development concept plan

march 1981

BUFFALO

TYLER BEND

NATIONAL RIVER / ARKANSAS

RECOMMENDED:

John F. Turney — January 8, 1981
Superintendent, Buffalo National River

APPROVED:

Robert Kerr — January 26, 1981
Regional Director, Southwest Regional Office

DEVELOPMENT CONCEPT PLAN

TYLER BEND

BUFFALO NATIONAL RIVER

ARKANSAS

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

CONTENTS

INTRODUCTION / 1

DESCRIPTION OF THE ENVIRONMENT / 7
- Tyler Bend / 7
- Natural Environment / 13
- Cultural Environment / 28
- Socioeconomic Environment / 31

THE PLAN / 35
- Development / 35
- Development Priorities / 39
- Land Use / 40
- Interpretation / 41
- Mitigating Measures / 43
- Cost Estimates / 45

APPENDIXES
- A: Legislation / 47
- B: Floodplain Management / 51
- C: Management Objectives / 59
- D: Memorandum of Agreement / 60
- E: Chemical Analysis of Buffalo River / 61
- F: Water Quality / 63

BIBLIOGRAPHY / 67

PLANNING TEAM AND CONSULTANTS / 69

MAPS AND FIGURES

Region / 3
Silver Hill District / 5
Vicinity / 9
Slope Analysis / 11
Soil Survey / 15
Soil Suitability / 18
Vegetation / 25
Land Profile / 27
Proposed Development / 35

TABLES

1. Visitation Summary / 8
2. District Visitation / 8
3. Conceptual Estimate/Visits Per Year / 10
4. Monthly and Annual Precipitation / 20

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. Tyler Bend, located in the park's Silver Hill district at the point where U.S. 65 crosses the river, is one of these areas. As defined in the Master Plan, the purpose for Tyler Bend is to establish a developed area where visitors can obtain information, interpretation, and outdoor recreation and where district management facilities can provide protection and management of the middle one-third of the Buffalo National River. For the Tyler Bend area, the facilities suggested for consideration include a visitor contact station, a district ranger station, an amphitheater, picnic areas, boat accesses, parking lots, National Park Service housing, and a maintenance facility.

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 Tyler Bend area was entirely in private ownership. Most of the area is now in public ownership, permitting detailed site planning for the first time.

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

Of the three areas identified for major development in the Master Plan, Tyler Bend has the least existing recreational development and use; consequently, there are more options for future use.

U.S. 65 is the most heavily traveled road bisecting the river.

The floating season frequently extends into the summer months at Tyler Bend, leading to a potential conflict between floater put-in and take-out and swimming activities.

Some structures remaining at Tyler Bend may qualify as interpretive "discovery" sites. Some of these discovery sites have the potential to contribute to a cultural interpretive program.

There are few commercial recreational services within convenient driving distance of Tyler Bend at this time.

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

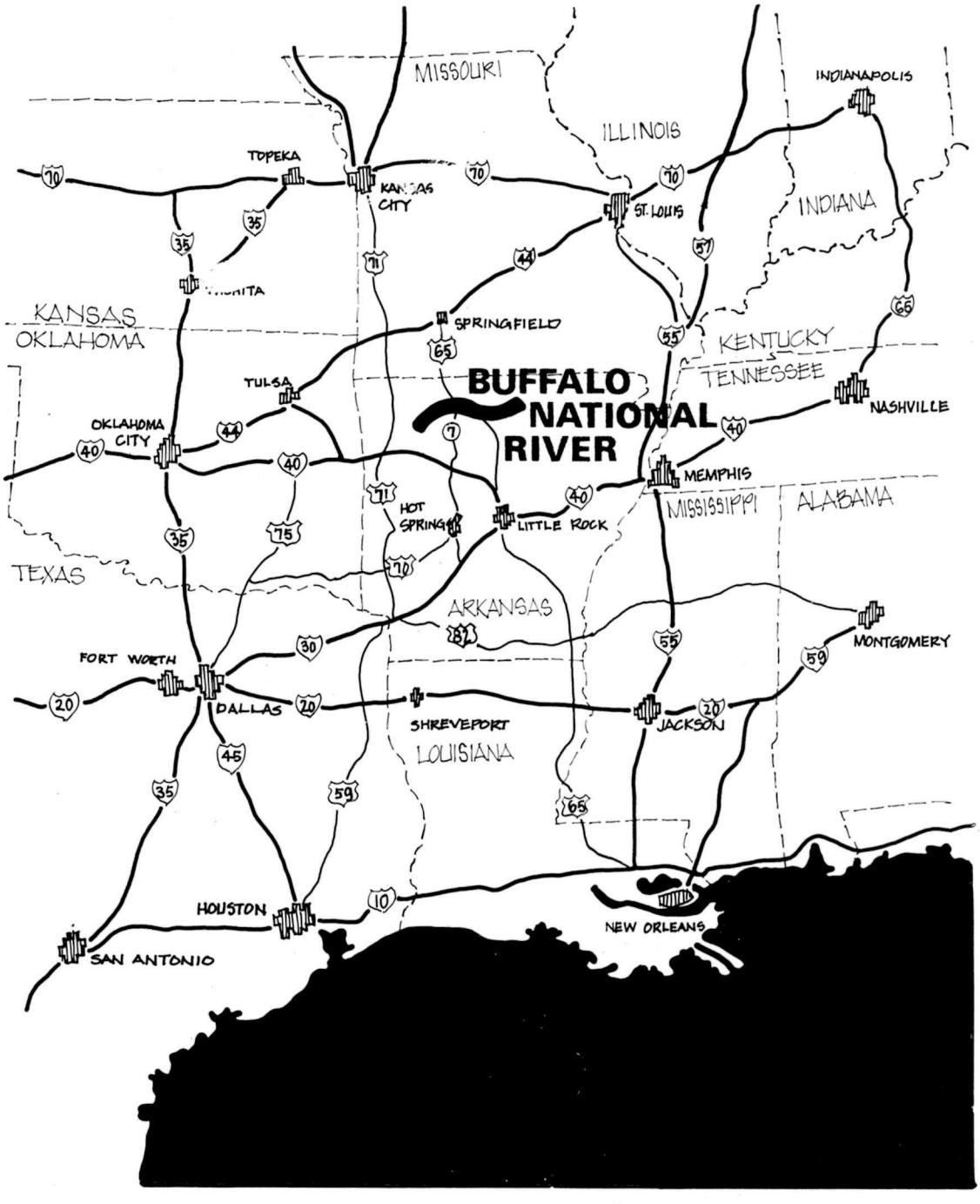
Developments need to be located within easy access of the river resource for visitor convenience, but they must be adequately screened by floodplain vegetation and landforms to visually enhance the floaters' experience.

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.

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," buildings will be designed and constructed to be energy efficient.

The limiting physical factors of rugged slopes (slopes from 10 to 20 percent grade and over), unfavorable soils, bottomland prone to flooding, travel distance, and the presence of Creek a site on the National Register of Historic Places, affect planning and design of the Tyler Bend area.



