

development concept plan

march 1981

BUFFALO
PRUITT



NATIONAL RIVER / ARKANSAS

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January 8, 1981

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DEVELOPMENT CONCEPT PLAN

PRUITT

BUFFALO NATIONAL RIVER
ARKANSAS

Prepared by
United States Department of the Interior
National Park Service
Denver Service Center

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INTRODUCTION

Buffalo National River was authorized by an act of Congress on March 1, 1972 (P.L. 92-237, 86 Stat. 44). Following this authorization, a conceptual master plan was developed to implement the general and specific mandates of Congress, the cooperative agreements, and the administrative policies and management objectives of the National Park Service. This plan, entitled Master Plan, Buffalo National River, was approved on October 16, 1975.

Three major visitor use areas are identified for future development in the Master Plan, each linking Buffalo River to an existing major highway. Pruitt, situated in Newton County at the point where Arkansas 7 crosses the river, is one of these areas. As defined the Master Plan, the purpose for Pruitt is to establish a developed area where visitors can obtain interpretive and outdoor recreational information about the river. The Pruitt developed area will also provide district management facilities for protecting and managing the upper one-third of the Buffalo National River. For the Pruitt area, the facilities suggested for consideration are a district ranger station, a visitor contact station, parking lots, boat accesses, National Park Service housing, a maintenance facility (completed), picnic areas, and a campfire circle.

The Master Plan provides general guidelines for development and use of the park; however, it does not include detailed recommendations for the design and management of specific sites. Furthermore, when Buffalo National River was authorized in 1972, few acres within its boundaries were federally owned. The Pruitt area was entirely in private ownership. Most of the area is now publicly owned, permitting detailed site planning for the first time.

This Development Concept Plan, Pruitt, Buffalo National River addresses the following specific concerns for the development and use of Pruitt:

Congestion already exists at the present floater put-in/take-out area. Not only is the area congested, but visitors exceed the capacity of the land. Overuse has created environmental degradation of the area (i.e., reduced grass, groundcover, and bank erosion) and management problems.

Substantial seasonal activities occur in the use of the Pruitt area, such as floater put-in/take-out, swimming, and picnicking in the spring and early summer.

Periodic flooding occurs on the lower floodplains, limiting the types of facilities that can be developed close to the river.

Several commercial campgrounds, stores, and the popular amusement park (Dogpatch USA) are located within a few miles of Pruitt. Use and development must complement rather than compete with these privately owned enterprises.

Developments need to be located within easy access of the river resource for visitor convenience, but they must be adequately screened by floodplain vegetation and landforms to visually enhance the floaters' experience.

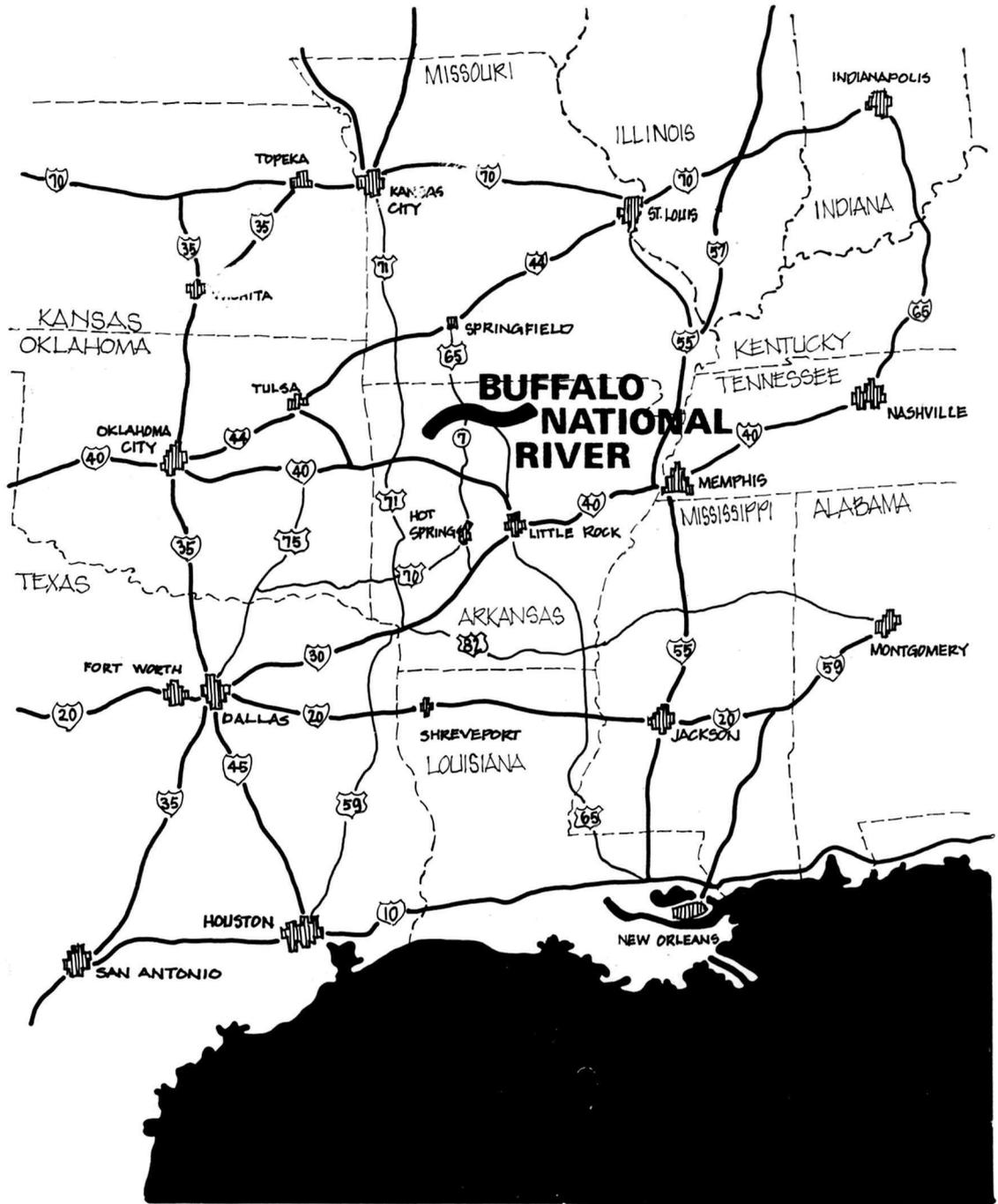
Although Buffalo National River has been designated as a recreational river--allowing appropriate facility development to support visitor use--development should be designed to permit protection and enhancement of the resource.

Planning and development must consider hikers, campers, sportsmen, and day users, as well as floaters on the Buffalo River.

Accessibility to and use of park facilities by physically and mentally handicapped visitors must be ensured in conformance with applicable provisions of the Design and Construction of Public Buildings to Accommodate the Physically Handicapped Act (P.L. 90-480, 82 Stat. 718) and other applicable laws and regulations.

In conformance with Executive Order 120031, "Energy and Conservation Guidelines," buildings will be designed and constructed to be energy efficient.

Consistent with the provisions of the National Environmental Policy Act, the National Historic Preservation Act, and other pertinent directives, the proposal includes an analysis of the anticipated impacts and a cost estimate for development.



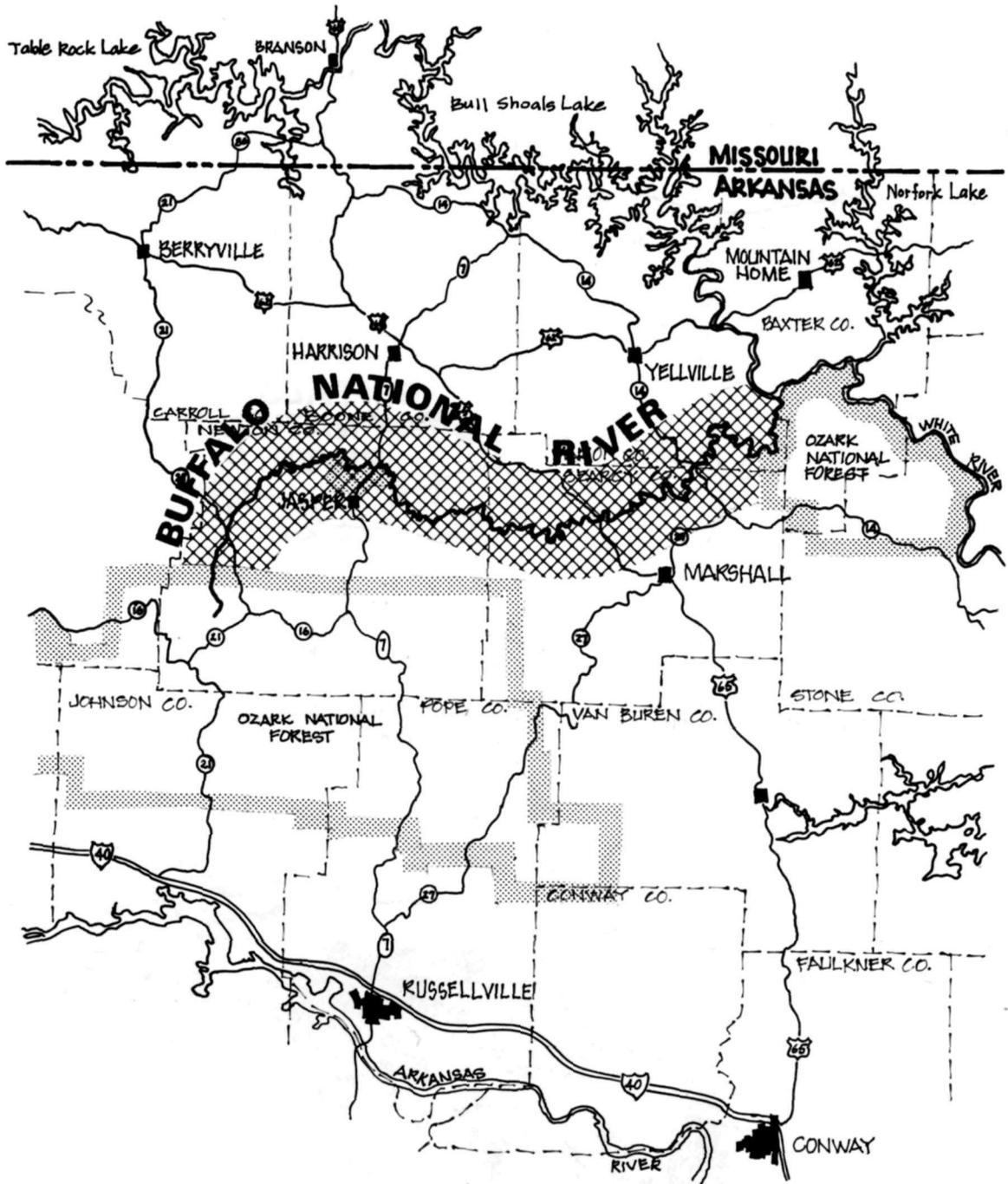
REGION

Buffalo National River, Arkansas

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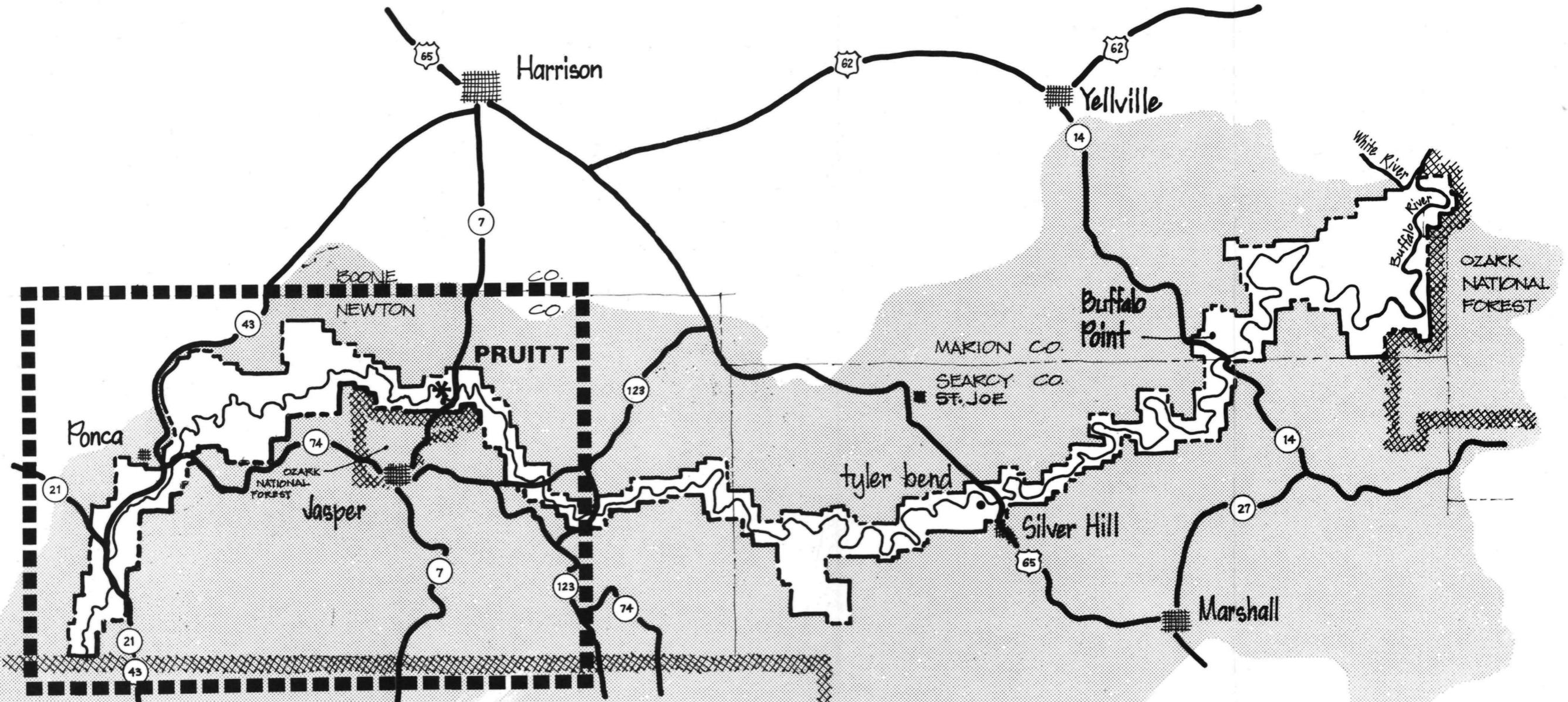
VICINITY

Buffalo National River, Arkansas



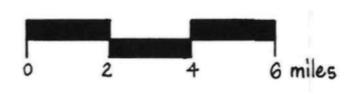
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pruitt district

Buffalo National River, Arkansas



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DESCRIPTION OF THE ENVIRONMENT

PRUITT

Existing Development and Use

The Pruitt district encompasses the upper one-third of Buffalo National River, and the Pruitt development area serves as district management headquarters.

