KIAMICHI RIVER BASIN WATER RESOURCES DEVELOPMENT PLAN

Kiamichi River Basin Working Group

February 1, 2000

Prepared by the
Oklahoma Water Resources Board
Duane Smith, Executive Director

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INTRODUCTION

Prompted by the ongoing legal dispute between the State of Oklahoma and the federal government concerning the outstanding Sardis Lake water storage obligation and years of discussion concerning proposed uses of water from Sardis and the Kiamichi River Basin, the State Legislature passed House Concurrent Resolution 1066 on May 28, 1999. HCR 1066 directs the OWRB, designated Tribal representatives and local citizens – together comprising the Kiamichi River Basin Working Group, co-chaired by Duane Smith, OWRB Executive Director and L.V. Watkins, Tribal advisor-- to develop this Kiamichi River Basin Water Resources Development Plan for submittal to the State Legislature by February 1, 2000. This landmark legislation also provides the authority necessary for the Oklahoma Water Resources Board to negotiate with the Choctaw and Chickasaw Tribes, whose lands encompass the Kiamichi River Basin, in an effort to facilitate development of the Basin's water supplies and identify potential benefits that those resources may provide to citizens of Oklahoma.

Kiamichi River Basin Working Group HCR 1066

Co-Chairs

Duane A. Smith, Executive Director, Oklahoma Water Resources Board
L.V. Watkins, Choctaw/Chickasaw Tribal Representative

Members

Gary Batton, Choctaw Nation
Jerry Buchanon, Clayton
Janie Ben, Clayton
Brian Campbell, Chickasaw Nation
David Davies, Little Dixie Community Action Agency
Lyndol Fry, Hugo
Chuck Hutchison, Tuskahoma
Jim Koopman, Clayton
Rob Martin, Talihina
Larry Morgan, Latimer County News
Butch Needham, Hugo
Jack Pate, Choctaw Nation
Danny Simon, Lamar
John Sirmans, Choctaw Nation
Stan Stamper, Hugo
Jefferson Keel, Chickasaw Nation
Wendell Thomason, Oklahoma Water Resources Board

Dates and Locations of Formal Kiamichi Group Meetings

August 3, 1999 @ Antlers Community Building
August 27, 1999 @ Stillwater, Oklahoma State University, Wes Watkins Center
September 16, 1999 @ Hugo Lake Hospitality Center
November 11, 1999 @ Talihina, Choctaw Community Building

January 11, 2000	@ Clayton
January 25, 2000	@ Hugo

BACKGROUND

Sardis Lake, on Jackfork Creek in southeast Oklahoma, was constructed by the U.S. Army Corps of Engineers between 1975 and 1982 primarily for water supply, flood control and recreation, fish and wildlife purposes. Because the state had confidence that the lake's water supply would be utilized by local users and/or as a supplemental regional source for central Oklahoma, the Oklahoma Water Storage Commission entered into the Sardis Reservoir Storage Contract with the Corps.

The Oklahoma Water Storage Commission was created by the Oklahoma Legislature in 1963 to promote the maximum development of state water resources. The Commission, comprised of the seven (later nine) members of the Oklahoma Water Resources Board, was charged with reviewing and determining the feasibility of proposed federal projects as well as the present and anticipated needs of users in the projects' watersheds. If such a determination was made, the Commission was directed to negotiate with the federal government, municipalities and other interests to repay the cost of conservation storage in the project. The Commission had no authority to build projects, only power to underwrite construction. Only storage not estimated for present or future needs could be contracted for; the Commission would then hold this surplus water in trust until needed. At that time, the state would recover its storage costs from the new customer(s). The Water Storage Commission survived for 16 years, holding its first meeting in August 1963. Senate Bill 138, known as the "Oklahoma Sunset Law," terminated the Water Conservation Storage Commission and transferred all existing obligations to the OWRB. The Commission's last meeting was held in June 1979.