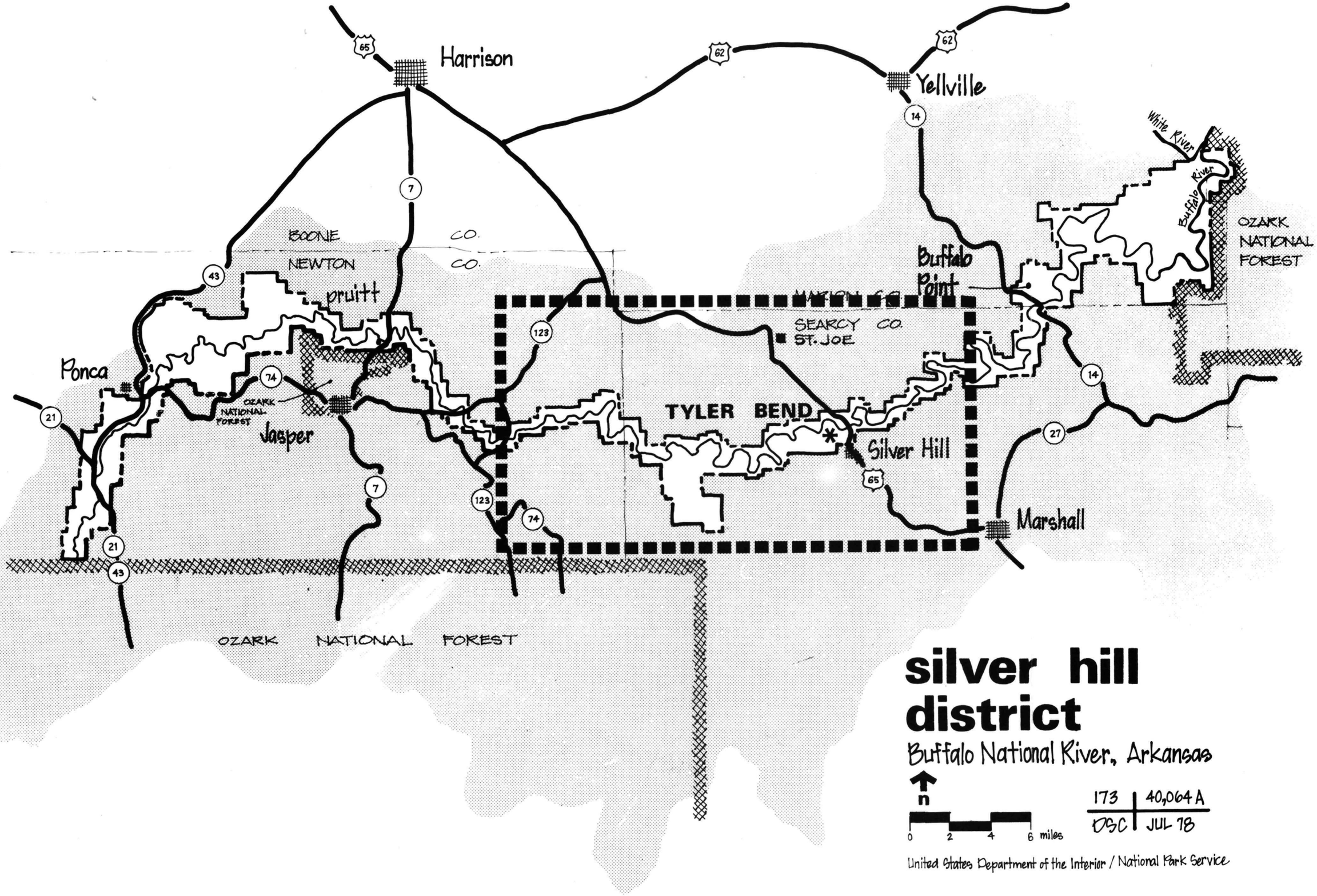
REGION

Buffalo National River, Arkansas

N

173	40,062
DSC	JUL 78

United States Department of the Interior / National Park Service



silver hill district

Buffalo National River, Arkansas

N

0 2 4 6 miles

173 | 40,064 A

DSC | JUL 78

United States Department of the Interior / National Park Service

DESCRIPTION OF THE ENVIRONMENT

TYLER BEND

Existing Development and Use

The Tyler Bend development area lies in the Silver Hill district on the middle one-third of Buffalo National River.

The Silver Hill district currently provides a small headquarters/contact station near the access to Tyler Bend. Information regarding recreational activities in the area and floating conditions along the Buffalo River are available. Pulloff visitor parking is provided along U.S. 65. A staff residence, a trailer, and a seasonal residence are immediately adjacent to this facility.

Visitor use near Tyler Bend occurs immediately downstream of the U.S. 65 bridge where the previous landowner has encouraged floater put-in use for a nominal fee. Other uses include camping, swimming, and picnicking. Poor visibility combined with substandard road conditions make this a hazardous intersection.

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 1978 visitation for the Buffalo Point, Silver Hill, and Pruitt districts, respectively. Visitation to the Silver Hill district has been observed at certain locations along the 43-mile-long district for a number of years; however, statistics have only been kept since June 1976.

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.

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

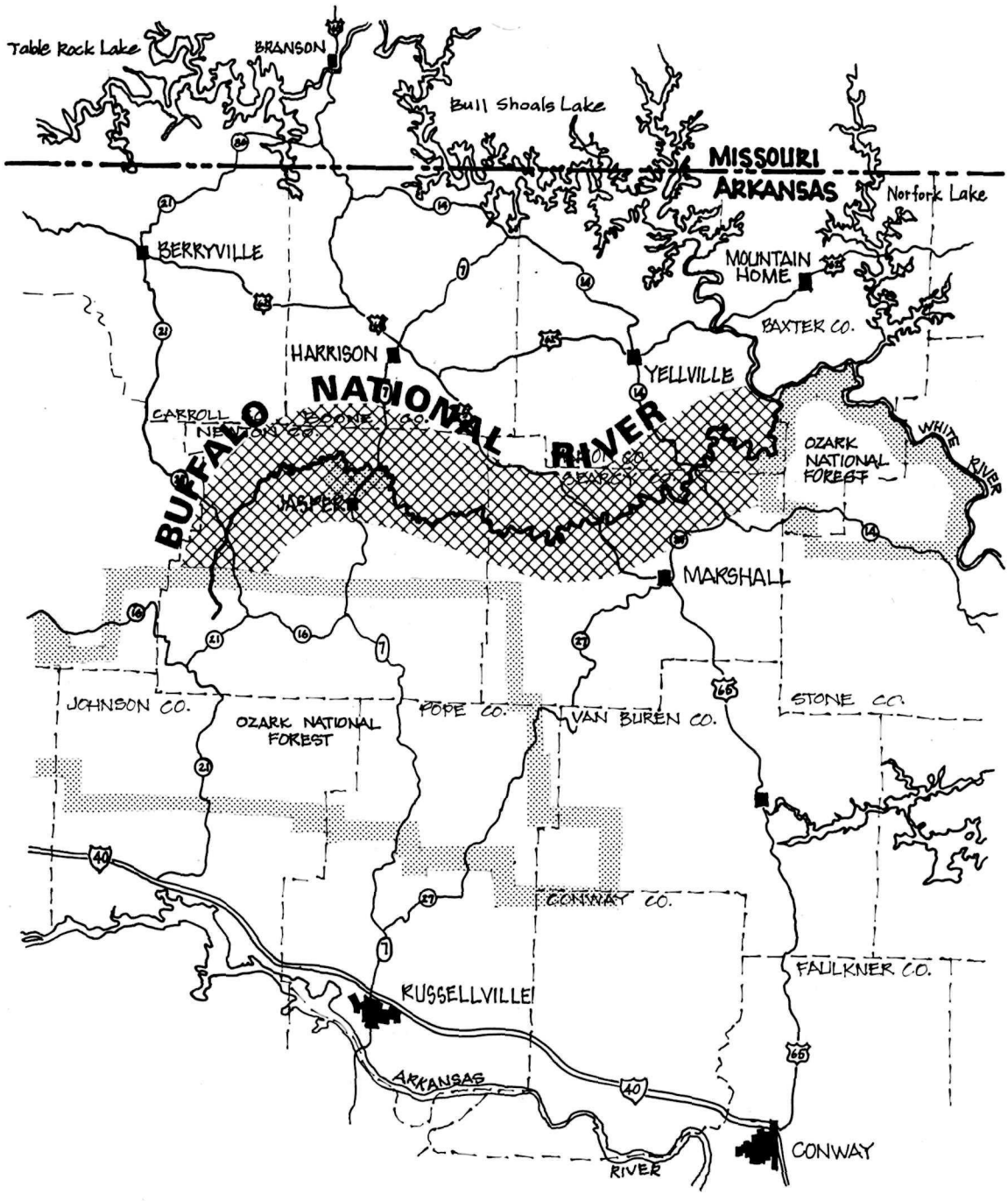
Table 1. Visitation Summary

Buffalo National River

	1974	1975	1976	1977	1978
January	1,452	2,768	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	2,223	1,145	5,582	4,562	19,201
Total	205,861	224,041	315,763	331,546	645,343