A former private residence immediately south of the Arkansas 7 bridge is currently being used as the headquarters/contact station. Information regarding recreational activities in the area and floating conditions along Buffalo River is available. Floater access to the river is located here where between 80 and 100 cars can be parked. Day use activities of this area include swimming, picnicking, and hiking.

Water for domestic use at the contact station is obtained from an existing well. The water is treated with a hypochlorinator prior to distribution and is tested twice a month in accordance with state and EPA standards. Electricity is available. Sewage is treated by a septic tank and drainfield.

A floater campground (Ozark campground) located west of the Arkansas 7 bridge is available to floaters from the river and from a steep substandard road from the highway. Potable water for Ozark Campground comes from an existing well. The water is treated before distribution with a hypochlorinator and is tested twice a month in accordance with state and EPA standards. Adequate electrical service exists. Existing comfort station sewage is adequately treated by a septic tank and drainfield. Canoe rental and shuttle service are provided by local business on a daily fee basis. Canoe launching is on NPS-owned land. Visitors also make use of a scenic overlook (Paradise Hill) about a mile south of the highway. The former maintenance building on Arkansas 7 will be utilized for a temporary fire station and rescue cache until a permanent facility can be constructed.

Visitation Patterns and Statistics

Since Buffalo National River has only been established since 1972, there are no lengthy statistical records of visitation or detailed profiles of typical visitor groups. Visitation statistics and visitor use records have been kept since October 1973, and recording methods and procedures have been continually updated to improve the accuracy of the data.

Tables 1 and 2 summarize 1974-1978 visitation for the entire Buffalo National River and the Pruitt district. Statistics for the Pruitt district include the Steel Creek-Lost Valley and Pruitt areas; these statistics have been kept since 1974 for the Steel Creek-Lost Valley area and since April 1975 for the Pruitt area. Visitation to the Pruitt area has been estimated at 40 percent of the Pruitt district total.

Table 1. Visitation Summary

Buffalo National River

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
January	1,542	2,786	4,927	1,611	1,952
February	2,404	2,436	5,244	3,991	4,749
March	7,570	10,881	13,684	16,750	19,658
April	17,687	19,483	27,311	38,258	60,423
May	25,525	29,341	39,865	50,414	57,564
June	36,630	43,387	43,447	55,247	114,834
July	49,502	45,929	66,232	56,345	152,619
August	31,392	37,165	55,586	51,087	97,070
September	12,663	11,636	24,133	23,833	42,327
October	14,512	14,632	19,871	20,474	39,828
November	4,301	5,238	9,881	8,974	35,118
December	<u>2,223</u>	<u>1,145</u>	<u>5,582</u>	<u>4,562</u>	<u>19,201</u>
Total	205,861	224,041	315,763	331,546	645,343

Table 2. Pruitt District Visitation

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
January	364	1,232	2,578	505	487
February	973	1,103	2,420	1,159	1,059
March	2,821	5,156	6,308	7,522	6,806
April	5,166	7,383*	12,411	14,323	27,633
May	5,016	6,723	14,475	8,943	9,305
June	4,358	5,313	5,965	7,961	23,017
July	3,451	4,774	12,373	7,103	22,890
August	3,635	4,369	9,550	7,632	12,547
September	2,450	1,756	8,294	7,251	9,728
October	5,818	4,837	6,063	5,868	8,978
November	1,918	1,731	3,829	4,291	9,407
December	<u>718</u>	<u>515</u>	<u>3,092</u>	<u>2,065</u>	<u>4,079</u>
Total	36,688	44,902	87,358	74,623	135,936

*Figures prior to April 1975 are for Steel Creek/Lost Valley only.
 Figures for April 1975-December 1977 include both Steel Creek/Lost Valley and Pruitt.

Visitation to the national river has followed a seasonal pattern since 1974, with approximately 64-69 percent arriving in the four summer months, May through August. Visits during the peak month of July constitute approximately 21 percent of the yearly total. From 1974 to 1977 visitation to the national river increased by approximately 61 percent. This increase can be attributed to (1) normal increases in visitation (5 percent/year), (2) opening of new areas, and (3) refinement of recording methods and procedures. From 1977 to 1978 visitation increased by 95 percent. The primary reason for this substantial increase was the refinement of recording methods and procedures and the recording of visitation to previously unrecorded areas.

Between March and October, monthly visitation to the Pruitt district averages about 11 percent of the total visitation to Buffalo National River, with a peak of 16 percent during April. The spring months (March, April, and May) account for approximately 38 percent of the total Pruitt district visitation, the summer months (June, July, and August) for 34 percent, and the fall months (September, October, and November) for 22 percent. Out of the 135,939 visits to the Pruitt district in 1978, it is estimated that approximately 54,000 were to the Pruitt area.

It is difficult to predict what added attraction the proposed facilities in Buffalo National River will have. Assuming a 5 percent annual increase, starting with 645,343 in 1978, visitation to Buffalo National River in 1980 would be about 712,000, and in 1985 it would be about 908,000 under existing conditions. With proposed developments in the Pruitt district (Steel Creek-Lost Valley and Pruitt) and the Silver Hill district (Tyler Bend) and improvements in the Buffalo Point district, visitation to Buffalo National River should increase by even greater percentages.

Because relatively little development currently exists in the Pruitt area and visitor use data is minimal, precise visitation projections cannot be made. However, based on proposals in this Development Concept Plan for the Pruitt area, the possible number of visits per year can be estimated. As shown in table 3, proposed developments will be able to accommodate approximately 90,000 visitors per year.

NATURAL ENVIRONMENT

The Pruitt area is situated in the Springfield-Salem plateaus section of the Ozark plateaus province of the Interior Highlands of northwestern Arkansas. The area to be developed is located approximately 15 miles south of Harrison from the Arkansas 7 bridge. Elevations range from 790 feet at the river up to 1,100 feet above mean sea level at the ridges near the highway.

Geology/Topography/Soils

The surface geology of the Pruitt area is sedimentary, dating to the middle Ordovician period. St. Peter sandstone and the Everton formation predominate, but the Boone formation exists to a lesser degree and is apparent on the hillsides and bluffs. Caves and springs occur in these limestone formations.

Table 3. Conceptual Estimate/Visits Per Year

<u>Activity</u>	<u>Unit Resource</u>	<u>Standard</u>	<u>Persons at One Time</u>	<u>Turnover Day</u>	<u>Visitors/Day</u>	<u>Activity/Day</u>	<u>Visitor/Days/Yr</u>	<u>Visitors/Year</u>
<u>Headquarters Area</u>								
Short-term parking	17 cars	3.5 persons/car	60	40.0				
	1 bus	35 persons/bus	35	40.0				
	4 RVs	4 persons/RV	16	40.0				
Park Staff	2 cars	4 persons/car	8	40.0				
			<u>119</u>					
<u>Primary River Access & Day Use</u>								
Floaters	80 cars	3.5 persons/car	280	1.0	280	122	81	22,680
	5 buses	20 persons/bus	100	1.0	100	122	81	8,100
	5 RVs	4 persons/RV	20	1.0	20	122	81	1,620
Picnicking	2 acres	5 sites/acre 4 persons/site	40	1.8	72	138	92	6,624
Swimming	1 acre	60 persons/acre	60	2.0	120	102	68	8,160
			<u>500</u>					
<u>Ozark Camping & Day Use</u>								
Picnicking	2 acres	5 sites/acre	40	1.8	72	138	92	6,624
		4 persons/site						
Swimming	1 acre	60 persons/acre	60	2.0	120	102	92	8,160
Camping	50 sites	2 persons/site	100	1.0	100	245	163	16,300
			<u>200</u>					
<u>Primitive Camping</u>								
Camping	75 sites	2 persons/site	150	1.0	150	245	163	<u>12,225</u>
								<u>90,493</u>
						Estimated Visitation		90,000

Steep hillsides and bluffs characterize this area. The total acreage of the Pruitt area is 2,104 acres. However, developable area (land from 0 to 10 percent slope) accounts for only 392 acres (18.6 percent). Of the developable area, 325 acres are located outside of the 100-year floodplain.

The soils in this part of Newton County have evolved from limestone formations and are generally categorized as Ozark Highlands limestone soils. These soils tend to be well to somewhat excessively drained and from very slow to moderate rapid permeability.

The surface soils are loamy. Ridgetops and sideslopes are silt loam or sandy loams and are stony or cherty. The floodplains or low terraces are mostly silt loam or sandy loam. Twelve general soil series occur on the site.

Arkana - Moko Complex

Slopes from 8 to 40 percent, well-drained, very slow to moderate permeability
Surface layer--very cherty to stony silt loam, 2 to 7 inches thick
Subsurface layer--very cherty to stony clay and silt loam, 4 to 8 inches thick
Subsoil--
 Upper - very cherty silt clay, 4 inches thick
 Middle - cherty clay, 6 inches thick
 Lower - clay, 6 inches thick
Underlying material--limestone bedrock

Steep slopes, shallow depth to bedrock, and presence of clay combine to severely limit development on these soils.

Brockwell

Slopes from 8 to 20 percent, well-drained soils with moderate permeability
Surface and subsurface layers--fine sandy loam, 12 inches thick
Subsoil--extends to 80 inches
 Upper - fine sandy loam
 Middle - fine sandy loam
 Lower - sandy clay loam

This soil has good potential for development. There are no significant limitations for most uses except as moderate erosion hazard or exposed areas during construction.

Noark

Slopes from 3 to 45 percent, deep, well-drained, soils moderate to slow permeability
Surface and subsurface layers--cherty silt loam, 10 inches thick

Subsoil--

- Upper - cherty silty clay loam, 7 inches thick
- Middle - cherty clay, 13 inches thick
- Lower - cherty clay

Depth to bedrock is 72 inches or more. This soil has fair potential for most development. Slope is a moderate limitation for buildings and a severe limitation for large structures. Low strength and slope are moderate limitations for local roads and streets. Slope and slow permeability are moderate limitations for septic tank absorption fields.

Healing

- Slopes from 0 to 3 percent, deep, well-drained, moderately permeable soil on stream terraces and floodplains
- Surface layer--silt loam, 15 inches thick
- Subsoil--
 - Upper - silt loam, 12 inches thick
 - Middle - silt loam
 - Lower - silt loam

Frequent and severe flooding of this bottomland soil severely limits its use for most development.