The Sardis Lake Water Storage Contract enables the state to use storage in the lake for municipal and industrial water supply in return for repayment of the project's construction costs attributed to water supply use. Forty-seven percent of the project's water supply storage is reserved for "present use" while 53 percent is reserved for "future use" where the contract's interest (4.012 percent) accumulates until that storage is used. The 1974 contract estimated water supply construction costs to total $16.4 million. Through the Statewide Water Development Revolving Fund, which also serves as the funding source for Oklahoma communities in need of water and sewer project improvements, the state initially made six annual payments to the Corps for approximately $2.7 million. Sardis is the only water supply lake in Oklahoma for which the state holds a contract to repay storage costs.

Anticipated development and subsequent use of Sardis Lake's water supply has not been realized and because the contract states that the Oklahoma Legislature is not legally obligated to appropriate funds for the payments, the State Legislature elected in 1989 not to authorize additional payments to the Corps. While payments were made in 1996 and 1997, bringing the paid amount to $4.3 million, the state again deferred payments in 1998 and 1999. Oklahoma is currently $5.5 million in arrears, with the Corps claiming late payment interest of more than $2 million; outstanding storage costs now amount to approximately $40 million. Annual payments for use of Sardis water storage could reach as much as $2 million when both present and future water supply storage are utilized.

Since 1990, several studies have been conducted and numerous efforts made to address the Sardis Reservoir contract/water use controversy. Progressively, each has resulted in better understanding of issues pertinent to the matter. However, further uncertainties presented through two lawsuits filed in 1998 prompted additional review of the situation.

Responding to local concerns, the Board adopted a permanent rule in July 1999 that set aside 20,000 ac-ft/yr for future water use in the 10-county area incorporating the Kiamichi River Basin. As the OWRB continues working to fulfill its mandate under HCR 1066, the agency is cooperating with the Corps of Engineers and the Office of Management and Budget to negotiate details of a potential discounted purchase of the Sardis water supply storage, estimated at approximately $20 million or less. In addition, Section 545 of the Water Resources Development

Act of 1999 authorizes the Corps to accept a discounted prepayment in an amount to be determined by an independent accounting firm.

OVERVIEW OF KIAMICHI RIVER BASIN WATER RESOURCES

The following section of this report summarizes the hydrologic data and related information pertinent to Basin resources presented to the members of the Kiamichi River Basin Working Group during the five formal meetings held in southeast Oklahoma from August through November 1999.

Hydrology

The Kiamichi River Basin (Figure 1) is the state's most prolific watershed. The river originates in the Ouachita National Forest in extreme western Arkansas, enters Oklahoma in southeastern LeFlore County, then meanders for 172 miles prior to its termination at the Red River in Choctaw County. Jackfork Creek -- one of the river's four major tributaries along with Cedar, Buck and Ten Mile Creeks -- impounds Sardis Lake. With a drainage area of 1,830 square miles, the Kiamichi River flows through six Oklahoma counties.

Rainfall in the Kiamichi River Basin is relatively high, especially in the eastern portion due to the influence of the Kiamichi Mountains combined with moist air masses from the Gulf of Mexico. Average annual precipitation in the basin is approximately 47 inches, ranging from less than 44 inches in the far western portion to more than 50 inches in the east. The maximum yearly rainfall of 77 inches occurred in 1945, the minimum of 23 inches in 1963. Area rainfall is usually greatest in May and September and lowest during January and February

Evaporation in the Kiamichi River Basin averages 69 inches per year, varying from almost 71 inches in the western part of the basin to almost 63 inches in the east portion. Although evaporation is greater than precipitation in the basin, substantial runoff causes abundant water to flow in many streams and accumulate in area reservoirs. For the purposes of this report, flow, which is the amount of water which passes a given point, is quantified in both cubic feet per second (cfs; one cubic foot of water flowing at an average rate of one foot per second) and acre-feet per year (ac-ft; the amount of water required to cover one acre of land to a depth of one foot).

Significant precipitation and steep topography make the Ouachita Mountain region of the Kiamichi River Basin one of the highest runoff-per-square-mile regions in the state. Average annual runoff varies from more than 1,050 ac-ft per square mile in the eastern portion of the basin to almost 750 ac-ft per square mile in the south and west. Three U.S. Geological Survey stream gages exist on the Kiamichi River; an additional gage at Hugo dam was discontinued in 1992, but provides valuable information on river flows at the basin's end prior to construction of Hugo Lake.