Table 2. District Visitation 1978

	Buffalo Point District	Silver Hill District	Pruitt District
January	894	571	487
February	2,439	1,251	1,059
March	7,372	5,480	6,806
April	22,221	10,569	27,633
May	33,122	15,138	9,305
June	68,890	22,927	23,017
July	92,428	37,301	22,890
August	61,476	23,047	12,547
September	23,988	8,611	9,728
October	19,172	11,678	8,978
November	5,954	19,757	9,407
December	1,849	13,273	4,079
Total	339,805	169,603	135,936



VICINITY

Buffalo National River, Arkansas

N

173	40,063
DSC	JUL 78

United States Department of the Interior / National Park Service

Table 3. Conceptual Estimate of Visits/Year

Activity	Unit Resource	Standard	Persons at One Time	Turnover/ Day	Visitors/ Day	Activity/ Day	Visitor Days/Yr.	Visitors/ Year
Area A								
Camping	30 sites	3.5 persons/site	105	1.0	105	245	163	17,115
Picnicking	6 acres	5 sites/acre						
		4 persons/site	120	1.8	216	138	92	19,872
	30 cars	3.5 persons/car	105	1.8	189	138	92	17,388
	2 buses	35 persons/bus	70	1.8	126	138	92	11,592
	3 RVs	4 persons/RV	12	1.8	22	138	92	2,024
Swimming	2.5 acres	60 persons/acre	150	2.0	300	102	68	22,400
	30 cars	3.5 persons/car	105	2.0	210	102	68	14,280
	2 buses	35 persons/bus	70	2.0	140	102	68	9,520
	3 RVs	4 persons/RV	12	2.0	24	102	68	1,632
			749					
Area B								
Camping	20 sites	3.5 persons/site	70	1.0	70	245	163	11,410
Picnicking	4 acres	5 sites/acre						
		4 persons/site	80	1.8	144	138	92	13,248
	20 cars	3.5 persons/car	70	1.8	126	138	92	11,592
	2 buses	35 persons/bus	70	1.8	126	138	92	11,592
	3 RVs	4 persons/RV	12	1.8	22	138	92	2,024
Swimming	2 acres	60 persons/acre	120	2.0	240	102	68	16,320
	30 cars	3.5 persons/car	105	2.0	210	102	68	14,280
	2 buses	35 persons/bus	70	2.0	140	102	68	9,520
	3 RVs	4 persons/RV	12	4.0	48	102	68	3,264
			609					
District Headquarters								
Short-term parking								
	67 cars	3.5 persons/car	235	10.0				
	4 buses	35 persons/bus	140	10.0				
	6 RVs	4 persons/RV	24	10.0				
Staff	2 cars	4 persons/car	8					
			407					
Floaters	70 cars	3.5 persons/car	245	1.0	245	122	81	19,845
	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
Trailhead	5 cars	3.5 persons/car	18	1.0	18	122	81	1,458
			383					
Parking	10 cars	3.5 persons/car	35	40.0				
	1 bus	35 persons/bus	35	40.0				
	1 RV	4 persons/RV	4	40.0				
			74					240,096
						Estimated Visitation		240,000

0·5

5·10

10·20

+20

Percent Slope

SLOPE ANALYSIS

0 250 1,000 2,000

100 500

north

TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

173 | 40,065

DSC | JUL 1978

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 with improvements in the Buffalo Point district, visitation to Buffalo National River should increase by even greater percentages.

Because of limited data, precise visitation projections for the Silver Hill district and the proposed Tyler Bend developed area cannot be made. However, based on proposals in this Development Concept Plan for Tyler Bend, the possible number of visits per year can be estimated. As planned, the proposed Tyler Bend developed area will be able to accommodate approximately 240,000 visitors annually (see table 3).

NATURAL ENVIRONMENT

The Tyler Bend area is situated in the Springfield-Salem Plateaus section of the Ozark Plateaus province, Interior Highlands division, in northwestern Arkansas. The area to be developed is located along Buffalo River and is approximately 1.2 miles upstream from the U.S. 65 bridge. Elevations range from about 590 feet above mean sea level at the river to 950 feet on the ridges near U.S. 65.

Geology/Topography/Soils

The surface geology of the Tyler Bend area is dominated by the Boone formation. Sedimentary in composition, the Boone formation dates to the Lower Mississippian age and is composed largely of limestone and chert. Small areas of various shales and sandstones may be found throughout the study area.

Weathering of the relatively soft limestone has created steep hillsides and bluffs, leaving little level area for development. Slopes from 0 to 10 percent (developable area) account for only 21 percent (545 acres) of the total developed area (2,584 acres). Developable area out of the 100-year floodplain totals 290 acres.

The soils on the site have evolved from limestone formations and are categorized as Ozark Highlands limestone soils. Practically all the soils are well drained but range in permeability from slow to excessive. Silt and sandy loams are present in the floodplains and on low terraces; the hillsides tend to be stony or cherty clays and loams. Eight general soil series occur on the site:

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 layer--silt loam, 46 inches thick
- Underlying material--gravelly silt loam

These soils have poor potential for most development due to flooding.

Bruno

Slopes from 0 to 5 percent, deep, excessively drained sandy soils on floodplains
Surface layer--sandy loam
Subsurface layer--loamy sand, sand, or loam, to a depth of 60 inches

The location of these soils on floodplains, combined with their sandy composition, makes them unsuited for extensive development.

Arkana - Moko Complex

Slopes from 8 to 40 percent, well-drained, very slow to moderate permeable soils
Surface layer--very cherty to stony silt loams, 2 to 7 inches thick
Subsurface layer--very cherty and stony clay and silt loams, 4 to 8 inches thick
Subsoil layer
    Upper - very cherty silty 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.

Clarksville

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

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

Noark

Slopes from 3 to 45 percent, deep, well-drained, moderate to slow permeable soil
Surface and subsurface layer--cherty silt loam, 10 inches thick
Subsoil layer
    Upper - cherty silty clay loam, 7 inches thick
    Middle - cherty clay, 13 inches thick
    Lower - cherty clay

SOIL SURVEY

0 250 1,000 2,000

100 500

north

TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

173 | 40,066

DSC | JUL 78

Depth to bedrock is 72 inches or more. This soil has fair potential for most development. Slope is a moderate limitation for dwellings 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.