Clarksville

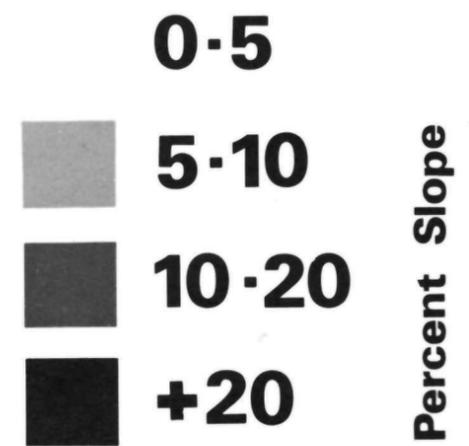
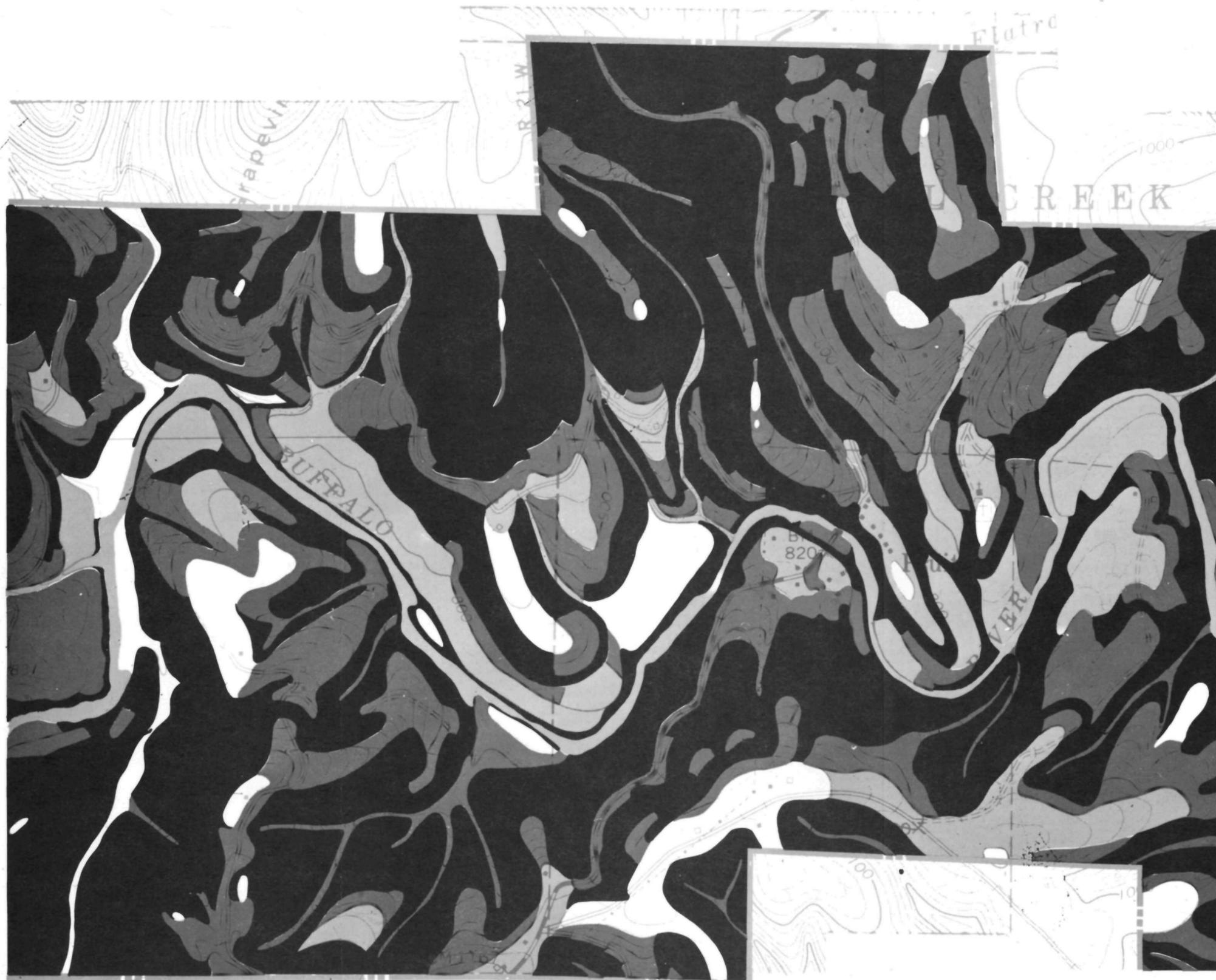
- Slopes from 20 to 40 percent, deep, very cherty, somewhat excessively drained soils on steep sideslopes and narrow ridgetops
- Surface layer-very cherty silt loam, 13 inches thick
- Subsoil--
 - Upper - very cherty silty clay loam, 34 inches thick
 - Lower - very cherty silty clay, 49 inches thick
- Underlying material--very silty cherty clay loam

Development on this soil is severely limited by the steepness of the slopes on which it occurs.

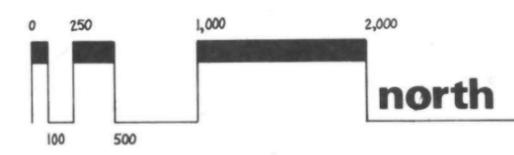
Nixa

- Slopes from 3 to 12 percent, deep, very slowly permeable soils on upland ridgetops and sideslopes
- Surface and subsurface layers--very cherty silt loam, 8 inches thick
- Subsoil--
 - Upper - very cherty silt loam, 10 inches thick
 - Lower - brittle fragipan of very cherty silt loam
- Underlying material--massive chert bed or cherty clay

Low strength and 8 to 12 percent slopes and coarse fragments are moderate factors limiting development on this soil.



**SLOPE
ANALYSIS**



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 BUFFALO NATIONAL RIVER, ARKANSAS
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Portia

Slopes from 8 to 12 percent, deep, well-drained, moderate to slow permeable soil on uplands

Surface layer--fine sandy loam, 7 inches thick

Subsurface layer--fine sandy loam, 3 inches thick

Subsoil--

Upper - loam, 14 inches thick

Middle - clay loam, 22 inches thick

Lower - sandy clay, 24 inches thick

This soil has good potential for most development. Shrink/swell potential and low strength are moderate limitations. Moderately slow permeability is a moderate limitation for septic tank absorption fields.

Razort

Slopes from 0 to 3 percent, deep, well-drained, moderately permeable soil on low terraces, floods common

Surface layer--silt loam, 8 inches thick

Subsoil--silt loam, 46 inches thick

Underlying material--gravelly silt loam

These soils have poor potential for most development. Flooding is a severe hazard for dwellings, large structures, local roads and streets, and septic tank absorption fields.

Mountainburg

Slopes from 1 to 40 percent, shallow, well-drained, moderately to rapidly permeable soils

Surface layer--stony fine sandy loam, 1-inch thick

Subsurface layer--very gravelly fine sandy loam, 5 inches thick

Subsoil--very gravelly sandy clay loam, 12 inches thick

Underlying material--sandstone bedrock less than 20 inches deep

This soil has poor potential for most development. Depth to bedrock and surface stones are severe limitations for buildings, large structures, local roads and streets, and septic tank absorption fields. These limitations are very difficult to overcome.

Boden - Moko Complex

Slopes from 8 to 40 percent, deep, well-drained, moderately to slowly permeable soil

Surface and subsurface layers--very stony clay loam to fine sandy loam, 7 inches thick

Subsoil--

Upper - sandy to stony clay loam, 4 inches thick

Middle - sandy to stony clay, 21 inches thick

Lower - sandy to stony clay loam, 10 inches thick

Underlying material--fine sandy loam and limestone bedrock

Steep slopes and the presence of clay and large stones limit development on these soils.

Britwater

Slopes from 1 to 12 percent, deep, well-drained, moderately permeable soil

Surface layer-gravelly silt loam, 6 inches thick

Subsoil--

Upper - gravelly silty clay loam, 16 inches thick

Middle - very gravelly silty clay loam, 38 inches thick

Lower - very gravelly silty clay

This soil has good potential for most development. Moderate limitations exist for some uses because of low bearing strength and limitations are slight for septic tank absorption fields.

Lindside

Slopes from 0 to 3 percent, deep, well-drained, moderately permeable soils on floodplains

Surface layer--silt loam, 8 inches thick

Subsoil--

Upper - silt loam, 9 inches thick

Upper middle - silty clay loam, 13 inches thick

Lower middle - silt loam, 14 inches thick

Lower - silt loam and silty clay loam, 16 inches thick

The flood hazard limits the desirability of development on these soils.

The Soil Suitability chart indicates the relative suitability of the above soil series for certain types of use. Ratings of slight, moderate, or severe are relative gradations, indicative of the amount of effort required to accommodate a particular use on a particular soil. Slight limitations indicate few, if any, problems for a use. Moderate limitations indicate that there are some incompatibilities between a soil and a use, but careful engineering design, construction, and maintenance can mitigate the problems. Severe limitations portend extensive engineering and mitigation to adapt a use to a soil.

Climate

The climate of the Buffalo River is temperate. The average annual temperature is 58 degrees Fahrenheit, and the average day-night temperature difference is approximately 29 degrees. Summers are long and warm, with July temperatures averaging about 80 degrees. The frost-free season averages 199 days.

The average annual precipitation is 46 inches with distribution relatively uniform throughout the year, although spring months receive slightly higher amounts. From records that date back to 1900, the greatest annual precipitation was 82 inches a year in 1927, and the least was 30 inches in 1901. Snowfall averages 12 inches a year and may occur from November through March.

soil suitability

SOIL SERIES	USES					Comments
	Recreation	Development	Sanitary Fac.	Water Mgmt.	Source Mat'l.	
Arkana-Moko Complex	■	■	■	■	■	Steep slopes
Boden-Moko Complex	■	■	■	■	■	Steep slopes
Brockwell	◑	■	◑	■	■	Slopes 8-20%
Noark	■	■	■	□	■	Stones & Clay
Healing	□	■	■	◑	◑	Floods
Clarksville	■	■	■	■	■	Sideslopes
Nixa	■	◑	■	■	■	Ridgetops
Portia	◑	◑	◑	◑	◑	Upland
Razort	□	■	■	◑	◑	Low terraces
Mountainburg	■	■	■	■	■	Shallow bedrock
Britwater	□	□	◑	□	■	
Lindside	◑	■	■	■	■	Floods

LIMITATIONS

- Slight
- ◑ Moderate
- Severe

pruitt

DEVELOPMENT CONCEPT PLAN
Buffalo National River - Arkansas

There is some variability in annual rainfall at local measuring stations: Compton Station recorded 44 inches; the Jasper station recorded 46 inches. Compton is 14 miles away from the Pruitt ranger station and Jasper 5 miles away.

Temperatures have been recorded at the following three stations in the Buffalo River area: Harrison - 13 air-miles from Pruitt; Gilbert - 24 air-miles from Pruitt; and Marshall - 31 air-miles from Pruitt. Gilbert, Marshall, and Harrison temperatures are generally comparable. Gilbert, being within the immediate Buffalo River valley, is generally 1 or 2 degrees warmer than Marshall or Harrison. Temperature extremes of 114 degrees and -23 degrees have been recorded at Gilbert.

Prevailing southerly winds are moderate. Drought conditions, common to the Great Plains, often extend into the Ozarks and affect streamflow and plant and animal life.

Table 4. Monthly and Annual Precipitation

<u>MONTH</u>	<u>AVERAGE PRECIPITATION (Inches)</u>	<u>AVERAGE ANNUAL PRECIPITATION (Percent)</u>
January	3.4	7.0
February	3.1	6.4
March	3.8	7.8
April	5.2	10.7
May	5.9	12.1
June	4.4	9.1
July	4.2	8.6
August	4.3	8.9
September	3.9	8.0
October	3.6	7.4
November	3.3	6.8
December	<u>3.5</u>	<u>7.2</u>
Annual	48.6	100.0

Air Quality Measurements of air quality parameters in Buffalo National River are generally nonexistent. Waggoner (1978) has provided data on particle scattering extinction coefficient for the period November 4 - December 4, 1975, at Hall Mountain, near Huntsville, Arkansas. These nephelometer measurements of b_{sp} ranged from about $0.9 \times 10^{-6} \text{ m}^{-1}$ to $2 \times 10^{-4} \text{ m}^{-1}$ at 550 nanometers. These values correspond to visual ranges of between 170 and 20 kilometers.* The values are distributed bimodally, with a broad, primary mode at approximately 87 kilometers and at a narrow mode 27 kilometers.

*assuming visual range = $\frac{3.92}{b_{sp}}$

Local sources of air pollution include motor vehicle emissions, smoke from occasional clearing of pasturelands, and unsurfaced roads, which are responsible for fugitive dust.

A coal-fired electrical generating plant will be constructed at Newark, approximately 75 miles to the east. The plant will generate up to 1,000 megawatts of power, and it may have an impact on air quality in Buffalo National River unless adequate control technology is utilized at the plant.

Additional visibility measurements are planned for 1979, and particulate sampling is underway. When available, the results of these analyses will help to provide baseline data on air quality.

Water Resources

Surface Water Sources. Buffalo River--which originates in the Boston Mountains almost 2,400 feet above mean sea level--drains an area of approximately 1,400 square miles as it meanders eastward to join White River. Major tributaries to Buffalo River include Little Buffalo River, Richland Creek, Bear Creek, and Big Creek.

Average annual streamflow in Buffalo River at the St. Joe gauging station is 1,059 cubic feet per second. Flow in the river is lowest in late summer and early fall and highest in spring and early summer. The 100-year flood, a streamflow with a 1 percent chance of occurring in any one year, has an estimated discharge of approximately 32,242 cfs at Pruitt; the flood crest here is approximately 800 feet above mean sea level. Such flooding may occur in the Buffalo River drainage at any time of year.