The average annual flow of the Kiamichi River (Table 1) at the USGS stream gage near Big Cedar is 62,264 ac-ft/yr. Flow downstream increase as the contributing drainage area measured by each gage increases. At Clayton, the average annual flow for the period of record is 815,948 ac-ft; at Antlers, more than 1.3 million ac-ft. Estimated inflow into Hugo Lake is 1,594,248 ac-ft/yr or 1,422 million gallons per day (mgd). The minimum annual regulated flow ever recorded at the Corps of Engineers' Hugo Lake gage is 484,356 ac-ft; the maximum is 3,050,000 ac-ft.

Figure 1
The Kiamichi River Basin

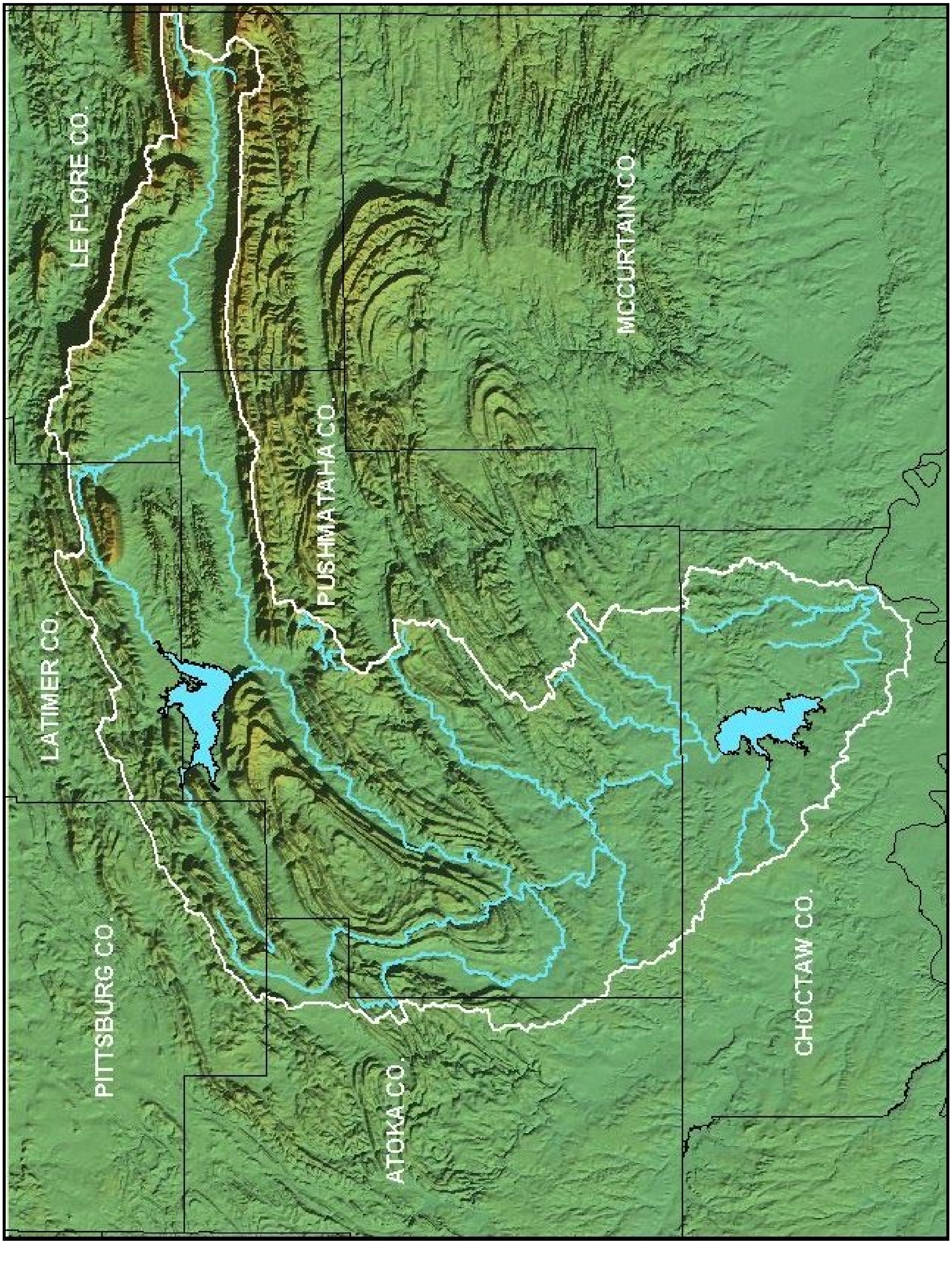


Table 1						
Historical Streamflow Data, Kiamichi River Basin						
Gage	***Drainage Area (square miles)***	***Annual Flow for Period of Record***				
		Minimum (ac-ft/yr)	***Maximum (ac-ft/yr)***	***Average (cfs)***	***Average (ac-ft/yr)***	***Average (mgd)***
Big Cedar	40	24,544	110,048	86	62,264	56
Clayton	708	396,028	1,424,108	1,127	815,948	728
Antlers	1,138	569,064	2,305,216	1,821	1,318,404	1,176
Hugo	1,709	484,356	3,050,000	2,202	1,594,248	1,422