Nixa

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

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

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 layer
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

Peridge

Slopes from 3 to 8 percent, deep, well-drained, moderately permeable soil
Surface layer--gravelly silt loam, 6 inches thick
Subsoil layer
Upper - gravelly silt clay loam, 16 inches thick
Middle - very gravelly silt clay loam, 38 inches thick
Lower - very gravelly silt clay

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

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

soil suitability

SOIL SERIES	Recreation	Development	Sanitary Fac.	Water Mgmt.	Source Mat'l.	Comments
Razort	☐	■	■	◪	◪	Low terraces
Bruno	☐	■	■	◪	◪	Floods
Arkana - Moko Complex	■	■	■	■	■	Steep slopes
Clarksville	■	■	■	■	■	Sideslopes
Noark	■	■	■	☐	■	Stones & Clay
Nixa	■	◪	■	■	■	Ridgetops
Healing	☐	■	■	◪	◪	Floods
Peridge	☐	☐	◪	☐	■	

LIMITATIONS

- ☐ Slight
- ◪ Moderate
- ■ Severe

tyler bend

DEVELOPMENT CONCEPT PLAN
Buffalo National River - Arkansas

problems. Severe limitations portend extensive engineering and mitigation to adapt a use to a soil.

Climate

The climate of the Buffalo River region 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.

There is some variability in annual rainfall at local measuring stations. The Gilbert station recorded 44 inches of rainfall per year; the Marshall station recorded 49 inches.

Mean temperatures for Gilbert and Marshall are generally comparable; however, temperatures at Gilbert, within the immediate Buffalo River valley, tend to be 1 to 2 degrees cooler than at Marshall. Temperature extremes of 114 degrees Fahrenheit and -23 degrees have been recorded at Gilbert.

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

The average annual precipitation at Tyler Bend is 48.6 inches. This figure is the same for the entire Buffalo River basin. The average monthly distribution for the river basin is shown in table 4. For purposes of this discussion, it is assumed that the monthly distribution pattern for the entire basin is duplicated at Tyler Bend.

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.

Table 4. Monthly and Annual Precipitation

MONTH	AVERAGE PRECIPITATION (Inches)	AVERAGE ANNUAL PRECIPITATION (Percent)
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	3.5	7.2
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 bsp ranged from about 0.9 x 10-6 m-1 to 2 x 10-4 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 a narrow mode at 27 kilometers.

Local sources of air pollution include motor vehicle emissions, smoke from occasional clearing of pastureland, and unsurfaced roads that are responsible for atmospheric 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 the Buffalo National River area unless adequate control technology is utilized at the plant.

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

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 the White River. Major tributaries to the Buffalo River include the Little Buffalo River, Richland Creek, Bear Creek, and Big Creek.

Average annual streamflow in the 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. Average low flow for a seven-day period (with a statistical chance of occurring once every two years) is 36 cfs near Tyler Bend, and 90 percent of the streamflow in the river downstream from Tyler Bend exceeds 48 cfs. The 100-year flood (a streamflow with a 1 percent chance of occurring in any one year) has an estimated discharge of approximately 140,000 cfs at Tyler Bend; the flood crest here is approximately 620 feet above mean sea level. Such flooding may occur in the Buffalo River drainage at any time of the 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 provisions of section 208 of P.L. 92-500, the state of Arkansas has been monitoring the water quality of the Buffalo River at stream mile 97, which is 7 stream miles below the Arkansas 7 bridge at Pruitt. Data show that the 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 the Buffalo and White rivers to Ponca) as an effluent limited class segment and from Ponca to the origin of the Buffalo River (22 miles) as a water quality segment. All major tributaries to the Buffalo River are classified as water quality segments with the exception of the Little Buffalo River, which has been classified as follows: confluence of Little Buffalo River to Henson Creek (7.2 miles), effluent limited segment; Henson Creek to the origin of the Little Buffalo River (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 plants, 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. Precipitation and stream infiltration are the principal sources of recharge for the deep artesian aquifers.

Groundwater Quality. Information is not available on groundwater quality for each aquifer underlying the Tyler Bend area. 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 at Pruitt and is locally known as residence 4-9. The geology in this area is similar to that found at Tyler Bend. 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 Treatments 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:

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

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

3. Install 6-inch diameter black steel well casing.

4. Grout well around casing.

All National Park Service potable water distribution systems are equipped with hypochlorinators. Water samples are taken and analyzed twice a month in accordance with state and EPA standards.

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 the 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 Buffalo River near St. Joe, Arkansas.

Vegetation

Floodplain. Vegetation found in the floodplain is mostly composed of American elm, 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, and cottonwood. Gravel bar species include ward's willow and sandbar willow. Because streamside communities are too narrow and gravel bar communities are too small for accurate delineation on the following 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.

Cutover Area. Cutover areas may include any forest vegetation. Usually such areas are dominated by dense stands of small trees.

To Harrison

SWIMMING BEACH
SECONDARY RIVER ACCESS
LANDSCAPE MANAGEMENT AREA
SWIMMING BEACH
LONG TERM PARKING & TRAILHEAD
75 CAR & 10 BUS/RV
PRIMARY RIVER ACCESS

TYLER BEND

65

AREA A
20 PICNIC SITES
PARKING
60 CAR & 10 BUS/RV
CAMPGROUND
30 TENT SITES
PIT TOILETS

ARNOLD BEND

OVERLOOK

AREA B
15 PICNIC SITES
PARKING
30 CAR & 10 BUS/RV
CAMPGROUND
20 TENT SITES
PIT TOILETS

AMPHITHEATER

CAMPGROUND
50 DESIGNATED SITES
FLUSH TOILETS

DISTRICT HEADQUARTERS/INTERPRETIVE CENTER
PARKING
50 CAR WITH 25 CAR OVERFLOW & 10 BUS/RV

HOUSING
3 STAFF RESIDENCES
2 DUPLEX SEASONAL QUARTERS

FIRE/RESCUE CACHE

MAINTENANCE AREA

UNMANNED CONTACT STATION
PARKING
10 CAR & 2 BUS/RV

OVERLOOK

OVERLOOK

TRAIL

TRAIL

Maintenance & Service Road Only

CALF CREEK

PROPOSED ROAD REALIGNMENT WITH LOW WATER BRIDGE

EXISTING ROAD TO BE ABANDONED

65

To Marshall

Note:

100 Year Flood Crest at about elevation 620-623 above mean sea level.

▲ Existing Water Wells

PROPOSED DEVELOPMENT

0 250 1,000 2,000
100 500

north

DEVELOPMENT CONCEPT PLAN
TYLER BEND
BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

173 | 40,070 E
DSC | SEPT. '80

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

Mixed Hardwood. Generally, mixed hardwoods provide a transition between the floodplain and oak/hickory, oak/pine, 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. Species present include upland vegetation such as oak/hickory or oak/pine and floodplain or lowland species like 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 the 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.

Oak/Pine. Occurring extensively on upland soils derived from sandstones or shales, these areas are usually dominated by oaks, although shortleaf pine can occur locally in almost pure stands. Generally, pines constitute from 10 to 40 percent of the total species composition. In some instances, pure or nearly pure stands of pine have been planted.

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

Wildlife

Wildlife present along Buffalo River is typical of the deciduous forest biome. In general, 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 the Buffalo National River region are white-tailed deer, squirrel, rabbit, bobwhite quail, mourning dove, and wild turkey. Fur-bearing animals found in the Tyler Bend area are beaver, opossum, raccoon, mink, bobcat, gray fox, skunk, muskrat, and otter. Hunting is permitted in season within the national river boundaries but is prohibited within the developed area.

The red fox and mountain lion are protected species and may not be hunted. Black bear are found in small numbers and are now listed as game animals.

