

development concept plan

proposal / assessment

january 1980

BUFFALO
TYLER BEND



NATIONAL RIVER / ARKANSAS

This plan has not yet been approved. Its purpose is to provide planning information for further consideration and discussion, and it may undergo revision.

PROPOSAL/ASSESSMENT
DEVELOPMENT CONCEPT PLAN

TYLER BEND

BUFFALO NATIONAL RIVER
ARKANSAS

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

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INTRODUCTION AND PROBLEM STATEMENT

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, a pioneer farm, 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.

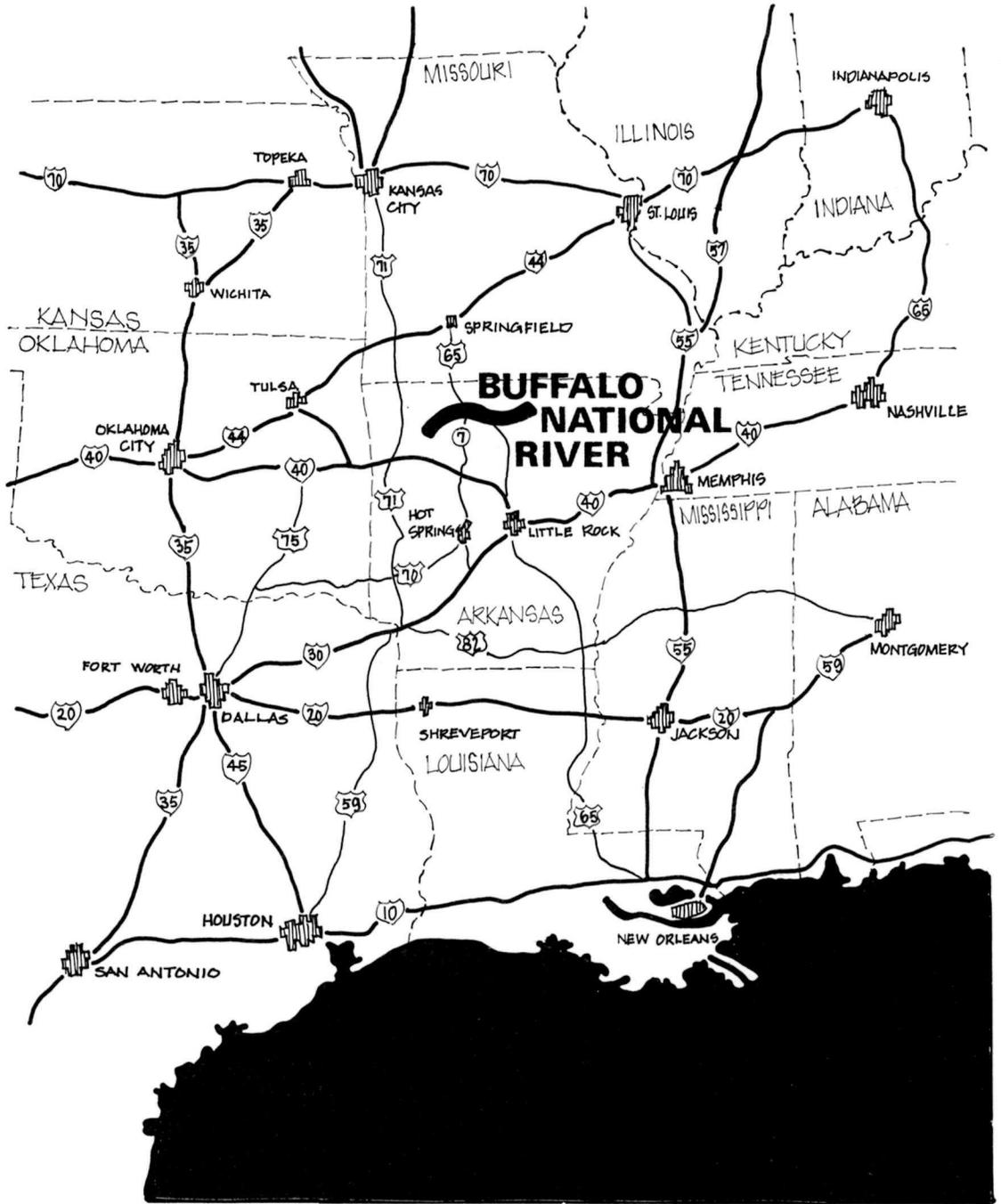
Although Buffalo National River has been designated as a recreational river--allowing appropriate facility development to support visitor use--development should be designed to permit protection and enhancement of the resource.

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.

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 Calf Creek (a site on the National Register of Historic Places) affect planning and design of the Tyler Bend area.