Surface Water Quality. The Buffalo River is one of the few remaining free-flowing rivers in Arkansas. The river is nationally known for its scenic beauty and recreational opportunities. The Arkansas Department of Pollution Control and Ecology has designated the entire river as a class AA stream for smallmouth bass fish. A class AA stream is described as having extraordinary recreational and aesthetic value and is suitable for primary contact recreation, propagation of desirable species of fish, wildlife, and other aquatic life, raw water source for public water supplies, and other compatible uses.

In accordance with the provisions of section 208 of P.L. 92-500, the state of Arkansas has been monitoring the water quality of Buffalo River at stream mile 97, which is 7 stream miles below the Arkansas 7 and bridge at Pruitt. Data show that Buffalo River has excellent water quality at this point; however, one dissolved oxygen violation was measured at 5.69 mg/l in August 1974.

A more comprehensive University of Arkansas study, sponsored by the National Park Service, substantiates the state of Arkansas results to date. All data indicate that existing water quality exceeds the water quality standards set by the state of Arkansas.

Interim regulations (title 40, Code of Federal Regulations) require a reclassification of all stream segments in accordance with the following criteria: water quality segments and effluent limited class segments. By definition, a water quality segment is any segment where water quality is meeting and will continue to meet water quality standards after the application of best practicable technology for industry and secondary treatment for municipalities. An effluent limited class segment is any segment where it is known that water quality does not meet applicable water quality standards even after the application of technology for industry and secondary treatment for municipalities.

The state of Arkansas has classified the first 126.5 stream miles (from the confluence of Buffalo and White rivers to Ponca) as an effluent limited class segment and from Ponca to the origin of Buffalo River (22 miles) as a water quality segment. All major tributaries to Buffalo River are classified as water quality segments with the exception of Little Buffalo, which has been classified as follows: confluence of Little Buffalo with Buffalo River to Henson Creek (7.2 miles), effluent limited segment; Henson Creek to the origin of Little Buffalo (15 miles), water quality segment.

Groundwater Sources. Groundwater in the area is obtained from shallow aquifers of Mississippian and Pennsylvanian age and from deeper aquifers of Cambrian and Ordovician age. The shallow aquifers commonly yield 2-6 gallons per minute, but in highly fractured zones and along bedding planes, yields of 25-50 gallons per minute may be encountered. Deep artesian aquifers commonly yield 150-300 gallons per minute; however, yields are highly variable, and yields up to 500 gallons per minute have occasionally been encountered. The deep aquifers are most dependable as a source of water for municipal, industrial, and agricultural uses.

Recharge to the shallow aquifers is by a combination of local precipitation and upward vertical movement of groundwater from the deeper aquifers.

Groundwater Quality. Information on groundwater quality for each aquifer underlying the Pruitt area is not available. The common practice when drilling wells in the region is to encase the upper 20 feet of the well to keep the soil overburden from sloughing into the well. The remaining portion of the well, if it is drilled through hard rock, is left uncased. Grout is seldom if ever used to seal the annular space between the casing and borehole. Completing wells in this fashion allows water from all aquifers intercepted by the borehole to mix. Surface waters may also be introduced into the well because of the absence of grout.

The location of the nearest well completed by the National Park Service in accordance with EPA standards is located at Pruitt and is locally known as residence 4-9. Tables found in appendix F reflect the quality of water that may be expected when all water-producing zones from the formations at St. Joe to Jefferson City are mixed.

Availability of Water and Treatment of Wastes. Existing and future wells providing potable water to developments and campgrounds are or will be located out of the floodplain and uphill from facilities served, to allow for gravity flow in future distribution systems.

Wells drilled since establishment of Buffalo National River are to the following general specifications:

Drill a 6-inch-diameter test well to a reliable source of water (± 200 ft.)

Ream test hole to 10-inch diameter from surface to 20 foot depth

Install 6-inch diameter black steel well casing

Grout well around casing

All National Park Service potable water distribution systems are equipped with hypochlorinators, and samples are taken and analyzed twice a month to maintain a safe water supply.

The Buffalo River Flooring Company at Marshall (the only known source of industrial waste) treats its sawdust leachate and runoff in a two-stage aerated lagoon.

Nonpoint sources of water pollution are due to widespread and diffused sources as opposed to point sources, which are readily traceable to a single outlet.

Water quality studies on Buffalo River by the University of Arkansas for the National Park Service have identified the following as the principal nonpoint sources of pollution: (1) cattle, (2) septic tank effluent from the many nonincorporated towns and farmhouses within the watershed, and (3) visitor use of the river (wading and boat trips).

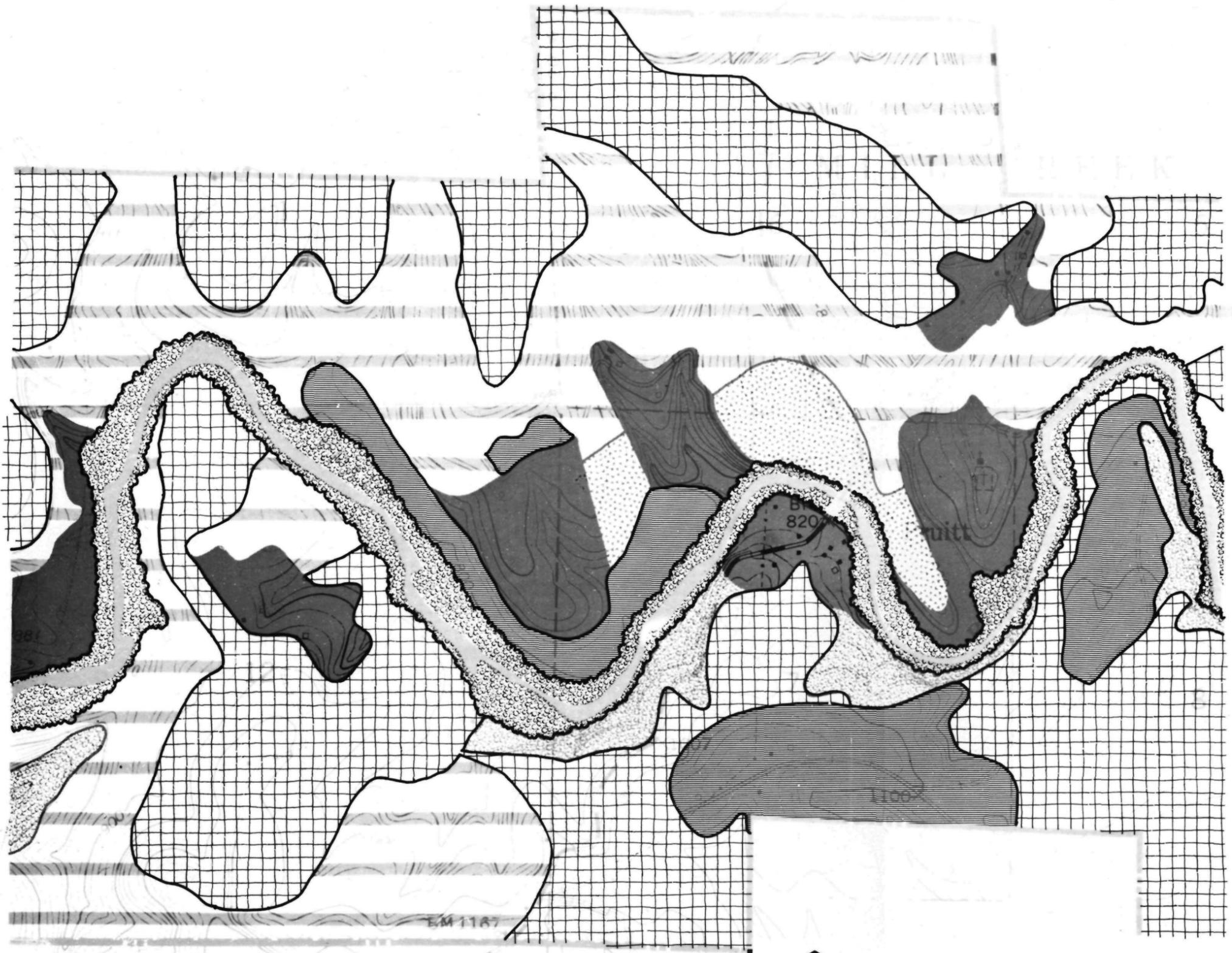
A continuing effort by the state of Arkansas and the National Park Service to identify all nonpoint sources of pollution as mandated under section 208 (P.L. 92-500) is underway.

Tables found in appendix E reflect the chemical analysis of the Buffalo River near St. Joe, Arkansas.

Vegetation

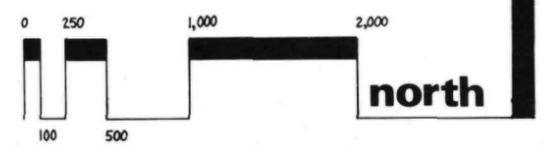
Floodplain. Vegetation found in the floodplain are green ash, silver maple, and boxelder. These species occur on low, relatively flat terraces and are subject to flooding almost yearly. Streamside species include sycamore, black river birch, black willow, or cottonwood. Gravel bar species include ward's willow or sandbar willow. Because streamside communities are too narrow and gravel bar communities too small for accurate delineation on a map, they have been described here.

Pasture, Meadow, and Cultivated Field. Pastures, meadows, and cultivated fields are open areas with few or no trees; management practices have occurred or are occurring here.



-  Floodplain Forest
-  Pasture, Meadow, & Cultivated Field
-  Oak/Hickory Forest
-  Disturbed Area
-  Mixed Hardwood
-  Cutover Area
-  Cedar Glade

VEGETATION



PRUITT
 BUFFALO NATIONAL RIVER, ARKANSAS
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Cutover Area. Cutover can refer to any forest vegetation. Usually such areas are dominated by dense stands of small trees.

Disturbed Area. Disturbed areas are those other than cutover areas, pastures, meadows, or cultivated fields; however, they may contain cultural features such as buildings, campgrounds, etc.

Mixed Hardwood. Generally, mixed hardwoods provide a transition between the floodplain and oak/hickory or cedar glade vegetation. They occur typically in moist areas on north-facing slopes above the river and along small mesic streams and upland ravines. Such areas are frequently steep sided with a northerly exposure. Oak/hickory species occupy the uplands. Floodplain or lowland species include American elm, green ash, silver maple, sweetgum, white ash, bitternut hickory, hackberry, black gum, black walnut, shumard oak, and white oak.

Cedar Glade. Cedar glades exist almost exclusively as narrow bands of vegetation on the tops or steep sides of limestone or dolomite bluffs. Glades have a variable vegetative composition, with drier areas supporting mainly red and some white cedar, prairie grasses (if undisturbed), or weedy grasses and forbs (if heavily grazed). More mature glades support oak/hickory forests with little cedar.

No rare, threatened, or endangered vascular plants have been identified within the Pruitt area (Babcock 1977, 1978).

Wildlife

Wildlife present along Buffalo River is typical of the deciduous forest biome. In general, the wildlife habitat has decreased in recent decades as a result of continued clearing of forested lands for pastureland. The decrease is applicable to species that favored climax deciduous forest cover. Habitat diversity created by land clearing and other cover manipulation practices has actually benefited wildlife quantitatively and qualitatively.

Arkansas game animals present in Buffalo National River are white-tailed deer, squirrel, rabbit, bobwhite quail, mourning dove, and wild turkey. Fur-bearing animals found in the Pruitt area are beaver, opossum, raccoon, mink, bobcat, gray fox, black bear, skunk, muskrat, and otter. Hunting is permitted in season within the national river boundaries but prohibited within the developed area. Red fox and mountain lion are protected species and may not be hunted. The Arkansas State Game and Fish Commission's efforts to reestablish the black bear in Arkansas have been successful to the extent that it has been reclassified to a game status.

A number of species have been extirpated from the region: timber wolf, elk, and bison. The red wolf is an endangered species. His existence in the region is in doubt. The black bear and wild turkey were once nearly extirpated in Arkansas, but these have been successfully reestablished. The ruffed grouse is locally extinct but has some restoration potential.

Buffalo River is noted for its smallmouth bass fishing. Other game fish present are the largemouth bass, spotted black bass, rockbass, sucker, catfish, bluegills, green sunfish and other sunfish. In a species survey in 1977, there were 59 species of fish recorded in the Buffalo River. Among the more unusual are the studfish, chestnut lamprey, darters, and gar.

Over 250 species of birds have been reported in the Buffalo River area. These include many migratory waterfowl, which are seen during spring and fall migrations.

The gray bat (Myotis grisescens) and the Indiana bat (Myotis sodalis) are known to live in the region, and both are on the federal endangered species list. Keen's bat (Myotis keenii), a rare species, is known to hibernate in Bat Cave at Boxley, Arkansas.

The Buffalo National River and development sites were examined in July and September 1978 by a study team (Memphis State University 1978) that produced an annual report identifying a number of bat caves and the number of individual bat species inhabiting these caves. In addition to the endangered species mentioned above, the following common species inhabit caves in the area: eastern pipistrelle (Pipistrellus subtlavus), red bat (Lasiurus borealis), and big brown bat (Eptesicus fuscus).