Floodplain Forest

Pasture, Meadow, & Cultivated Field

Disturbed Area

Mixed Hardwood

Cutover Area

Cedar Glade

Oak/Pine

VEGETATION

0 250 1,000 2,000

100 500

north

TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

173 | 40,079A
DSC | NOV 79

A number of species like timber wolf, elk, and bison have been extirpated from the region. The red wolf is classified as endangered; its existence in the locale is doubtful. The black bear, and wild turkey were once nearly extirpated species in Arkansas, but these have been successfully reestablished.

The Buffalo River is noted for its smallmouth bass fishing. Other game fish present are the largemouth bass, spotted black bass, rock bass, suckers, catfish, bluegills, green sunfish, and other sunfish. In a species survey from 1965 to 1973, there were 59 species of fish recorded in the Buffalo River including the studfish, chestnut lamprey, darters, and gar.

Over 250 species of birds have been reported in the Buffalo River area, including many migratory waterfowl that 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 Arkansas endangered species list (1979). Keen's bat (Myotis keenii), a rare species, is known to hibernate in Bat Cave at Boxley, Arkansas.

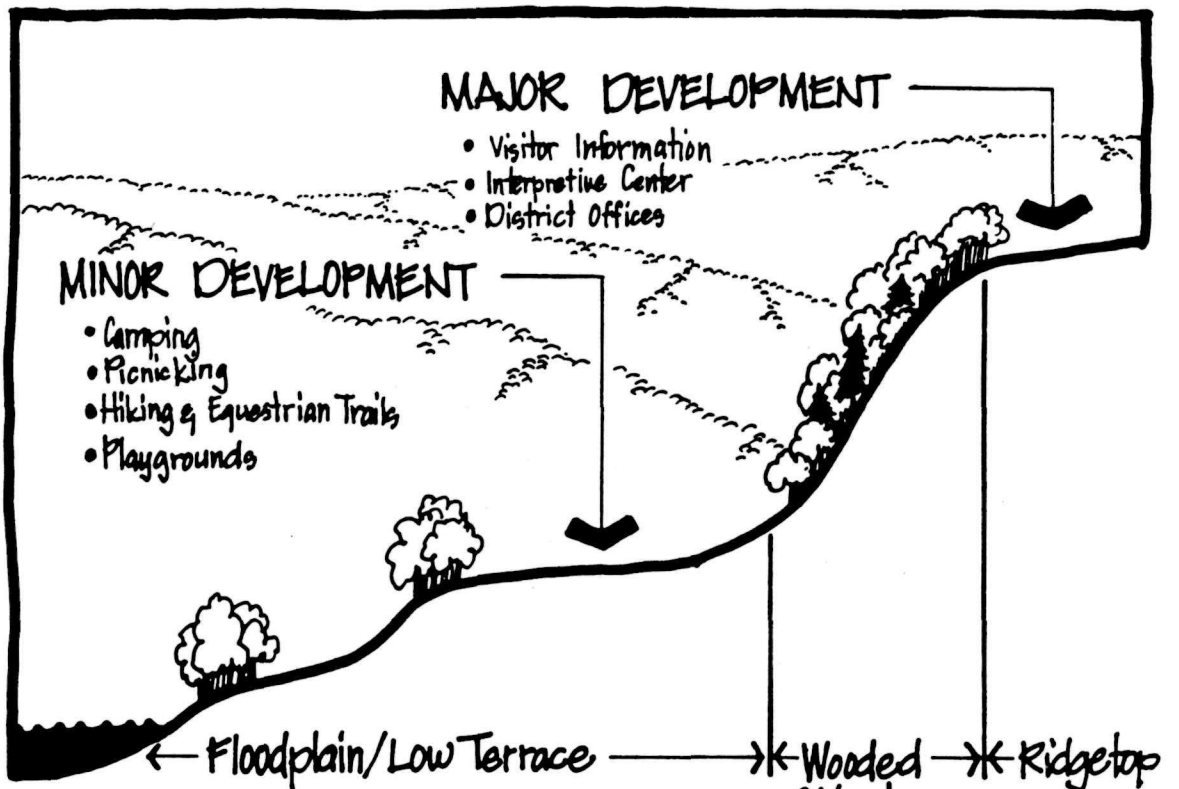
Buffalo National River and its development sites were examined in July and September 1978 by a study team from the Ecology Research Center, Department of Biology, Memphis State University. The team produced an annual report, "Distribution Status and Ecology of Endangered Bats of Buffalo National River," that identified 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 (Pipistre ilus), red bat (Lasiurus borealis), and big brown bat (Eptesicus fucus).

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, and the river itself are the features that contribute to the aesthetic quality of Buffalo National River.

Development to accommodate visitors must be located close to the river to permit optimum recreational use. Minor developments like campsites, picnic areas, restrooms, and hiking and equestrian trails that 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 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 developments will be designed to blend with the landforms and be screened from the river by native vegetation (see Land Profile).



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 was 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, gravers, 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. 700-1700).

The elaborate ceremonialism and erection of large temple mounds and associated towns that characterized the Mississippian period in the Mississippi Valley and surrounding areas did not appear in the Buffalo River region, so far as is known. 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

The Tyler Bend area like most of northwestern Arkansas was sparsely settled by the early 1800s. Hunters, trappers, and traders were lured here by the abundant game. Some lead-mining entrepreneurs were also early residents. Cherokee Indians briefly occupied the area from late 1817 to 1828 on their westward migration from Kentucky to Oklahoma.

The rugged terrain offered little for settlers interested in farming. Ridgetops are narrow and rocky; low river terraces, although limited in

size, offer deep rich soil. A few individuals did begin settling 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.

Civil War activities occurred in areas adjacent to the Tyler Bend area. 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 Tyler Bend 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.

Probably the event affecting the Tyler Bend area the most was the construction in 1903 of the railroad from Joplin, Missouri, through Gilbert (a small community located on the river only 2 miles east from the present U.S. 65 bridge) on to Helena, Arkansas. Up to this time, residents had difficulty transporting cash crops and commercial products out of the hilly country to markets in Springfield (Missouri), Eureka Springs, Batesville, and Russellville (Arkansas), as roads were few and inadequate.

Lead and zinc mining near Rush, Arkansas, was beginning to expand during the early 20th century but would not reach its peak until 1916-1917. The increased mining and smelting were having an effect on Gilbert and certainly the Tyler Bend area. Smelters required large amounts of wood to fire their furnaces. Timber was cut upriver and floated to the sawmill at Gilbert, and by 1920 the easily accessible stands had been depleted. The peak in the mining industry was due to the demand for zinc and lead created by World War I. Increased production to meet the demand created an oversupply of minerals. The war took away the young workers; jobs were filled by older laborers. The older laborers reduced efficiency and made production costs rise. A surplus of minerals and the increased production costs marked the decline of mining in northwestern Arkansas.

The depression of the 1930s coupled with a drought during the early portion of that decade brought hard economic times to the Buffalo River region 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 Tyler Bend 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. Archeological site 3 SE-33 is listed on the National Register of Historic Places.

Historic Sites

Structures eligible for inclusion on the National Register do not exist within the Tyler Bend area. However, several old structures do exist in the area and would lend themselves to interpretation.

This plan is addressed in a memorandum of agreement with the Advisory Council on Historic Preservation for the adoption of the Buffalo National River Master Plan and Wilderness Recommendation, signed by the chairman March 15, 1975. The memorandum of agreement includes a proposal requiring that all Development Concept Plans be reviewed by the state historic preservation officer. In accordance with this proposal, if any National Register properties are affected by the plan, the documentation of the results of the review and consultation with the state historic preservation officer shall be provided the Advisory Council on Historic Preservation. If the effects are adverse, the plan shall be modified to avoid such effects or appropriate mitigation developed and the revised development plan would again be subject to review and comment by the ACHP and SHPO.