All data from U.S. Geological Survey stream gages, except Hugo, which is estimated inflow from the Corps of Engineers reservoir gage.						

Stream Water Quality

The quality of water in the Kiamichi River Basin is considered excellent with little mineralization. The water is suitable for irrigation and, with treatment, is an excellent source for municipal and industrial purposes. The water is moderately turbid and classified as soft.

Groundwater Resources & Quality

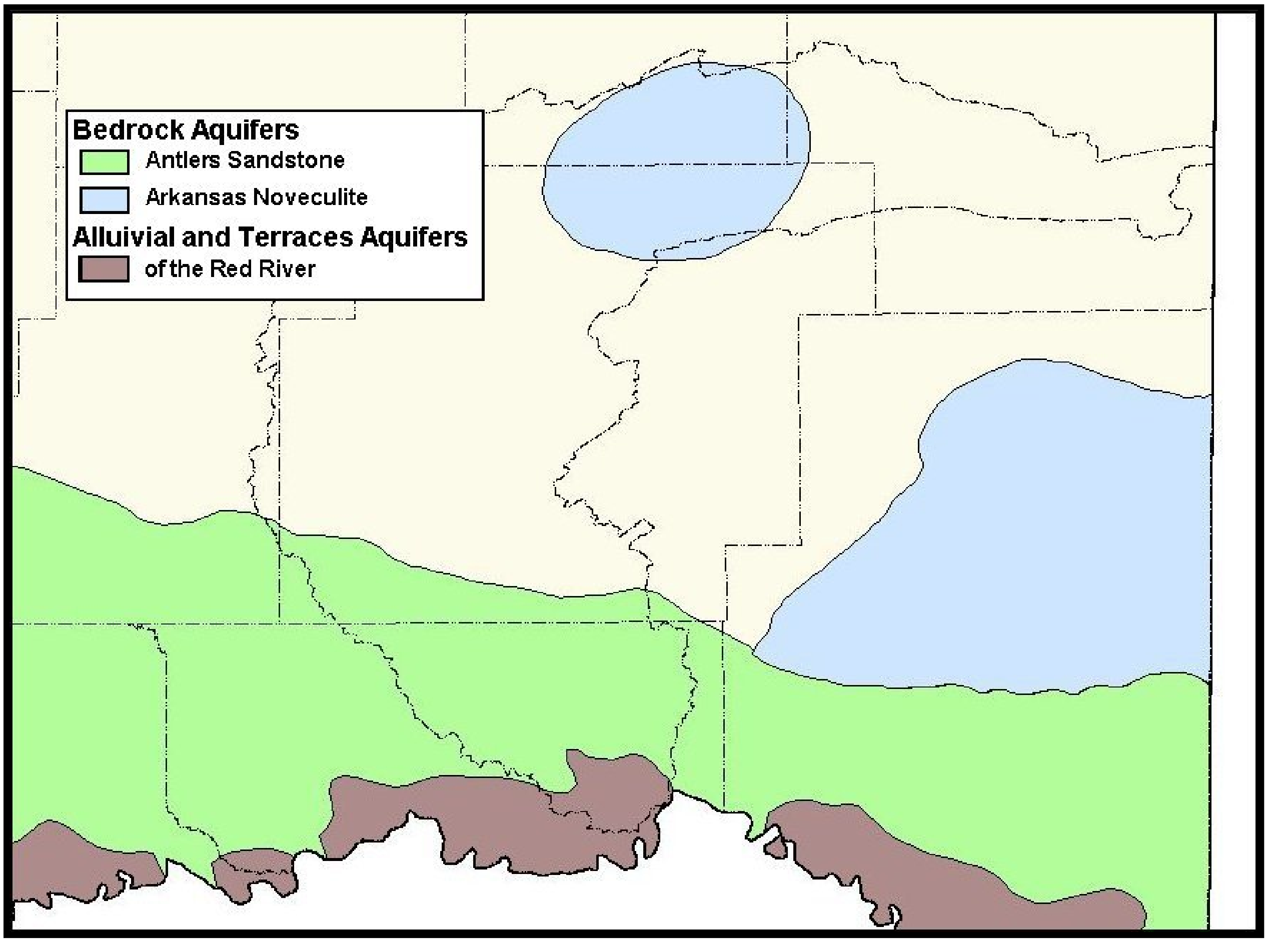
In addition to alluvium and terrace deposits of the Red River, two major groundwater basins underlie the Kiamichi River Basin (Figure 2). The Antlers Sandstone (Cretaceous in age, laid down 53 to 133 million years ago) is a fine-grained sand interbedded with clay, unconsolidated and friable. It crops out in a 10-mile-wide belt in parts of Atoka, Bryan, Choctaw, Johnston, McCurtain and Pushmataha Counties. The entire Choctaw County portion of the Kiamichi River Basin, along with small portions of Atoka and Pushmataha Counties, is underlain by the Antlers Sandstone formation. It is estimated that at least 320 square miles of the aquifer's 4,400-square-mile area (2,816,000 acres) lies under the basin.