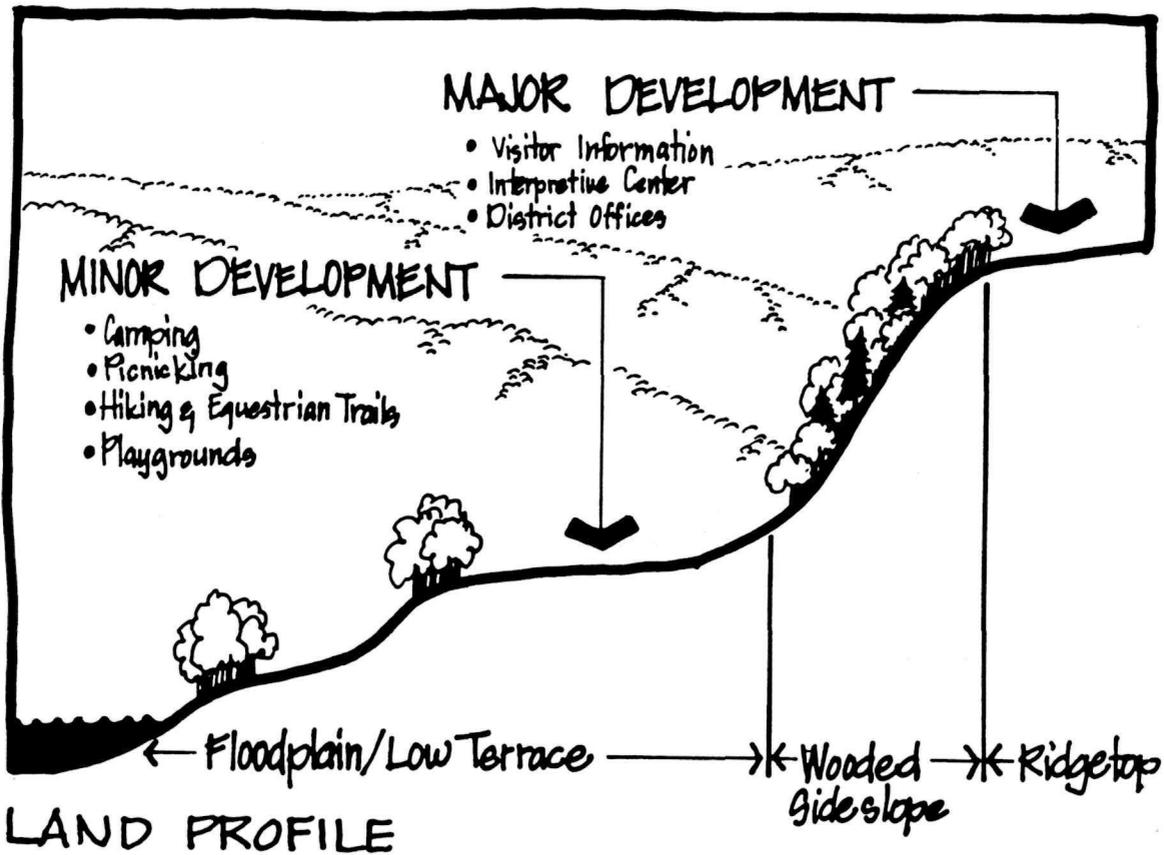
Boxley Bat Cave houses the largest known hibernating colony of Indiana bats in Arkansas, numbering about 2,000. It also contains a small hibernating colony of gray bats. The cave is heavily visited by people from the area and should be protected. Efforts in the past to have the cave designated as critical habitat for the Indiana bat have been to no avail.

Research on reptiles and amphibians is lacking at this time, and has been identified as a future need.

Aesthetic Quality

Prominent bluffs, steep hillsides, narrow ridgetops, abundant vegetation, animals, caves, springs, cultures, historic structures, people, and the river itself are features that contribute to the aesthetic quality of Buffalo National River.

Development to accommodate visitors must be located close to the river. Minor development like camping, picnicking, restrooms, hiking and equestrian trails, which do not entail substantial construction, can be placed within the floodplain where native streamside vegetation will help screen these areas. However, because of almost yearly flooding of the low terraces (and in compliance with Executive Order 11988, Floodplain Management, dated May 24, 1977), substantial developments like visitor information facilities, interpretive centers, and district offices must be located well above the 100-year floodplain. Such major development will be designed to blend with the landforms and be screened from the river by native vegetation (see Land Profile).



The design concepts discussed above will help to preserve the aesthetic quality of Buffalo National River.

CULTURAL ENVIRONMENT

Prehistory

On the basis of archeological research in the area, it is believed that the first inhabitants of the Buffalo River region arrived during the Paleo-Indian period (ca. 10,000-6,000 B.C.). The subsistence of these early people is characterized by the hunting of large game animals, such as mammoth and bison. They were organized in small mobile bands or extended family units. They possessed a highly developed chipped stone industry, which included the manufacture of spear and dart points as well as scrapers, graters, and knives.

During the following stage, the Archaic period (ca. 6,000-1,000 B.C.), the Paleo-Indian hunters were forced to adjust to a changing environment. Because the Pleistocene megafauna became extinct, the scope of subsistence had to be widened to include the hunting of smaller animals and the gathering of natural vegetable foods. They tended to be somewhat more restricted in their settlement pattern but continued to move around in order to take advantage of seasonal animal and vegetable resources. Bluff areas and rock shelters were utilized for habitation.

During the Woodland period (ca. 1,000 B.C.-A.D. 700), the basic resource exploitation pattern of the preceding period was retained, but the manufacture of pottery was added, along with an increasingly sedentary settlement pattern. Sometime after A.D. 1, the bow and arrow came into use in the Buffalo River area. Toward the close of the Woodland period, agriculture came into practice--a revolutionary development that continued into the following Mississippian period (ca. A.D. 700-1,700).

There is no evidence of the elaborate ceremonialism and erection of large temple mounds and associated towns that characterized the Mississippian period in the Mississippi Valley and surrounding areas in the Buffalo River region. In general, the patterns of life developed during the Archaic and Woodland periods appear to have continued with little change until the arrival of European settlers in the early 19th century.

History

Northwestern Arkansas was sparsely settled by the early 1800s. Hunters, trappers, and traders were lured there by the abundant game. Some lead-mining entrepreneurs were also early residents. The rugged terrain offered little for settlers interested in farming. Ridgetops are narrow and rocky; low river terraces are limited in size but do offer deep rich soil. A few individuals did begin to settle within the Buffalo River watershed during the 1820s and 1830s, clearing fields and raising small herds of domestic animals. Hunting helped the early settlers supplement their diet, allowing them to eke out a meager existence.

One of the major engagements of the Civil War west of the Mississippi took place at Pea Ridge, Arkansas, 65 miles northwest of Harrison. Several of the small lead-mining and processing operations in the area were taken over by the Confederates, as was a saltpeter mine upriver. Generally, the Pruitt area was physically untouched by the war.

Following the war, area residents continued their subsistence living and began to augment their income with cash crops like cotton. However, inadequate roads, lack of rail service, and small acreages, all the result of the hilly landscape, prevented residents from raising their lifestyle above that of subsistence farming.

Lead and zinc mining and smelting development further downriver only slightly affected the Pruitt area. Timber harvesting for cord wood to fire the smelters and for commercial purposes depleted the easily accessible stands by the 1920s.

The depression of the 1930s, coupled with a drought during the early portion of that decade, brought hard economic times to Buffalo River once again, but subsistence farming saw most residents through this crisis.

Throughout the last 40 years, subsistence farming has characterized the lifestyle of northwestern Arkansas where today as in the 1830s the counties of the Buffalo River watershed remain among the least populated counties of the state. Within the last 20 years, economic progress has come to the area--mostly in the form of light- manufacturing companies, but also through the construction and development of four large reservoirs.

Regionally at least, northwestern Arkansas has become a favorite outdoor recreation area where the existing lifestyle remains as relaxed and uncomplicated as it must have been 100 years ago.

Archeological Sites

The Pruitt area of Buffalo National River is now being systematically surveyed for archeological sites. Such sites are known to exist, having been reported by amateur investigators and recorded by the state of Arkansas. No sites within the Pruitt district are currently listed on the National Register. However, recorded sites will receive evaluation to determine eligibility for such listing.

HISTORIC SITES

The only extant early structure is the Floyd Hawkinsmith cabin. Although this cabin has been rebuilt, its logs were originally used in the post-Civil War era. This cabin is located $\frac{1}{2}$ mile northeast of the Arkansas 7 bridge. It reflects the material and construction techniques typical of an Ozark pioneer cabin and may be a significant historic structure.

COMPLIANCE WITH SECTION 106

This Development Concept Plan is addressed in a memorandum of agreement with the Advisory Council on Historic Preservation for adoption of the Buffalo National River Master Plan and Wilderness Recommendation, which was signed by the chairman on March 15, 1975. Under the memorandum of agreement, all Development Concept Plans will be reviewed by the state historic preservation officer. If any properties listed on, or eligible for, the National Register of Historic Places are affected by the plan, documentation of the results of the review and consultation with the state historic preservation officer will be provided to the Advisory Council on Historic Preservation. If the effects are considered to be adverse, the plan will be modified to avoid such effects, or appropriate mitigation will be developed in consultation with the state historic preservation officer and the Advisory Council on Historic Preservation.

SOCIOECONOMIC ENVIRONMENT

Transportation

Arkansas 7 leads south from Bull Shoals Lake near the Arkansas/ Missouri border through Harrison and Jasper and south to I-40 at Russellville. While not as heavily used as U.S. 65, Arkansas 7 (2,000 vehicles per day, 1976) is noted as a scenic drive through the Ozark and Quachita mountain country.

To the north, Harrison is only 15 miles away. The community of Jasper is situated 5 miles south of the Arkansas 7 bridge and is the county seat for Newton County. Continuing south, no major community exists until the junction of Arkansas 7 with I-40 some 70 miles away.

Though commercial bus service travels Arkansas 7, automobiles are expected to continue to be the major means of access.

Land Use

Historically, the Pruitt area was a mixed area of bottomland farms surrounded by forest. In 1970, Pruitt was incorporated as a town, with approximately 20 permanent residences and about 10 business enterprises. In 1972, 77 people resided there, although less than 3 percent of the incorporated area was developed. Currently, three privately owned houses are within the Pruitt developed area, and about 8 miles of gravel and dirt roads provide access to the area.

Population

Pruitt is situated in the sparsely populated Newton County. Total population of the county was 5,844 in 1970, down from the 1960 total of 5,963. Newton County's density of 7.4 people/square mile make it the most thinly populated of the nine counties in northwestern Arkansas, although it is the fourth largest in terms of area. The largest community in the county is Jasper, with a 1970 population of 394.

Economic Development

Newton County remains a rural county with a largely agricultural economic base. As with much of the Buffalo River drainage, the farmland is no longer sufficiently productive to support substantially larger populations. Most residents supplement their incomes with jobs in nearby towns. As agriculture declines, tourism industry becomes an important part of the local economy.

THE PLAN

DEVELOPMENT

The Pruitt area will serve as a district management headquarters, covering the upper one-third of the Buffalo National River.

Under the proposal, the existing Pruitt district headquarters on the south side of the river immediately upstream from the Arkansas 7 bridge will be phased out, and a new district headquarters/ interpretive center will be consolidated and constructed near Arkansas 7 immediately north of the bridge. A 25-car and 5-bus/RV parking lot will be built in association with this facility; in addition, a staff residence will either be attached or constructed in close proximity for protection purposes.

The adjoining plateau and floodplain will serve as the primary river put-in point, providing access for commercial canoe rental, large groups of floaters and the general public. A 75-car and 8-bus/RV parking area will be provided to serve the primary river access point; long-term parking for a 25-car and 2-bus/RV parking lot will also be built above the floodplain for river users and hikers.

To reach the currently accessible swimming beaches along the south riverbank, a pedestrian walkway should be attached to the existing one, or constructed in concert with any future bridge on the highway. To facilitate use of the existing swimming holes on the south side of the river, an access road, a 40-car parking area constructed with stabilized turf, a changing house and 10 picnic tables, will be placed in the area south and east of the existing bridge.

The focal point for onsite interpretation will be off Arkansas 7 at the Ozark floater/hiker campground. This development will serve as a secondary river access point (a convenient put-in for campers and other recreationists) and will include a day use area with a pavilion, swimming, picnicking, and 50 primitive campsites, with a nature trail and campfire circle. A 50-car and 5-bus/RV parking lot will be constructed to serve this development. The existing road will be upgraded.

A new maintenance area has been constructed at a site adjacent to a secondary road leading east from Arkansas 7. The district fire/rescue cache will be located approximately 300 feet east of the maintenance area on the same side of the road. The fire/rescue cache on less than 1/3 acre of land will be enclosed by a security fence. Within the fence, there will be located a heated 1,500-square-foot building for two fire trucks, available potable water for this facility, 800 square feet of covered storage space for rescue boats and fire equipment, canoe storage racks, 600 square feet of graveled parking, and approximately 4,000 square feet of graveled turning space. The remainder of the site will be vegetated.

Personnel necessary for protection will continue to live in existing houses dispersed throughout the district.

The existing Paradise Hill complex (gift shop) is not compatible with approved planning and park management concepts and will be phased out and converted to a scenic overlook with 8- to 10-car parking, restrooms, and 10 picnic tables.