SOCIOECONOMIC ENVIRONMENT

Transportation

U.S. 65 intersects the Silver Hill district and is the major highway crossing through the watershed, averaging 2,700 vehicles per day (1976). Traversing north and south, U.S. 65 links Springfield, Missouri (I-44), 137 miles to the north, and Little Rock (I-30 and I-40), 105 miles to the south. From the Tyler Bend area, Harrison is located 14 miles to the north, and Marshall is 11 miles southeast, both on U.S. 65.

Passenger as well as freight train service in the area was abandoned in 1946 when the railroad line through Gilbert was closed. Searcy County is served by one major commercial busline that travels through the Tyler Bend area on U.S. 65. At Marshall, Searcy County Airport has a 2,500-foot paved runway that mainly serves small private aircraft. The nearest commercial airport is the Boone County Airport in Harrison, which offers regularly scheduled service to St. Louis and Dallas/Ft. Worth.

Visitors rely primarily on private vehicles to reach Buffalo National River. Because most visitors come to float the river, motor vehicles are necessary to make the shuttles required for this experience. Moreover, vehicles are used to transport equipment used for floating and camping. It is expected that this traditional reliance on private vehicles

will continue in the future until vehicles and gasoline costs become prohibitive. As gasoline prices escalate, the Tyler Bend area can expect the ratio of visits by cars to visits by buses to reverse. This has definite implications during the comprehensive design phase of the development process when parking lots should be designed for more buses and fewer cars.

Land Use

Subsistence farming has been the traditional land use for northwestern Arkansas. The bottomlands were developed for crops like corn, wheat, and cotton, and wooded hillsides were used for grazing cattle, sheep, and hogs, but the ridgetops were generally undeveloped due to the rocky soil. Farmhouses were usually located in the bottomland where water was plentiful.

In recent years some small-scale subsistence farming has remained, with farmers supplementing their income through jobs in the surrounding communities. The contemporary trend, however, has been for the total number of farms to decrease while the size of farms in acres has increased, thereby making farming operations more profitable. This point is illustrated for Searcy County during the years 1964 to 1969 in Northwest Arkansas Economic Development District's report, Socioeconomic Profile (1977).

Approximately 75 percent of the Tyler Bend area is forested. The remaining 25 percent is in grassland, where pasturing of cattle has been the most recent land use.

Residential and commercial land use in Searcy County (mainly specialty shops catering to tourists) is concentrated on small acreages along either side of the highways and county roads, wherever the topography is suitable for development. Interspersed among local residences are a small but growing number of vacation residences.

Population

In Searcy County the population dropped by 4,211 during the 30 years between the 1940 and 1970 censuses. The number of residents living in the three incorporated towns of Marshall, Leslie, and Gilbert totaled 2,005. That figure is 35 percent of the remaining rural population, which was 5,726. Searcy and Newton counties are unique within the district because they were the only two counties out of the nine that continued to show out-migration exceeding in-migration during the decade between 1960 and 1970, losing a total of 512 residents. However, population for the entire Northwest Arkansas Economic Development District is expected to continue to increase during the next two decades. Migration to the area has been attributed to increased economic development within the district, which has brought in more workers and retirees.

Economic Development

Three basic factors contribute to the district's economic well-being: agriculture, light manufacturing, and leisure industry. Farm income is derived from livestock operations producing cattle, hogs, or poultry; dairy operations; apple orchards; and feed and food grain crops. Major industries in the region include food processing, wood products, apparel, and electrical and plastic manufacturing. Four large reservoirs and Ozark National Forest have helped make the leisure industry the fastest growing segment of the local economy. Tourism has been enhanced by numerous commercial attractions, including Blanchard Springs Caverns and Ozark Folk Center. The mild climate and scenic beauty of the Ozarks has attracted an increasing number of retired persons to the area (Northwest Arkansas Economic Development District, Inc., 1977).

THE PLAN

DEVELOPMENT

Under the proposal, all existing functions in Silver Hill will be moved to the Tyler Bend vicinity and expanded to reflect land acquisition and anticipated visitation. Initial visitor contact will still be made along U.S. 65 on the north side of its intersection with the gravel road that leads to Tyler Bend. However, only an unmanned contact station will be built at this site. A 2-acre maintenance compound will be developed on the south side of the gravel road, some 1,500 feet from U.S. 65.

The district fire/rescue cache will be located approximately 2,500 feet west of U.S. 65 and north of the access road. Less than one-third of an acre will be enclosed by a security fence. Inside this fence will be a heated 1,500-square-foot building for two fire trucks, available potable water for this facility, 800 square feet of covered storage area for rescue boats and fire equipment, a canoe storage rack, 600 square feet of graveled parking, and approximately 4,000 square feet of graveled turning space. The remainder of the land will be vegetated.

Three staff residences and two duplex seasonal quarters will be constructed about 3,000 feet from the highway (or acquired houses may be moved to this location). A single integrated utility system will serve this entrance area. The road to the Tyler Bend developed area will be widened to 20 feet and paved.

A district headquarters/interpretive center will be constructed south of the Tyler Bend access road approximately 1½ miles west of U.S. 65 to serve the middle one-third of Buffalo National River. A 50-car/10-bus parking area with space allocated for 25-car overflow will be constructed within this complex. Two trails will lead from the interpretive center to separate viewpoints overlooking the river.

Within the 100-year floodplain, the development at Tyler Bend will consist of three areas:

Area A

30-site tent campground with pit toilets and trash receptacles
20 picnic sites
swimming beach
secondary river access
60-car and 10-bus/RV parking

Landscape Management Area

A 5-acre managed meadow separating area A from area B will provide open space for impromptu Frisbee, kite flying, or ball games.

Area B

20-site tent campground with pit toilets and trash receptacles
15 picnic sites
swimming beach
50-car and 10-bus/RV parking

A 50-site campground with potable water and flush toilets will be located above the floodplain. Five of the 50 sites will be designed to accommodate groups of up to 50 persons each. An amphitheater will be built in association with the campground.

A tertiary sewage treatment plant will be constructed to serve the 50-site campground, district headquarters/interpretive center, staff residences, and maintenance area.

The unimproved road to Arnold Bend will become a limited-access maintenance and service road. Persons with use and occupancy rights to property served by this road will continue to have access. A portion of the road will be realigned, and a low-water bridge provided across Calf Creek. The section of road to be abandoned is now being undercut and eroded by Calf Creek. Continued use of this section would require expensive construction, and the result would not justify the expense. The proposed realignment is along a route currently used by private individuals and park staff. This route is more environmentally sound and would be less costly to develop and maintain than improving the existing road.

The primary river accesses (providing commercial canoe rental for large groups of floaters and the general public) and associated day use facilities will be on the north side of the river about 1,000 feet upriver from the U.S. 65 bridge. The road into this site (about 1,000 feet in length) will be upgraded and paved to 20 feet in width. Paved parking for 75 cars and 10 buses/RVs will be provided above the 100-year floodplain. Egress and ingress lanes will be established at the entrance to the site. Existing roads not required for visitor or administrative use will be abandoned. This site will serve as a trailhead for a future river hiking trail.

The primary and secondary river access points and the tent campgrounds will be vulnerable to flooding because they will be within the 100-year floodplain, a potential area of flood danger. Although the national river has an early flood warning system, no permanent facilities or structures will be located at these sites.

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 of 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. 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, amphitheater, swimming beaches, toilet facilities, and so forth.

DEVELOPMENT PRIORITIES

The primary features of this Development Concept Plan are listed below in order of development priority. The objectives are to upgrade the Tyler Bend area and to serve the numbers of visitors anticipated during the next several years.

