HYDROLOGY

Precipitation

In the lower and upper subbasins, the annual average precipitation is 46 inches and 42 inches, respectively (MDNR 1986). In the upper subbasin, the average annual run off is 16.6 inches and in the lower subbasin, runoff averages 14.5 inches per year (Vandike 1995).

Gaging Stations

Currently, there are four United States Geological Survey (USGS) streamflow stations operating in the basin. Three stations are located in the upper subbasin (Logan Creek at Ellington, East Fork of the Black River at Highway 72, and Black River at Highway K, just upstream of Clearwater Reservoir). In the lower subbasin, the flow station is located on the Black River at Poplar Bluff. For additional information regarding streamflow (*e.g.*, site map, real time gage height and discharge, or annual streamflow statistics) go to http://waterdata.usgs.gov/mo/nwis/current/?type=flow.

Stream Flow

Ozark streams have the highest, most well-sustained base flows in the state because of the high permeability of the carbonate rocks, which store and transmit large quantities of groundwater (Kratzer and Jenkins 1985). The lowland streams, located in Mississippi Alluvial Plain are sustained by ground water contributions from the extensive alluvial deposits.

Lower Subbasin

The average discharge of the Black River at Popular Bluff is 1,330 cubic foot per second (cfs) (Vandike 1995). The 1984 water year (October through September) had the highest average discharge (2,858 cfs). The 1954 water year was the driest with an average discharge of 564 cfs. The maximum and minimum instantaneous discharges ever recorded were 65,000 cfs (12/4/82) and 180 cfs (9/25/66).

Upper Subbasin

In the upper subbasin, the average discharge of the Black River at Highway K is 591 cfs (Vandike 1995). The highest and lowest yearly averages were 1,420 cfs in water year 1985 and 244 cfs in water year 1954. The highest recorded instantaneous discharge was 98,500 cfs on November 11, 1985. On August 12, 1965, the lowest instantaneous discharge (67 cfs) was recorded.

Springs

In the upper and lower subbasins there are 17 and 11 springs, respectively (Table 4). Pittman (20 million gallons/day) and Keener (14 million gallons/day) are the largest springs in the lower subbasin (Vandike 1995). Warner Bay Spring (11 million gallons/day) is the largest spring in the upper subbasin (Vineyard 1982). For additional information on springs, visit http://www.umsl.edu/~joellaws/ozark_caving/springs/jspring.html.

Dam and Hydropower Influences

Two reservoirs exist in the basin and both of these are located in the upper subbasin. Clearwater Reservoir (1650 acres) is located on the Black River and Lower Taum Sauk Lake (200 acres) is located on the East Fork of the Black River (Figure 3).

Clearwater Dam is in Wayne County, but nearly all of the reservoir is in Reynolds County. Clearwater Reservoir was authorized by the Flood Control Act of 1938. Construction was initiated in May 1940 and was completed in 1951. This reservoir is operated by the Corps of Engineers for the primary purpose of flood control, with conservation of fish and wildlife and recreation as other purposes.

Water releases from Clearwater Reservoir are dictated by river stages at the Popular Bluff gage. The authorized regulating plan calls for a maximum river stage of 11½ feet from December 1 through March 31 and a maximum river stage of 10½ feet from April 1 through November 30.

An environmental assessment is being conducted on proposed changes to the Clearwater Reservoir water control plan. The proposed plan calls for discharge to be regulated both by the Poplar Bluff river stage and Clearwater Reservoir level (Figure 4). In the proposal, the conservation pool would be held at 498 NGVD from April 15 through October 14. Starting the October 15th, the conservation pool elevation would be lowered to 494 NGVD.

At an elevation of 494 NGVD, the Reservoir covers 1,650 acres (22,000 acre-feet of water). At the top of the flood pool (567 NGVD), the Reservoir covers 10,250 acres (413,000 acre-feet of water). Approximately 95% of the Reservoir volume (391,000 acre-feet) is for flood control purposes, an extremely high proportion when compared to the other reservoirs. The highest water level ever recorded (566.6') occurred on May 20, 2002.