A future option of the proposal will provide a primitive campground and some parking on the river bend directly downstream and across the river from the primary river access point. This property is known locally as the Hamilton tract. Access to this area will be along the existing spur road leading off Arkansas 7, which divides with a secondary road leading to the site. The entire road will be upgraded but not paved. Parking will be provided for 75 cars and 10 buses/RVs. A new well and potable water will be provided and will meet EPA/PHS standards.

Energy conservation will be applied where possible. New structures should be heated and cooled by passive solar systems. Buildings should be sited to take advantage of southern orientations to optimize solar potential. Developments should be clustered to reduce road network systems and minimize the extent of utility systems. Low volume flush toilets should also be utilized where possible. The National Park Service, where practical, will implement energy-saving systems and will endeavor to carry out the "Draft Energy Conscious Planning Guidelines," September 1980.

Accessibility to and use of park facilities by physically and mentally handicapped visitors will be provided in conformance with applicable laws and regulations. Historic structures open to the public will be made accessible to the handicapped if their historic integrity will not be substantially compromised. Special populations would be provided with a variety of recreational, cultural, and educational activities, to include the access and use of interpretive contact facilities, interpretive areas, trails, campgrounds, picnic areas, swimming beaches, toilet facilities, and so forth.

DEVELOPMENT PRIORITIES

The preliminary features of this development concept plan are listed below in order of development priority. The objectives are to upgrade the Pruitt area's existing conditions and deficiencies and to serve the numbers of visitors anticipated during the next several years.

Primary River Access

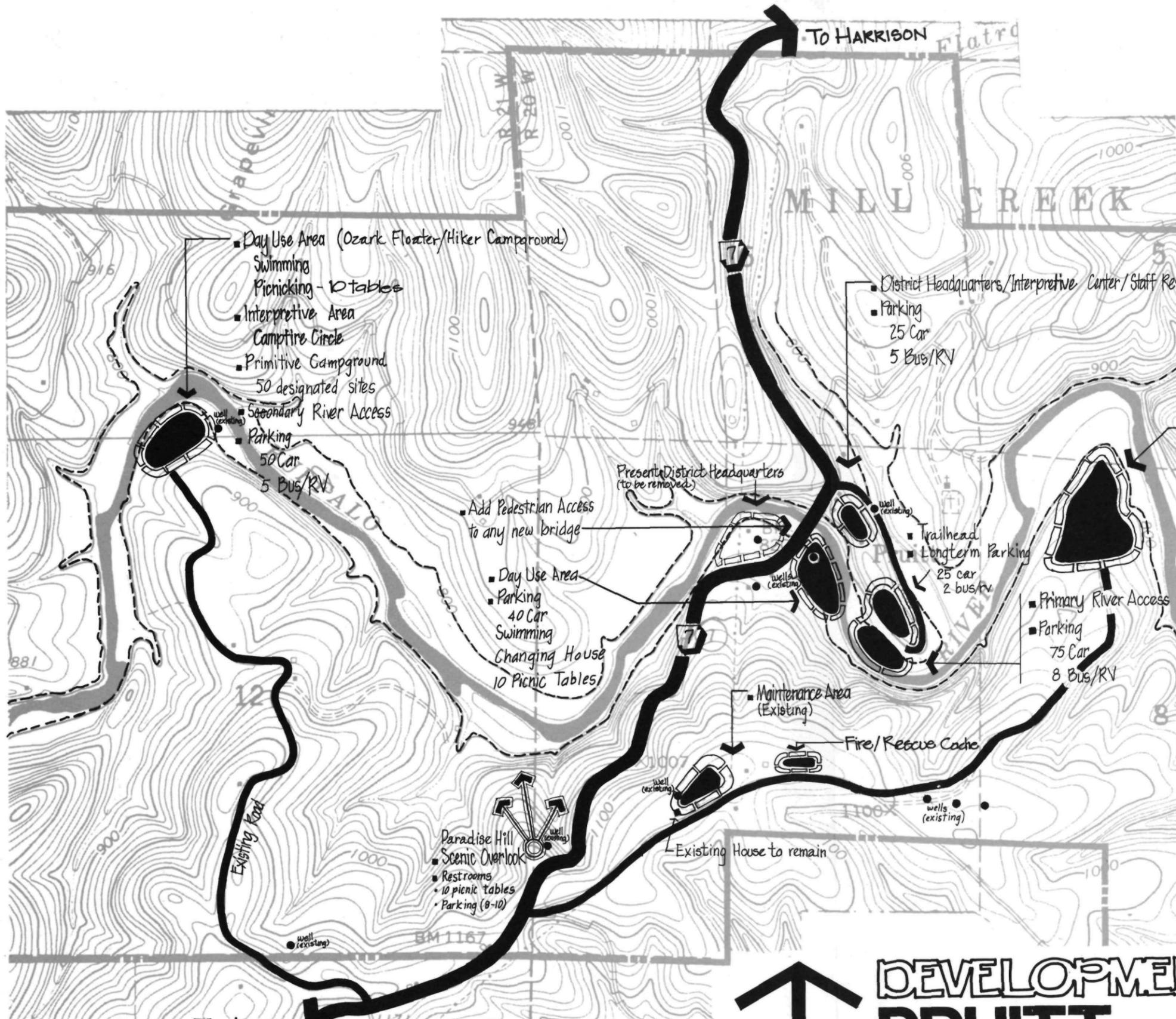
Provide for a primary river access, trailhead, and parking for 75 cars and 8 buses/RVs

Provide long-term parking for 25 cars and 2 buses/RVs

Day Use

Provide access road and parking for 40 cars

Provide changing house and 10 picnic tables



- Day Use Area (Ozark Floater/Hiker Campground)
- Swimming
- Picnicking - 10 tables
- Interpretive Area
- Campfire Circle
- Primitive Campground
- 50 designated sites
- Secondary River Access
- Parking
- 50 Car
- 5 Bus/RV

- District Headquarters/Interpretive Center/Staff Residence
- Parking
- 25 Car
- 5 Bus/RV

- Primitive Campground (Future option)
- 75 designated sites
- Secondary River Access
- Parking
- 75 Car
- 10 Bus/RV

- Add Pedestrian Access to any new bridge
- Day Use Area
- Parking
- 40 Car
- Swimming
- Changing House
- 10 Picnic Tables

- Trailhead
- Longterm Parking
- 25 car
- 2 bus/rv

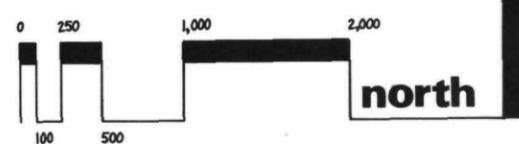
- Primary River Access
- Parking
- 75 Car
- 8 Bus/RV

- Paradise Hill
- Scenic Overlook
- Restrooms
- 10 picnic tables
- Parking (8-10)

Existing House to remain

----- 100 Year Flood Crest at about elevation 800 above mean sea level.

PROPOSED DEVELOPMENT



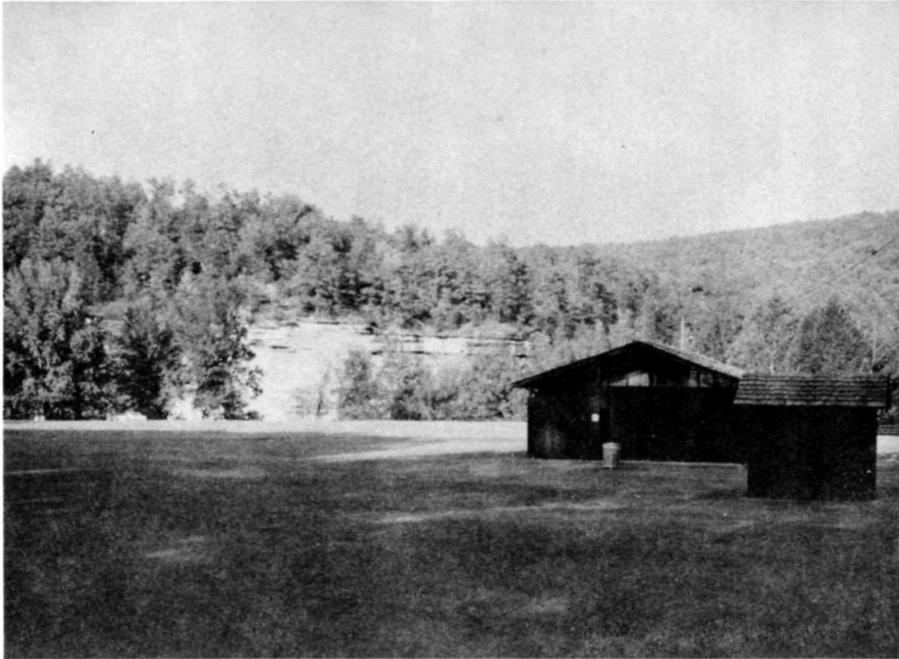
DEVELOPMENT CONCEPT PLAN

PRUITT

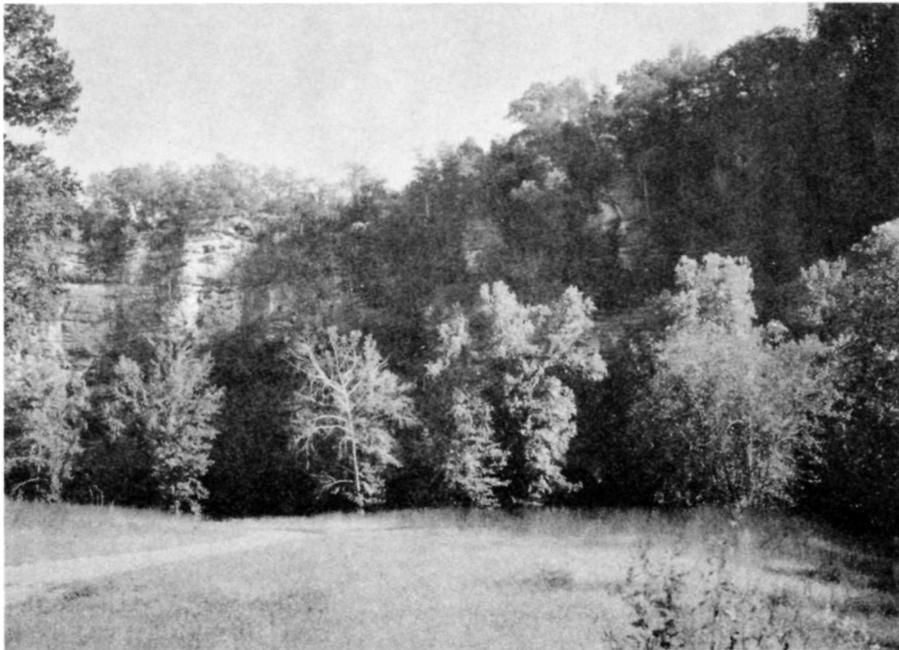
BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

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Day Use Area
(Ozark Floater/Hiker Campground)



Primary Put-In, Arkansas 7



Primary Put-In, Arkansas 7

District Headquarters/Interpretive Center/Staff Residence

- Construct the facility
- Provide parking for 25 cars and 5 buses/RVs
- Tie in to the existing well
- Provide potable water
- Connect to power
- Provide telephone service
- Provide a pedestrian access to new bridge
- Remove the existing district headquarters complex and maintenance area

Scenic Overlook (Paradise Hill)

- Provide restrooms
- Provide 10 picnic tables
- Provide parking for 8-10 cars

Fire/Rescue Cache

- Construct a 1,500-square-foot building
- Provide parking for three vehicles
- Provide covered storage--800 square feet
- Provide a canoe rack
- Enclose the area with a security fence

Day Use Area (Ozark floater/hiker campground)

- Construct a primitive campground, 50 designated campsites, a campfire circle, and a nature trail
- Provide a secondary river access
- Provide parking for 50 cars and 15 buses/RVs
- Establish a swimming beach
- Provide 10 picnic tables
- Pave a portion of the existing access road from Arkansas 7 to the day use area

Primitive Campground (future option)

- Provide 75 designated campsites
- Provide a secondary river access by upgrading the existing road
- Provide parking for 75 cars and 10 buses/RVs
- Provide a new well
- Provide potable water

LAND USE

	<u>Acres</u>
District headquarters/interpretive center/parking lot	28.0
Day use area/primary river access/parking lot	
Primitive campground/interpretive area (future option)	35.0
Fire/rescue cache	0.34
Maintenance area (constructed)	2.0
Staff housing	8.5
Ozark floater/hiker campground	12.5
Scenic overlook	1.5
Roads	
to Ozark camp	2.5
to primitive camp	<u>3.5</u>
Total	93.84

INTERPRETATION

The Pruitt area offers a variety of attractions for Ozark visitors, such as spectacular scenic views, spring and fall floral displays, amusement at Dogpatch USA, and an important canoe put-in/take-out point on the Buffalo River. Visitors will be attracted to these amenities, and it is believed that the Pruitt area will become an important visitor contact point when a higher grade of facilities, interpretive programs, and activities are offered.