Area A
- Construct a 30-site tent campground
- Construct a picnic area
- Install pit toilets
- Provide parking for 60 cars and 10 buses/RVs
- Provide a secondary river access and a swimming beach
- Prepare and provide an overlook

Primary River Access
- Construct ingress and egress lanes connecting with U.S. 65
- Pave the access road to the river access point
- Construct parking for 75 cars and 10 buses/RVs above the 100-year floodplain
- Provide pit toilets above the 100-year floodplain
- Provide potable water from the existing well

Campground
- Construct 50 designated sites with flush toilets above the 100-year floodplain
- Provide a new well
- Provide potable water

Amphitheater

Landscape Management Area

Sewage Treatment Plant
- Construct a plant above 100-year floodplain

Maintenance Area
- Construct a maintenance building and yard
- Connect to sanitary sewer
- Tie in to the existing well
- Provide potable water
- Connect to power
- Provide telephone service

Contact Station

- Construct an unmanned station
- Provide parking for 10 cars and 2 buses/RVs
- Tie in to the existing well
- Provide potable water

Residence Area

- Construct, or move to the site, three staff residences and two duplex seasonal quarters
- Tie in to the existing well
- Provide potable water
- Connect to sanitary sewer
- Connect to power

District Headquarters/Interpretive Center

- Construct the facility
- Provide parking for 50 cars and 10 buses/RVs
- Provide 25-car overflow parking
- Provide a well and potable water
- Connect to power
- Connect to sanitary sewer
- Provide telephone service
- Construct trails to overlooks
- Pave the access road from U.S. 65 to the center

Area B

- Construct a 20-site tent campground
- Install pit toilets
- Construct a picnic area
- Provide parking for 50 cars and 10 buses/RVs
- Establish a swimming beach

Fire/Rescue Cache

- Construct a 1,500-square-foot building
- Construct a fenced enclosure
- Provide 600 square feet of parking and 4,000 square feet of turning space
- Construct covered storage and canoe racks

LAND USE

	Acres
Contact station	2.0
Maintenance area	2.0
Fire/rescue cache	0.34
Staff housing	6.5
District headquarters/interpretive center/parking lot	6.0
Tyler Bend area	77.5
Primary river access area	27.0
Total	121.34

INTERPRETATION

Tyler Bend will become one of the most popular vacation areas on Buffalo National River because of the excellent water-related recreational opportunities, long float season, scenic beauty, and easy highway access. It is important that this area provide visitors with a high standard of interpretive programming so that a full park experience can be offered. This Development Concept Plan is designed to help realize this goal.

The visitor's first experience with Tyler Bend will be at the contact station located at the junction of U.S. 65 and the main entrance road to the developed area. This unmanned contact facility will provide exhibits relating to what to see and do, campground availability, up-to-date weather and river conditions, general information on other Buffalo River districts, and upcoming interpretive programs. A roving interpreter may be stationed here, but only at times of high visitation. The contact station exhibits will need to be of a self-explanatory design and as vandal-proof as possible.

The interpretive center will be centrally located in the developed area and will provide uniformed personnel for public contact, possibly year-round. At this strategic location, the center will be accessible to visitors coming from the main campground and day use areas and will be readily available for arriving visitors who want additional information.

Two short nature trails will lead from the interpretive center, terminating at overlooks that offer excellent vistas of Buffalo River and surrounding terrain. These self-guiding trails will offer interpretation of the flora and opportunities for bird-watching and photography. At the trail overlooks, wayside exhibits will interpret the geological and ecological story of Buffalo River and surrounding land. A third, short loop trail from the center will take visitors to several existing discovery sites, such as the Pat Brown schoolhouse, where exhibits will point out early life and building construction techniques. (This loop trail, which will be within the district headquarters/interpretive center complex, does not appear on the Proposed Development map.)

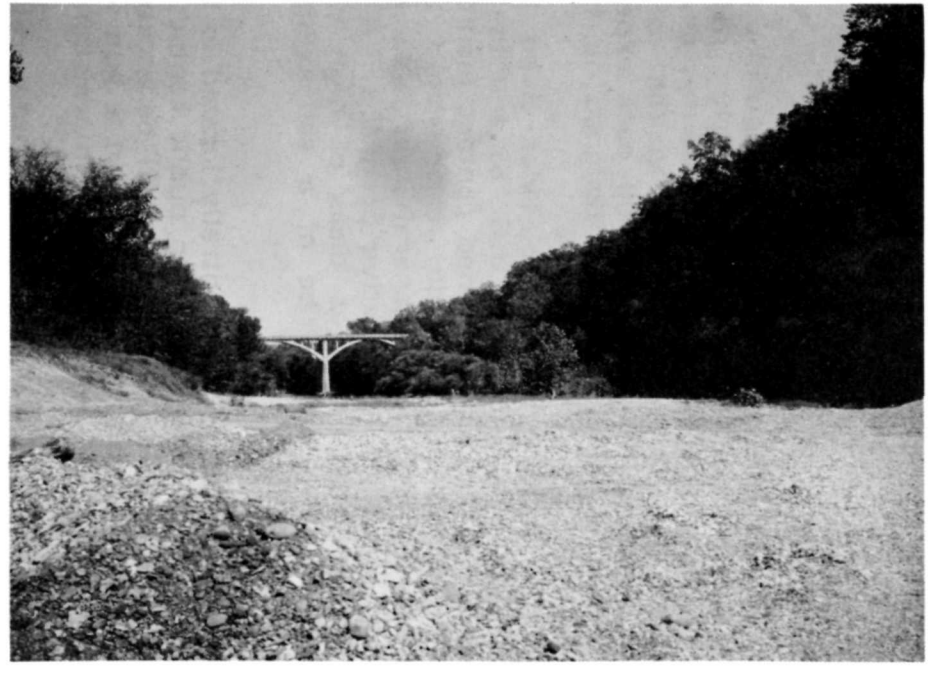
The interpretive center will provide a full-scale interpretive effort with substantial exhibits and audiovisual equipment. This multiroom facility will have a manned information desk year-round and a complete sales counter offering float maps, publications, postcards, and slides.

Exhibit rooms will provide space for theme media focusing on water-related activities such as canoeing, swimming, wading, and fishing methods so that visitors will get an overview of how to enjoy these activities while participating in them safely. Other exhibits will focus on land-based activities, providing hiking, bicycling, exploring, and hunting safety messages and identifying hunting areas and seasons. Themes of early Indian, trapper, and pioneer-farming life will also be presented.

A medium-sized theater will be designed for multiple purposes (e.g., school seminars and local art and photography shows). The theater will have movable seats that can be arranged to fit the occasion. Complete

Areas A and B

Primary Put-In, U.S. 65 Bridge



Areas A and B

audiovisual equipment will be installed so that film or slide programs can be periodically shown during the day. These film presentations will cover topics of canoeing techniques (for example, "How to Read the Rapids of the Buffalo"), fishing methods, wildlife viewing, and historic building methods. Major films that are in the park's collection and films currently in production will be shown on special occasions. The theater will also be useful when inclement weather denies use of the outdoor amphitheater, allowing the scheduled naturalist programs to continue.

An amphitheater with a stage, rearview projection, and a full assortment of audiovisual equipment will be built adjacent to the campground and within easy walking distance of areas A and B. This site will be the central point for evening interpretive programs and a variety of day use demonstrations.

Small, covered, unmanned kiosks will be located at the Tyler Bend campground and the primary river access point upriver from the U.S. 65 bridge. These kiosk displays will provide up-to-date information on water levels, weather reports, naturalist program information, official park and visitor-related notices, and a visitor note panel. The kiosks at the primary river access will be located near the river and at the trailheads where information about the trail systems will be provided with self-guiding booklets. Floaters will be able to stop and get the latest weather/water information at these kiosks.