Through its entire extent, the Antlers Sandstone ranges in thickness from 180 feet in the west to more than 880 feet in the southeast. Well yields range from 5 to 50 gallons per minute (gpm) for water table wells and from 50 to 650 gpm in artesian wells. An average yield for wells completed in the groundwater basin is 100 to 150 gpm.

Groundwater quality is good in the outcrop areas and suitable for industrial, municipal and irrigation use. Downdip from those areas, the quality deteriorates. Dissolved solids range from 130 to 1,240 milligrams per liter (mg/L); hardness from 8 to 300 mg/L; sodium from 1 to 350 mg/L; and bicarbonate from 10 to 580 mg/L.

The other major groundwater basin, the Arkansas Novaculite and Bigfork Chert, exists in the Potato Hills area of Pushmataha and Latimer Counties and virtually the entire extent of the two formations (estimated at 33 square miles, or 21,120 acres) underlie the Kiamichi River Basin. With a combined thickness of 850 to 1,200 feet, the formations consist of highly fractured novaculite and chert with some interbedded shale and limestone. The formations are probably capable of storing and yielding moderate to large amounts of water. However, because of the area's remoteness, few wells have been drilled into the aquifer and its potential can only be inferred. Due to extensive folding and faulting of the formations, selection of a well site requires careful study.

Figure 2
Groundwater Resources, Kiamichi River Basin



Water Resources Development

Sardis Lake

Sardis Lake (Figure 3), one of the two major reservoir development projects in the Kiamichi River Basin, was authorized by Congress with passage of the Flood Control Act in 1962. Located on Jackfork Creek, a tributary of the Kiamichi River, construction of Sardis was completed in 1983 by the U.S. Army Corps of Engineers. The project's authorized multiple purposes are flood control, water supply, recreation and fish and wildlife mitigation. The dam is located in Pushmataha County approximately three miles north of the Town of Clayton and five miles northwest of Tuskahoma.

