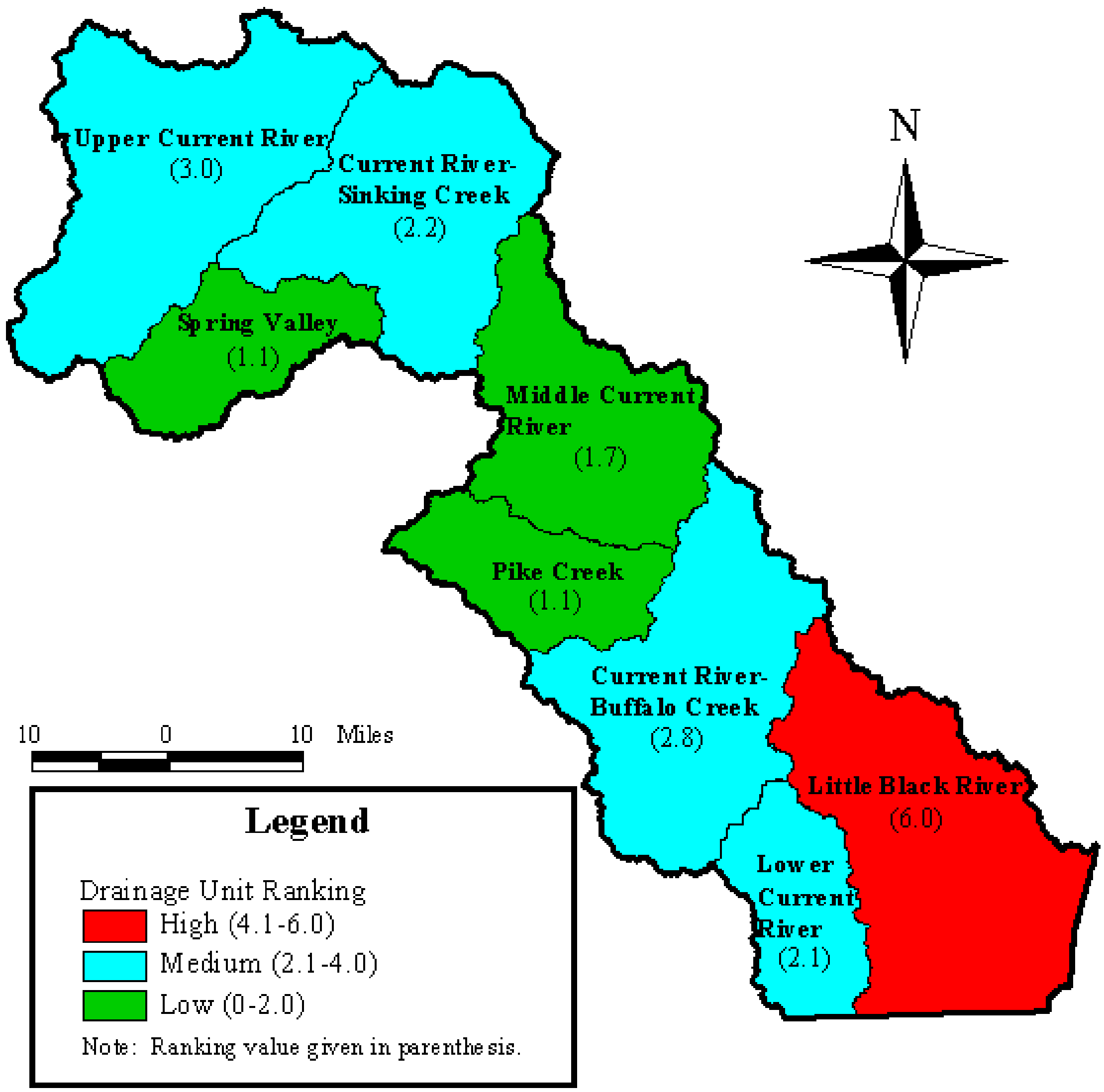
9. Provide promotional, educational, and technical stream materials to groups, fairs and other special events.