The prime interpretive contact will be made on the northeastern side of the Arkansas 7 bridge. This centrally located interpretive center will provide easy access to motorists passing through the area. The visitor's principal focal point for general information will be a year-round manned information desk. The information area will also provide a sales counter with publications, maps, postcards, and slides of Buffalo National River.

Interpretive themes will be recreational and cultural sites to visit within the region and things to see and do along the Buffalo River. Other themes will be canoeing, swimming, safety, how to read the river, and ways to protect the resource. Natural history, flora, fauna, and aquatic life will be presented through various forms of exhibit media. A theater with rearview projection, audiovisual equipment, and capabilities for slide and movie programs will be part of the interpretive center. Full length movie features currently in the park's possession and those in production, along with slide programs, will be shown during the day.

Short slide/movie subjects with themes of "Reading the Waters of the Buffalo" and "Enjoying Spring and Fall Color Floral Shows by Hiking or Auto Tours" will be presented. The theater will be used for daytime demonstrations, as well as for evening programs if inclement weather should prevent the scheduled programs at the outdoor campfire.

Facilities at the day use area (Ozark floater/hiker campground) will consist of a campfire circle and a trailhead. A variety of interpretive demonstrations will be given; however, techniques of canoeing, with strong emphasis on water safety, will be given at regular intervals.

After the facilities have been phased out at Paradise Hill, picnic tables will be placed at the overlook along with an interpretive exhibit. The exhibit will relate to the view of forests below and the history of Indians, trappers, and farmers.

Small, covered, unmanned kiosks will be located at the Ozark floater/hiker campground, the Pruitt primary river access/day use area, and the Hamilton primitive campground/secondary river access (future option). These kiosks will provide up-to-date information on water levels, weather reports, naturalist programs, and official park and visitor-related notices. Floaters on the river or those putting in would be able to get the latest weather-water information, making for a safer and more enjoyable river experience.

MITIGATING MEASURES

Basic sanitation facilities such as vault toilets will be installed at primitive campsites, popular access points, and picnic areas to protect human health and preserve water quality.

Visitors will be notified by flood alert signs of possible flood danger and loss of life; personnel will advise visitors to vacate the area if necessary. Since most visitors will remain within the confines of the developed area, warnings can be immediate.

At areas designed for intensive use, such as the district headquarters/interpretive center, a package sewage treatment plant will be necessary. The sewage disposal system will be designed to meet all federal and state water quality standards and criteria and will minimize adverse impacts on water quality.

Soil erosion and siltation during initial construction will be minimized as follows: (1) temporary dams and drainage will be constructed to catch silt and allow it to be absorbed into the ground without affecting the quality of the river water; (2) soil disturbance will be restricted to minimum areas required for construction of facilities; (3) disturbed areas will be revegetated as soon as possible; and (4) sites will be carefully selected so that construction will not occur in areas especially prone to erosion. In areas where runoff from paved parking areas may be a problem, critical erosion sites will be sodded or stabilized with appropriate soil conservation techniques. River water quality should be monitored frequently during construction, to ensure that soil erosion and siltation prevention measures are working adequately.

Marked trails will be provided to confine use to narrow paths, reducing adverse effects of heavy visitor use upon vegetation.

Recreational and support structures will be located where they blend with their surroundings in order to maintain existing scenic qualities. The riverbank cover of trees and shrubs will be maintained where currently intact and allowed to regenerate where denuded.

Archeological and historical inventories will be completed to ensure that any artifacts in undiscovered but possibly important sites are not disturbed during the construction phases of the proposed development. All inventories will be completed prior to the final plan. All impacts (direct and indirect) will be considered and section 106 compliance completed as appropriate.

Sanitation, littering prevention, and air quality protection will be carried out in compliance with all local, state, and federal pollution abatement and environmental quality standards. As air quality baseline data and resource sensitivity data become available, they will be utilized to mitigate any inadvertent impacts upon air quality related values.

Both bat caves will be monitored for increases in cave use by visitors or decreases in bat populations (Myotis grisescens). If a correlation is found and grey bat populations are being adversely affected, gates will be constructed and the caves or portions of the caves will be closed to public entrance.

COST ESTIMATES

Primary river access point	
Construct parking area	161,000
Upgrade access road	32,000
District headquarters/interpretive center	
Construct facility	400,000
Construct parking area	45,000
Remove office/contact station	66,000
Revegetate area	6,000
Day use area	
Construct changing house	11,000
Construct access road	50,000
Construct parking area	44,000
Establish picnic area	10,000
Floater/hiker campground	
Establish facility (50 sites)	50,000
Provide secondary river access	110,000
Construct parking area and upgrade access road	232,500
Primitive campground (future option)	
Establish facility (75 sites)	55,000
Construct parking area	161,000
Upgrade access road	127,000
Revegetate area	4,000
Upgrade and expand utilities (water, power, toilet facilities, telephone)	350,000
Maintenance area	
Improve existing spur road	75,000
Paradise Hill (phase out)	
Revegetate area	8,000
Scenic overlook	
Construct parking area	12,000
Provide picnic tables	2,000
Provide restrooms	20,000

Miscellaneous	
Establish fire/rescue cache	127,000
Upgrade and expand utilities (water, power, toilet facilities, telephone)	15,000
Remove existing buildings (6-8)	35,000
Revegetate areas	44,000
Landscape and develop site	<u>99,000</u>
Total Gross Cost	\$2,351,500

All costs are gross amounts and include actual expenses plus design and contract supervision. Campfire circles, trail work, etc., will be accomplished by a local YACC group.

APPENDIXES

A: LEGISLATION

Public Law 92-237
92nd Congress, S. 7
March 1, 1972

An Act

86 STAT. 44

To provide for the establishment of the Buffalo National River in the State of Arkansas, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That for the purposes of conserving and interpreting an area containing unique scenic and scientific features, and preserving as a free-flowing stream an important segment of the Buffalo River in Arkansas for the benefit and enjoyment of present and future generations, the Secretary of the Interior (hereinafter referred to as the "Secretary") may establish and administer the Buffalo National River. The boundaries of the national river shall be as generally depicted on the drawing entitled "Proposed Buffalo National River" numbered NR-BUF-7103 and dated December 1967, which shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior. The Secretary is authorized to make minor revisions of the boundaries of the national river when necessary, after advising the Committees on Interior and Insular Affairs of the United States House of Representatives and the United States Senate in writing, but the total acreage within such boundaries shall not exceed ninety-five thousand seven hundred and thirty acres.

Buffalo National River, Ark. Establishment.

SEC. 2. (a) Within the boundaries of the Buffalo National River, the Secretary may acquire lands and waters or interests therein by donation, purchase or exchange, except that lands owned by the State of Arkansas or a political subdivision thereof may be acquired only by donation: *Provided*, That the Secretary may, with funds appropriated for development of the area, reimburse such State for its share of the cost of facilities developed on State park lands if such facilities were developed in a manner approved by the Secretary and if the development of such facilities commenced subsequent to the enactment of this Act: *Provided further*, That such reimbursement shall not exceed a total of \$375,000. When an individual tract of land is only partly within the boundaries of the national river, the Secretary may acquire all of the tract by any of the above methods in order to avoid the payment of severance costs. Land so acquired outside of the boundaries of the national river may be exchanged by the Secretary for non-Federal lands within the national river boundaries, and any portion of the land not utilized for such exchanges may be disposed of in accordance with the provisions of the Federal Property and Administrative Services Act of 1949 (63 Stat. 377; 40 U.S.C. 471 et seq.), as amended. With the concurrence of the agency having custody thereof, any Federal property within the boundaries of the national river may be transferred without consideration to the administrative jurisdiction of the Secretary for administration as part of the national river.

Lands and waters, acquisition.

(b) Except for property which the Secretary determines to be necessary for the purposes of administration, development, access or public use, an owner or owners (hereafter referred to as "owner") of any improved property which is used solely for noncommercial residential purposes on the date of its acquisition by the Secretary or any owner of lands used solely for agricultural purposes (including, but not limited to, grazing) may retain, as a condition of the acquisition of such property or lands, a right of use and occupancy of such property for such residential or agricultural purposes. The term of the right retained shall expire upon the death of the owner or the death of his spouse, whichever occurs later, or in lieu thereof, after a definite term which shall not exceed twenty-five years after the date of acquisition. The owner shall elect, at the time of conveyance, the term of the right

Retention rights.

reserved. The Secretary shall pay the owner the fair market value of the property on the date of such acquisition, less the fair market value of the term retained by the owner. Such right may, during its existence, be conveyed or transferred, but all rights of use and occupancy shall be subject to such terms and conditions as the Secretary deems appropriate to assure the use of such property in accordance with the purposes of this Act. Upon a determination that the property, or any portion thereof, has ceased to be used in accordance with such terms and conditions, the Secretary may terminate the right of use and occupancy by tendering to the holder of such right an amount equal to the fair market value, as of the date of the tender, of that portion of the right which remains unexpired on the date of termination.

"Improved property."

(c) As used in this section the term "improved property" means a detached year-round one-family dwelling which serves as the owner's permanent place of abode at the time of acquisition, and construction of which was begun before September 3, 1969, together with so much of the land on which the dwelling is situated, the said land being in the same ownership as the dwelling, as the Secretary shall designate to be reasonably necessary for the enjoyment of the dwelling for the sole purpose of noncommercial residential use.

Hunting and fishing, rules and regulations.

Sec. 3. The Secretary shall permit hunting and fishing on lands and waters under his jurisdiction within the boundaries of the Buffalo National River in accordance with applicable Federal and State laws, except that he may designate zones where and establish periods when, no hunting or fishing shall be permitted for reasons of public safety, administration, fish or wildlife management, or public use and enjoyment. Except in emergencies, any rules and regulations of the Secretary pursuant to this section shall be put into effect only after consultation with the Arkansas Fish and Game Commission.

Water resource projects, restriction.

Sec. 4. The Federal Power Commission shall not license the construction of any dam, water conduit, reservoir, powerhouse, transmission line, or other project works under the Federal Power Act (41 Stat. 1063), as amended (16 U.S.C. 791a et seq.), on or directly affecting the Buffalo National River and no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river is established, as determined by the Secretary. Nothing contained in the foregoing sentence, however, shall preclude licensing of, or assistance to, developments below or above the Buffalo National River or on any stream tributary thereto which will not invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the area on the date of approval of this Act. No department or agency of the United States shall recommend authorization of any water resources project that would have a direct and adverse effect on the values for which such river is established, as determined by the Secretary, nor shall such department or agency request appropriations to begin construction on any such project, whether heretofore or hereafter authorized, without, at least sixty days in advance, (i) advising the Secretary, in writing, of its intention so to do and (ii) reporting to the Committees on Interior and Insular Affairs of the United States House of Representatives and the United States Senate, respectively, the nature of the project involved and the manner in which such project would conflict with the purposes of this Act or would affect the national river and the values to be protected by it under this Act.

Administration.

Sec. 5. The Secretary shall administer, protect, and develop the Buffalo National River in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.), as amended and supplemented; except that any other statutory authority available

B: FLOODPLAIN MANAGEMENT

THE PRESIDENT

Executive Order 11988

May 24, 1977

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APPENDIX B

FLOODPLAIN MANAGEMENT

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4001 et seq.), and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Stat. 975), in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, it is hereby ordered as follows:

Section 1. Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

Sec. 2. In carrying out the activities described in Section 1 of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget requests reflect consideration of flood hazards and

to the Secretary for the conservation and management of natural resources may be utilized to the extent he finds such authority will further the purposes of this Act.

Sec. 6. Within three years from the date of enactment of this Act, the Secretary shall review the area within the boundaries of the national river and shall report to the President, in accordance with subsections 3(c) and 3(d) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132 (c) and (d)), his recommendation as to the suitability or non-suitability of any area within the national river for preservation as a wilderness, and any designation of any such area as a wilderness, shall be accomplished in accordance with said subsections of the Wilderness Act.

Area review;
report to
President.

Sec. 7. For the acquisition of lands and interests in lands, there are authorized to be appropriated not more than \$15,115,000. For development of the national river, there are authorized to be appropriated not more than \$283,000 in fiscal year 1974; \$2,923,000 in fiscal year 1975; \$3,643,000 in fiscal year 1976; \$1,262,000 in fiscal year 1977; and \$1,260,000 in fiscal year 1978. The sums appropriated each year shall remain available until expended.

Appropriation.

Approved March 1, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-807 accompanying H. R. 8382 (Comm. on Interior and Insular Affairs).

SENATE REPORT No. 92-130 (Comm. on Interior and Insular Affairs).

CONGRESSIONAL RECORD:

Vol. 117 (1971): May 21, considered and passed Senate.

Vol. 118 (1972): Feb. 7, considered and passed House, amended, in lieu of H. R. 8382.

Feb. 9, Senate concurred in House amendment.