The total initial conservation storage capacity of the reservoir is 274,210 ac-ft and it will yield almost 140 million gallons per day (156,800 ac-ft/yr) of excellent quality water. Initial capacity of the Sardis flood pool, prior to 100-year sediment accumulation, is 122,570 ac-ft. (Pool elevation and storage capacity information for Sardis Lake is depicted in Table 2). The length of the lake's shoreline is 117 miles; the contributing drainage area of the lake's watershed is 275 square miles. The final cost of the project is almost $40 million.

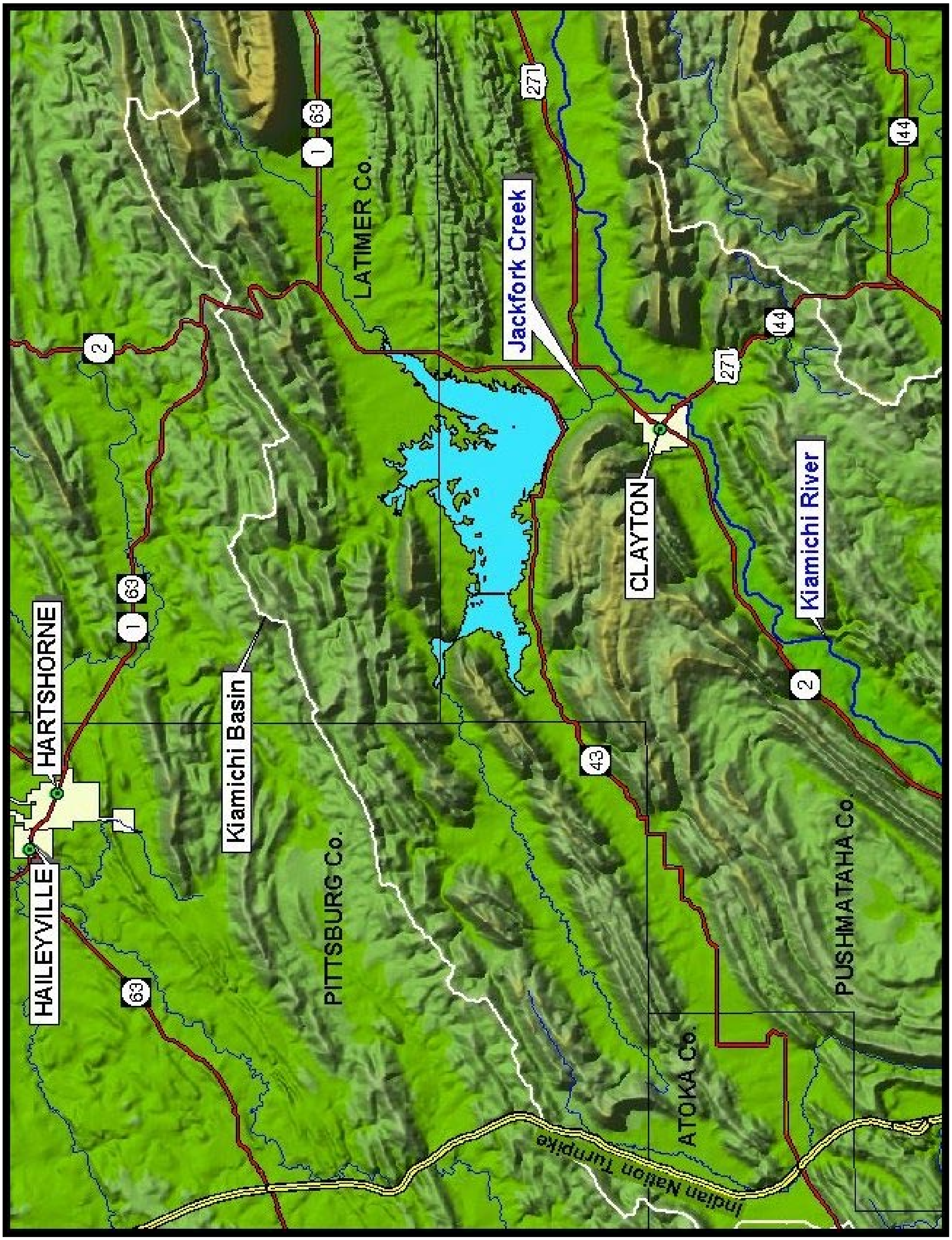
Table 2
Pertinent Data for Sardis Lake

Feature	***Elevation*** ***(feet)***	***Area*** ***(acres)***	***Capacity*** ***(ac-ft)***
Initial Flood Control Storage	599.0-607.0	16,960	122,570
Initial Conservation Storage	542.0-599.0	13,610	274,210
Initial Inactive Storage	530.0-542.0	40	120
Sardis Water Supply Yield = 156,800 (140 mgd)			

The flood of record at the dam site occurred in May 1943 with an estimated discharge of 60,000 cfs and volume of 80,000 ac-ft. The total volume of inflow during the 1990 flood was 270,000 ac-ft (April through May) with a peak daily inflow of 33,600 cfs. The peak release during that flood was 5,675 cfs.

Sardis Lake, which is the tenth largest in Oklahoma by surface area (13,610 acres), contains four recreational areas comprising more than 1,500 acres. Public hunting and wildlife propagation areas have been set aside on 8,435 acres of land surrounding the reservoir. The lake is home to one of the nation's premiere trophy largemouth bass fisheries, incorporating one fishing pier and berm, three boat ramps, two designated campsites and one swimming beach. Sardis Lake hosts at least 400,000 visitors each year. The greatest number of recreationists visit Sardis Lake in the four-month period April through July. According to the Department of Wildlife Conservation, fishing at Sardis generates at least $4 million per year to the local economy.

Figure 3
Sardis Lake Area



Hugo Lake