10. In cooperation with regional field personnel from all divisions, develop brochure which describes the watershed and promotes best management practices within the watershed.

Figure Mc01.

Current River Watershed

Riparian Corridor Enhancement Potential



Ranking factor based on the following formula: ((Rg+Rc+Ru+Sp+Sl)/3)(Au/Aw)+(S*0.1)
where:

Rg=Percent grassland riparian land use.
Rc=Percent cropland riparian land use.
Ru=Percent urban riparian land use.
Sp=Percent permanent stream.
Sl=Percent losing stream.
Au=Unit area.
Aw=Watershed area
S=Number of Aquatic Oriented Species of Conservation Concern observed.
(Only those records listed in MDC 1999c are included)

ANGLER GUIDE

Current River *(upper) (Ozark Region - Dent and Shannon Counties*)

Information: 417/256-7161

Camping, trout fishing, canoeing, the 19 miles of river from Montauk State Park to Akers Ferry has it all. Visitors have the choice of three areas to visit.

<u>Montauk State Park</u>

Rainbow trout are stocked daily in the 2.3 miles of water within Montauk State Park. If you don't mind the company of other anglers, this is the place to catch trout. The state park here also offers lodging, and restaurant facilities. See the Trout Fishing section of this publication for more information.

<u>Special Trout Management Area</u>

The 9.0 miles from the state park downstream to the Cedargrove bridge is managed for large size **brown trout** on a put-grow-and-take basis with a 15" minimum length limit and three fish per day. Brown trout, 8-10", are stocked each spring but do not reach legal size until at least one year later. Studies prior to 1998 documented that catch and release mortality from bait angling was high, therefore, numbers of sublegal size trout rapidly declined throughout the summer and numbers of tackle testing 15-20" trout were not as high as they could be. The brown trout population instantly responded to a regulation change in **1998 that restricts tackle to flies and artificial lures only in this area.** Density and sizes of browns increased 25% each year for the first two years of the new regulations. Mother nature has not been so kind to the Current River the past three years, as drought conditions have persisted. Estimated numbers of browns for the year 2003 will be similar to 2002 at around 326 per mile. Percent of legal size (15" and larger) trout will be slightly higher and make up about 20% of the population while 18" and larger fish will make up about 6%. These numbers are impressive for an Ozark brown trout population and the fishery is still in good condition. The Current River brown trout population has shown it's potential and biologist are confident that the fishery will rebound when consistent normal flows return. In the meantime, biologist have experimented with a supplemental fall stocking of brown trout in 2002 to see if survival through the summer of 2003 improves. MDC will also continue with the normal spring stocking of brown trout in April of 2003.

<u>Trout Management Area</u>

The 9.0 miles from the Cedargrove bridge to Akers Ferry are managed with rainbow trout on a put-and-take basis. Rainbows, 10-12" are stocked every few weeks from February to mid-October. Regulations include no size limit and five fish per day. Fishing here is less crowded than in the trout park and the stream can be easily waded or floated in a canoe.

Current River *(middle)*

(Ozark Region - Shannon and Carter Counties)

Information: 417/256-7161

This 70-mile stretch offers some spectacular scenery, easy floating and great **smallmouth bass** fishing. Look for deep rocky runs and pool with rootwads and boulders. A canoe or jon boat is recommended to get to the best water. The National Park Service has camping and access sites at Pultite, Round Springs, Two Rivers, Powder Mill, and Watercress at Van Buren. Good numbers and sizes of **smallmouth bass** can be found in the 25 mi. reach between Pulltite Access and Two Rivers Access. For an Ozark Riverways map of these and other access sites contact the National Park Service in Van Buren at 573/323-4236.

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 1º Celcius 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.

Hypolemnion 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.

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 hierarchial 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 (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.

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