Prior to design of the Tyler Bend developed area, several sites in the vicinity were studied and evaluated for their appropriateness (suitability) for various uses and facility development. Three sites were identified where development could occur (see Sites Considered map):

Site 1--Site 1 is directly east of the south end of the U.S. 65 bridge. Access is across a 15- to 20-foot-deep ravine, making the area costly to develop. A bridge or large culvert would be required. However, this addition would neither improve existing poor visibility nor permit development of turning lanes and gradients necessary to accommodate the large number of arriving vehicles that would result after the site was developed. Access to this site would involve using a dangerous intersection and would result in traffic tie-ups on both sides of the U.S. 65 bridge.



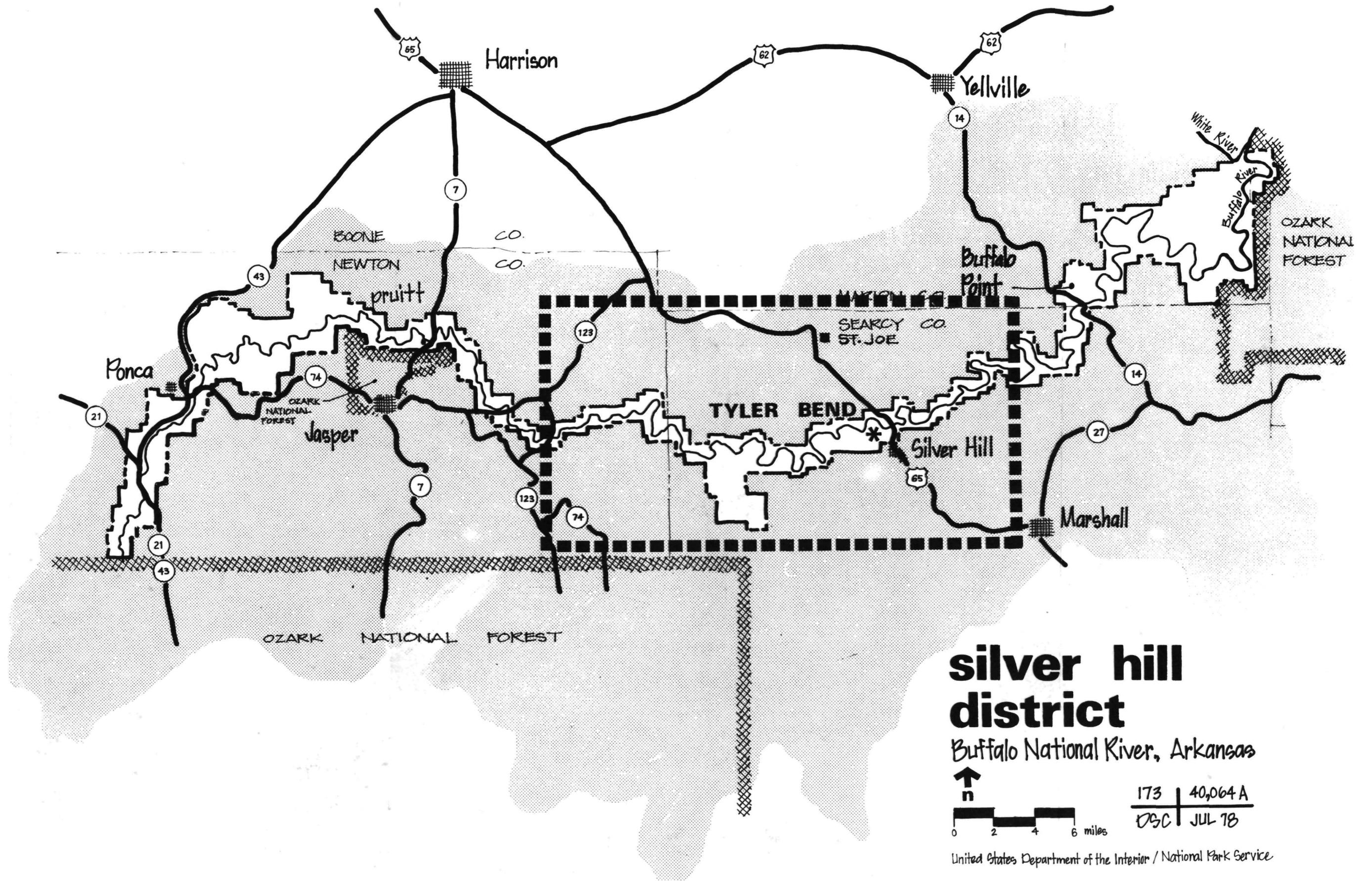
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Buffalo National River, Arkansas

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Site 1 lies mostly in the floodplain, which precludes permanent development, and is limited in size, which inhibits expansion in the future should demand warrant.

Site 2--This site is reached by a gravel road south of the U.S. 65 bridge. The road heads west and then north to Tyler Bend, a totally undeveloped portion of the river. The land adjacent to the river has been used in the past as a pasture, and it includes a terrace in the 100-year floodplain that lends itself to camping because it allows direct access to the river. A gentle slope leads up from this area to a much smaller terrace, which is above the 100-year floodplain and could serve as the location for a small comfort station and other permanent facilities.