Hugo Lake (Figure 4), the other major impoundment in the Kiamichi River Basin, is impounded by the Kiamichi River in the far southern reach of the basin. Originally authorized by the Flood Control Act of 1946, the lake was constructed by the U.S. Army Corps of Engineers and completed in 1971 for flood control, water supply, water quality, recreation and fish and wildlife uses. The dam is located in Choctaw County approximately seven miles east of the City of Hugo, 30 miles north of Paris, Texas and 18 river miles upstream of the Kiamichi's confluence with the Red River.

The conservation storage capacity of the reservoir is 158,617 ac-ft and it will yield approximately 58 million gallons per day for water supply and 90 mgd for water quality control. Capacity of the Hugo flood pool is 955,176 ac-ft. (Pool elevation and storage capacity information for Hugo Lake is depicted in Table 3). The length of the lake's shoreline is 110 miles; the drainage area is 1,709 miles.

Table 3
Pertinent Data for Hugo Lake

Feature	***Elevation*** ***(feet)***	***Area*** ***(acres)***	***Capacity*** ***(ac-ft)***
Initial Flood Control Storage	404.5-437.5	35,045	809,100
Initial Conservation Storage	390.0-404.5	13,144	127,160
Initial Inactive Storage	352.0-390.0	3,521	24,739
Hugo Water Supply Yield = 64,960 (58 mgd); Water Quality Control Yield = 100,800 (90 mgd)			

The flood of 1990 completely filled the flood control pool. The maximum peak inflow of 120,000 cfs occurred on May 3, 1990. The maximum volume of flow past the dam site, occurring from April through June 1957, was 1,549,500 ac-ft.

Hugo Lake offers many types of recreation, including boating, fishing, hunting and sightseeing. The lake, which normally hosts more than 500,000 visitors each year, has eight recreational areas and 5,000 acres of accessible, uncleared areas for fishing enthusiasts. The Hugo Public Hunting Area covers 18,196 acres of land and water for wildlife conservation with nearly all project lands open to hunting.

Hugo was constructed with 90 mgd of water quality storage. Water quality releases are made in response to emergency conditions downstream of Hugo, such as fish kills, increased pollution loading during drought conditions, or aesthetics problems. The current 90-mgd level, a significant increase in the amount offered in the original Hugo project plan, was recommended by the Public Health Service and eventually adopted by the Corps.

Figure 4
Hugo Lake Area