An AmerenUE dam on the East Fork of the Black River forms Lower Taum Sauk Lake (LTS), the lower lake of a two lake pump-storage hydroelectric plant. The upper reservoir is located on Proffit Mountain, approximately 800 feet higher than the lower reservoir. During peak electrical demand periods, water is released from the upper reservoir through a 6,500-foot tunnel and into the lower reservoir. During low electrical demand periods, water is pumped back into the upper reservoir.

The LTS dam was designed to allow the same amount of water entering the lake from the East Fork of the Black River to exit the lake at the base of the dam. Because the facility is a peak hydroelectric

facility, water levels in the lower lake can fluctuate greatly in a short time period. Water levels can rise 15 feet in eight hours during power generation or fall 15 feet in 12 hours during the pumpback process.

To keep river-borne sediment from reducing LTS's storage capacity or blocking the canal between the power plant and the lake, a dam to trap gravel was constructed across the East Fork of the Black River just upstream of the reservoir. In the past 30 years, this gravel trap has been cleaned out five times. Each time approximately 30,000 cubic yards of material were removed.

Table 4. Springs in the Black River basin.

Spring Name	Nearest Town	County	T R S
Lower Subbasin			
Bay	Poplar Bluff	Butler	24N 5E SE¼ SE¼ S5
Branscum	Poplar Bluff	Butler	25N 4E SW¼ NE¼ S13
Brewer Bay	Piedmont	Wayne	28N 3E SW¼ NW¼ S5
Bunyard #1	Mill Spring	Wayne	27N 4E SW¼ NW¼ S6
Bunyard #2	Mill Spring	Wayne	27N 4E SE¼ NW¼ S6
Keener	Williamsville	Wayne	26N 5E SE¼ SE¼ S4
Leeper	Leeper	Wayne	28N 3E SE¼ NE¼ S27
Lord	Williamsville	Wayne	27N 5E NE¼ SE¼ S27
Markham	Williamsville	Wayne	27N 4E SW¼ NW¼ S23
Mill	Mill Spring	Wayne	28N 3E NE¼ NW¼ S8
Pittman	Piedmont	Wayne	28N 3E NW¼ NW¼ S8
Upper Subbasin			
Ansden	Centerville	Reynolds	31N 1E SE¼ SE¼ S19
Carter #1	Piedmont	Reynolds	29N 2E SE¼ SW¼ S34
Carter #2	Piedmont	Reynolds	28N 2E SW¼ NW¼ S3
Champion	Annapolis	Reynolds	31N 3E SE¼ NW¼ S19
Cook	Centerville	Reynolds	32N 1W NE¼ SW¼ S3
Faulkenberry	Lesterville	Reynolds	32N 1E NE¼ NW¼ S16
January	Centerville	Reynolds	32N 1E SE¼ SE¼ S29

Spring Name	Nearest Town	County	T R S
John Beck	Corridon	Reynolds	31N 2W NW¼ SW¼ S36
Joe Beck	Corridon	Reynolds	31N 2W SE¼ NE¼ S26
Keith	Bixby	Iron	34N 1E NE¼ NE¼ S8
Morris	Ellington	Reynolds	30N 1E SE¼ NW¼ S36
Randolph	Ellington	Reynolds	30N 1E SW¼ SW¼ S20
Reeds	Centerville	Reynolds	32N 1E NE¼ SW¼ S28
Ringo	Black	Reynolds	33N 1E NE¼ NW¼ S33
Spout	Corridon	Reynolds	31N 2W SE¼SW¼ S13
Unnamed	Lesterville	Reynolds	31N 2E NW¼ NE¼ S9
Warner Bay	Lesterville	Reynolds	31N 2E NW¼ NW¼ S9

Figure 4. Proposed discharge plan for Clearwater Lake.