THE PRESIDENT

floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

(a) (1) Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain -- for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared under Section 102(2)(C) of the National Environmental Policy Act. This determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

(2) If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains. If the head of the agency finds that the only practicable alternative consistent with the law and with the policy set forth in this Order requires siting in a floodplain, the agency shall, prior to taking action,

- (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and
- (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

THE PRESIDENT

(3) For programs subject to the Office of Management and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include:

(i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicating whether the action conforms to applicable state or local floodplain protection standards and (iii) a list of the alternatives considered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

(4) Each agency shall also provide opportunity for early public review of any plans or proposals for actions in floodplains, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under Section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

(b) Any requests for new authorizations or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

(c) Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provision for the evaluation and consideration of flood hazards in the regulations and operating procedures for the licenses, permits, loan or grants-in-aid programs that they administer. Agencies

THE PRESIDENT

shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

(d) As allowed by law, each agency shall issue or amend existing regulations and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council, shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their procedures in consultation with the Water Resources Council, the Federal Insurance Administration, and the Council on Environmental Quality, and shall update such procedures as necessary.

Sec. 3. In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

(a) The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

(b) If, after compliance with the requirements of this Order, new construction of structures or

THE PRESIDENT

facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

(c) If property used by the general public has suffered flood damage or is located in an identified flood hazard area, the responsible agency shall provide on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to enhance public awareness of and knowledge about flood hazards.

(d) When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

Sec. 4. In addition to any responsibilities under this Order and Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

THE PRESIDENT

Sec. 5. The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter, the Water Resources Council shall periodically evaluate agency procedures and their effectiveness.

Sec. 6. As used in this Order:

(a) The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

(b) The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

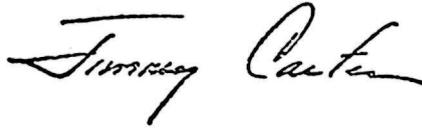
(c) The term "floodplain" shall mean the lowland and relatively flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Sec. 7. Executive Order No. 11296 of August 10, 1966, is hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

Sec. 8. Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to Sections 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

THE PRESIDENT

Sec. 9. To the extent the provisions of Section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640, 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

A handwritten signature in cursive script, reading "Jimmy Carter". The signature is written in dark ink and is centered on the page.

THE WHITE HOUSE,
May 24, 1977

C: MANAGEMENT OBJECTIVES

FROM THE STATEMENT FOR MANAGEMENT (Approved 2/77)

To preserve the natural river scene and maintain a free-flowing, nonpolluted river and to protect the historical, archeological, and cultural remains from loss through the securing of a land base within the authorized boundaries through acquisition or other means; the implementation of a viable research program; the initiation of programs of stabilization, maintenance, and protection; and, as needed, the modification of management practices and other means of eliminating conditions having adverse effects.

To provide significant recreational opportunities for visitors to the national river by reducing congestion at river put-in and take-out areas during periods of heavy visitation; permitting hunting and fishing (in designated areas in accordance with appropriate laws and consistent with the park's purpose); analyzing and evaluating the three primitive areas nominated for wilderness and encouraging backcountry use therein within yet-to-be-established carrying capacities; and providing a varied and balanced interpretive program, which emphasizes the river and the historical and archeological past and enhances visitor understanding of and interest in the past and present life in the Ozark Highlands and environment, which are still undergoing change.

To coordinate, encourage, and administer a viable research program, emphasizing the inventorying, identifying, and monitoring of the scenic, geologic, historic, hydrological, archeological, and general scientific values, as well as the physiographic and geologic condition of the river; the reintroduction of extirpated species where feasible; the maintenance of open fields where scenic and wildlife habitat will be enhanced; and the promotion of special protection for all rare and endangered species.

To maintain and foster close liaison and cooperation with governmental and nongovernmental entities and individuals who have an interest in the national river and its surroundings in order to achieve the area's purpose through the most harmonious integration possible of activities inside and outside of the national river boundaries.

D: MEMORANDUM OF AGREEMENT

Advisory Council
On Historic Preservation
1522 K Street N.W. Suite 430
Washington D.C. 20005

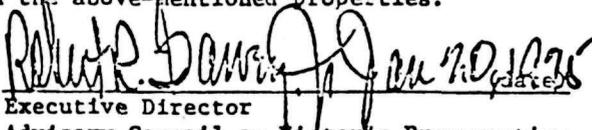
MEMORANDUM OF AGREEMENT

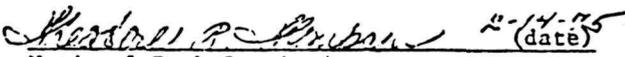
WHEREAS, the Department of the Interior, National Park Service proposes to adopt the Buffalo National River Master Plan and make a Wilderness Recommendation for the Buffalo National River; and,

WHEREAS, the Department of the Interior, National Park Service has determined that these undertakings as proposed could have an adverse effect upon cultural resources that appear to be eligible for inclusion in the National Register of Historic Places, and pursuant to Section 2(b) of Executive Order 11593, has requested the comments of the Advisory Council on Historic Preservation; and,

WHEREAS, pursuant to the procedures of the Advisory Council on Historic Preservation (36 C.F.R. Part 800), representatives of the Advisory Council on Historic Preservation, the National Park Service, and the Arkansas State Historic Preservation Officer have consulted and reviewed the undertaking to consider feasible and prudent alternatives to satisfactorily mitigate the potential adverse effects; now,

THEREFORE: It is mutually agreed that implementation of the undertaking, in accordance with the attached "National Park Service proposal to remove and/or mitigate any adverse effects on cultural resources within the Buffalo National River that might result from the Buffalo River Master Plan and Wilderness Recommendation," submitted by letter dated December 24, 1974 from Theodore R. Thompson, Acting Regional Director, Southwest Region, National Park Service, will satisfactorily mitigate any adverse effect on the above-mentioned properties.


Executive Director
Advisory Council on Historic Preservation


National Park Service
Department of the Interior


Arkansas State Historic Preservation
Officer


Chairman
Advisory Council on Historic Preservation

The Council is an independent unit of the Executive Branch of the Federal Government charged by the Act of October 15, 1966 to advise the President and Congress in the field of Historic Preservation.

E: CHEMICAL ANALYSIS OF BUFFALO RIVER

Chemical Analysis
Buffalo River near St. Joe, Arkansas
October 1974 to September 1977

	# SAMPLES	AVERAGE	RANGE minimum - maximum	
SPECIFIC CONDUCTANCE	40	207	126	- 291
pH	40	7.9	7.4	- 8.2
Water Temperature(°C)	54	16.2	(-)3	- 31
Color	39	7.7	0	- 35
Turbidity	28	7.2	2	- 30
Dissolved Oxygen	39	9.1	5.6	- 13.8
% Saturation	27	85.	67	- 97
BOD	39	0.9	0	- 2.3
Hardness(CaMg)	11	109	72	- 180
Non Carbonate	11	8	0	- 49
Calcium	11	78	50	- 110
Magnesium	9	4.4	1.7	- 13.
Sodium	12	2.4	1.1	- 4.0
Potassium	12	1.4	.1	- 7.0
Bicarbonate	6	130.	77.	- 160.
Carbonate	5	0.	0.	- 0.
Alkalinity	6	106	63.	- 131.
Carbon Dioxide	5	2.8	1.5	- 5.6
Sulfate	32	4.8	1.0	- 7.0
Chlorides	28	4.5	3.5	- 7.0
Total Dissolved Solids	39	131.	82	- 187
Nitrate	39	0.16	0.05	- .42
Phosphorous	39	0.01	.01	- .04

Trace Elements (ppb)

Arsenic	19	< 2.7	<1	- <3
Cadmium	24	< 4.5	0	- 10
Chromium	23	< 1.7	0	- 3
Copper	39	< 34	0	- 200
Iron	24.	< 189	<20	- 1100
Lead	38	< 86.	0	- 480
Manganese	40	< 46.	11	- 130
Zinc	39	10	0	- 167
Mercury	1	1.4		

Chemical Analysis
Buffalo River near St. Joe, Arkansas
October 1953 to September 1957

	# SAMPLES	AVERAGE	RANGE	
			minimum	maximum
SILICA	31	4.2	1.2	6.2
IRON	30	.02	0.00	0.15
CALCIUM	70	35.	21.	50.
MAGNESIUM	70	3.5	1.2	6.9
SODIUM	70	2.4	1.1	4.2
POTASSIUM	48	1.1	0.5	2.3
BICARBONATE	78	122.	.66	240.
SULFATE	78	6.0	2.0	16.
CHLORIDE	78	3.1	1.0	31.
FLUORIDE	30	0.1	.0	0.3
NITRATE	78	1.4	.1	5.7
Total Dissolved Solids	78	130.	77.	219.
HARDNESS				
Ca.-Mg.	78	103.	62.	204.
Non Carbonate	78	7.6	0.	30.
Specific Conductance	78	211.	138.	238.
pH	78	7.8	7.3	8.6
Color	67	8.3	3.	36.

Samples collected and analyzed by U.S. Geological Survey for the period October 1953 to September 1957. Data furnished by U.S. Geological Survey as part of their program of water resources investigations in Arkansas made in cooperation with the Arkansas Geological Commission.

F: WATER QUALITY

ENVIRONMENTAL CONSULTANTS, INC.

391 NEWMAN AVE. · P. O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL. (317) 202-8481

From Mr. Gary Moore
U.S. Department of the Interior
National Park Service
Southwest Regional Office
1100 Old Santa Fe Trail
Post Office Box 728
Santa Fe, New Mexico 87501

Date-25 October 1976

Sample Description-

Buffalo River
Brown Residence, Well #4-9
E.C.I. #7690

P. O. No. PX 7029-6-01158

Job No.- 7612-02

Alkyl benzene sulfonates	<u><0.005</u> mg/l	Manganese	<u><0.008</u> mg.
Arsenic	<u><0.002</u> mg/l	Mercury	<u>0.008</u> mg.
Barium	<u><0.03</u> mg/l	Nitrate--Nitrogen	<u>1.22</u> mg.
Bicarbonate, as CaCO ₃	<u>115</u> mg/l	Nitrite--Nitrogen	<u>0.001</u> mg.
Cadmium	<u>0.092</u> mg/l	pH	<u>7.37</u>
Calcium	<u>118.185</u> mg/l	Phenols	<u><0.001</u> mg.
Carbonate, as CaCO ₃	<u>0</u> mg/l	Phosphates:	
Chloride	<u>14.68</u> mg/l	Total filterable (dissolved) and non-filterable phosphate	<u>0.092</u> mg.
Chromium, hexavalent	<u><0.008</u> mg/l	Total filterable and non-filterable ortho phosphate	<u>0.026</u> mg.
Copper	<u>0.024</u> mg/l	Total filterable and non-filterable acid hydrolyzable phosphate	<u>0.069</u> mg.
Cyanide	<u><0.03</u> mg/l	Total organic phosphate	<u><0.001</u> mg.
Fluoride	<u><0.1</u> mg/l	Selenium	<u><0.005</u> mg.
Iron	<u><0.01</u> mg/l	Silica, as SiO ₂	<u>0.53</u> mg.
Lead	<u><0.025</u> mg/l		
Magnesium	<u>2.0117</u> mg/l		

Remarks:

Analyses Reviewed By



ENVIRONMENTAL CONSULTANTS, INC.

391 NEWMAN AVE. · P.O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL. (812) 202-0401

Date- 25 October 1976

From Mr. Gary Moore
U.S. Department of the Interior
National Park Service
Southwest Regional Office
1100 Old Santa Fe Trail
Post Office Box 728
Santa Fe, New Mexico 87501
P.O. No. PX 7029-6-01158

Sample Description-
Buffalo River
Brown Residence, Well #4-9
E.C.I. #7690
Job No.- 7612-02

Silver	<u><0.002</u> mg/l	Total dissolved solids	<u>294</u>
Sodium	<u>13.858</u> mg/l	Total hardness as CaCO ₃	<u>855</u>
Specific conductance	<u>400</u> $\mu\text{mho}/\text{cm}^3$	Turbidity	<u><2</u>
Sulfate	<u>3.60</u> mg/l	Zinc	<u>0.507</u>
Total alkalinity as CaCO ₃ , to pH	<u>115.0</u> mg/l <u>8.3</u>		
Inflection point at pli	<u>8.3</u>		

Analyses Reviewed By



Herbicides & Pesticides (ppb)					
Aldrin	5	0	-	-	
DDE	5	0	-	-	
DDT	5	< 0.4	0	-	2.0
Dieldrin	5	0	-	-	
Endrin	5	< 0.4	0	-	< 2.0
Lindane	5	< 0.2	0	-	< 1.0
Methyl Parathion	5	< 1.4	0	-	< 7.0
Toxaphene	5	< 0.2	0	-	< 1.0

Bacteriological (colonies/100 ml)					
Diate Coliform	31	< 145	< 10	-	760
Fecal Coliform	22	< 80	< 7	-	830
Streptococci	16	< 79	< 4	-	704

Samples collected and analyzed by the State of Arkansas Department of Pollution Control and Ecology in compliance with Section 208 of PL 92-500 as amended. The above tabulation was reduced from Water Quality Reports 1975-1977 inclusive as published by the U.S. Geological Survey.

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As the nation's principal conservation agency, the Department of the Interior has basic responsibilities to protect and conserve our land and water, energy and minerals, fish and wildlife, and parks and recreation areas, and to ensure the wise use of all these resources. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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