MITIGATING MEASURES

Basic sanitation facilities such as self-contained 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 drainages 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.

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

Recreational facilities 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 proposed development. Inventories and surveys 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 federal and state air quality standards and regulations.

Unpaved road surfaces will be treated with oil to limit atmospheric dust during heavy use and dry periods.

Construction of a gate at the entrance to Peter Cave and closure of the cave to public access will help protect the Myotis grisescens from the effects of any visitation resulting from increased river traffic past this cave.

River water quality should be monitored frequently during construction to ensure that soil erosion and siltation prevention measures are working adequately.

COST ESTIMATE

Primary river access point	
Construct parking area	$ 151,000
Upgrade and pave access road	40,000
Contact station	
Construct building	61,000
Construct parking area	26,000
Maintenance area	
Construct building and yard	263,000
Housing area	
Construct staff residences (3)	200,250
Construct seasonal quarters (2 duplexes)	175,000
District headquarters/interpretive center	
Construct facility	400,000
Construct parking area	153,000
Pave access road	600,000
Realign access road to Arnold Bend	492,000
Area A	
Establish picnic sites	20,000
Construct parking area	96,000
Establish tent campground (30 sites)	30,000
Area B	
Establish picnic sites	15,000
Construct parking area	96,000
Establish tent campground (20 sites)	20,000
Primitive camping area	
Establish campground (50 sites)	47,000
Upgrade and expand utilities (water, power, toilet facilities, telephone)	233,000
Establish fire/rescue cache	127,000
Landscape and develop site	324,000
Total Gross Amount	$3,569,250

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

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.

Buffalo National River, Ark. Establishment.

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.

Lands and waters, acquisition.

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.

Retention rights.

(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

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

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.

Area review; report to President.

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 nonsuitability 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.

Appropriation.

SEC. 7. For the acquisition of lands and interests in lands, there are authorized to be appropriated not more than $16,115,000. 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.

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.

Executive Order 11988 May 24, 1977

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

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.

(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

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

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.

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).

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.

Jimmy Carter

THE WHITE HOUSE,
May 24, 1977

[FR Doc.77-15121 Filed 5-24-77;1:42 pm]

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.

Robert R. Garvey Jr. 2/20/75 (date)
Executive Director
Advisory Council on Historic Preservation

Rodney R. Brown 2-14-75 (date)
National Park Service
Department of the Interior

C. E. Henderson 2-25-75 (date)
Arkansas State Historic Preservation Officer

Glenn A. Silvestro 3/13/75 (date)
Chairman
Advisory Council on 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.

ENVIRONMENTAL CONSULTANTS, INC.
391 NEWHAN AVE. · P.O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL (812) 282-8481

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	<0.005	mg/l	Manganese	<0.008	mg/
Arsenic	<0.002	mg/l	Mercury	0.008	mg/
Barium	<0.03	mg/l	Nitrate--Nitrogen	1.22	mg/
Bicarbonate, as $CaCO_3$	115	mg/l	Nitrite--Nitrogen	0.001	mg/
Cadmium	0.092	mg/l	pH	7.37	
Calcium	118.185	mg/l	Phenols	<0.001	mg/
Carbonate, as $CaCO_3$	0	mg/l	Phosphates:		
Chloride	14.68	mg/l	Total filterable (dissolved) and non-filterable phosphate	0.092	mg/
Chromium, hexavalent	<0.008	mg/l	Total filterable and non-filterable ortho phosphate	0.026	mg/
Copper	0.024	mg/l	Total filterable and non-filterable acid hydrolizable phosphate	0.069	mg/
Cyanide	<0.03	mg/l			
Fluoride	<0.1	mg/l	Total organic phosphate	<0.001	mg/
Iron	<0.01	mg/l	Selenium	<0.005	mg/
Lead	<0.025	mg/l	Silica, as SiO_2	0.53	mg/
Magnesium	2.0117	mg/l			

Remarks:

Analyses Reviewed By: Robert E. Stucke

ENVIRONMENTAL CONSULTANTS, INC.
391 NEWMAN AVE. · P.O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL. (812) 282-8401

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	<0.002 mg/l	Total dissolved solids	294
Sodium	13.858 mg/l	Total hardness as $CaCO_3$	855
Specific conductance	400 $\mu mho/cm^3$	Turbidity	<2
Sulfate	3.60 mg/l	Zinc	0.507
Total alkalinity as $CaCO_3$, to pH	115.0 mg/l 8.3		
Inflection point at pH	8.3		

Remarks:

Analyses Reviewed By Robert E. Grace

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.

BIBLIOGRAPHY

ARKANSAS DEPARTMENT OF PLANNING
1973 Atlas of Arkansas. Little Rock, AR.

BABCOCK, R.E.
1977 "Part III: Buffalo National River Ecosystems." Prepared for National Park Service. On file at Buffalo National River.

1978 "Part IV: Final Report, Buffalo National River Ecosystems." Prepared for National Park Service. On file at Buffalo National River.

MEMPHIS STATE UNIVERSITY, ECOLOGICAL RESEARCH CENTER, DEPARTMENT OF BIOLOGY
1978 "Distribution, Status and Ecology of Endangered Bat of Buffalo National River." Prepared for National Park Service. On file at the Denver Service Center.

MOORE, GARY
1978 "Hydrology Report-Tyler Bend, Buffalo National River, Arkansas."

NORTHWEST ARKANSAS ECONOMIC DEVELOPMENT DISTRICT, INC.
1977 Socioeconomic Profile. Harrison, AR.

PITCAITHLEY, DWIGHT TOWNSEND
1976 "Buffalo River: An Ozark Region from Settlement to National River." Ph.D. dissertation. Texas Tech University.

WAGGONER, ALAN
1978 Personal communication to Keith Yarborough.

U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE
1975a Master Plan, Buffalo National River, Arkansas. Denver: Denver Service Center.

1975b Wilderness Recommendation, Buffalo National River, Arkansas. Denver: Denver Service Center.

1975c Interpretive Prospectus, Buffalo National River, Arkansas. Denver: Denver Service Center.

1978a Buffalo National River Wilderness, Final Environmental Statement. Denver: Denver Service Center.

1978b "Management Policies." Washington, D.C.: Government Printing Office.

PLANNING TEAM AND CONSULTANTS

PLANNING TEAM

Dave Morris, Park Ranger (Planner) Former Team Captain, Denver Service Center

John Murphy, Landscape Architect, Team Captain, Denver Service Center

Lorraine Mintzmyer, Former Park Superintendent, Buffalo National River

Jack Turney, Park Superintendent, Buffalo National River

Larry Walling, Landscape Architect, Denver Service Center

Bill Rabinstein, Interpreter, Denver Service Center

Elmer Hernandez, Highway Engineer, Denver Service Center

Paul Wykert, Former Environmental Coordination, Southwest Regional Office

John Welch, Chief Park Ranger, Buffalo National River

Keith Whisenant, Resource Management Specialist, Buffalo National River

Rod Harris, Silver Hill District Ranger, Buffalo National River

CONSULTANTS

Bill Springer, Environmental Specialist, Denver Service Center

Garry Moore, Hydraulic Engineer, Southwest Regional Office

Craig Cellar, Cultural Resource Management Specialist, Denver Service Center

M. Dean Harper, Soil Scientist, Department of Agriculture, Soil Conservation Service, Harrison, Arkansas.

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.

Publication services were provided by the graphics and editorial staffs of the Denver Service Center. NPS 1526A

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980—777-027/70