Along the gravel access road is an ideal site for a visitor contact station/interpretive center, district headquarters, and parking. This area is high and offers views of the distant Ozark Mountains and the Buffalo River watershed, but it cannot be seen from the river (as required by the guidelines set forth in the Master Plan).

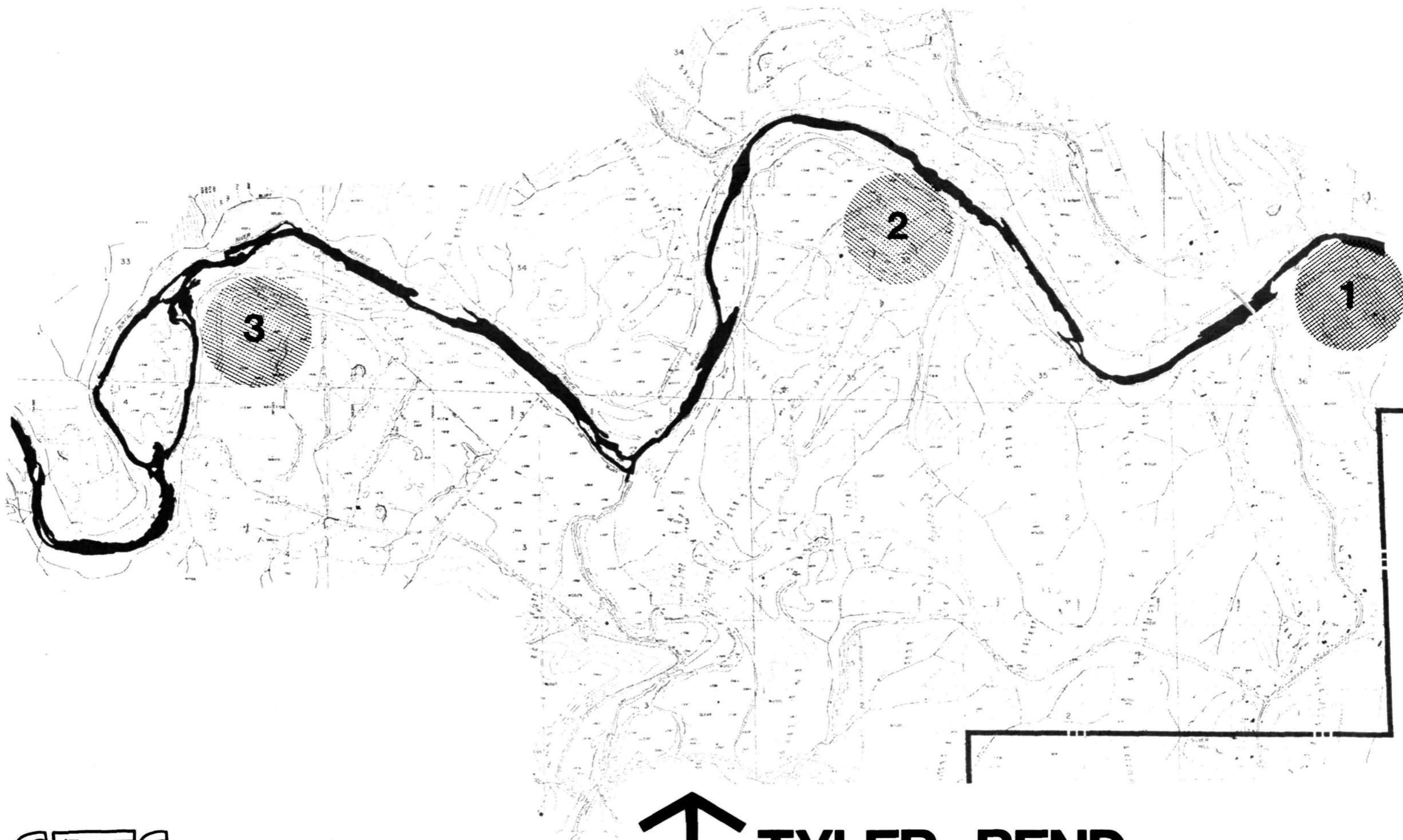
An additional advantage to site 2 is that it could support a good deal of development; however, the intent of this Development Concept Plan is to provide minimum development initially and increase development as demand warrants.

Site 3--The major disadvantage of this site (known as Arnold Bend) is the lengthy access from U.S. 65, which would involve a long period of travel and expense for the National Park Service. In addition, the access road crosses Calf Creek, which periodically floods. In order to provide reliable ingress and egress during periods of high water, extensive bridge building and road alignment work would be required. Another disadvantage is that the Calf Creek archeological site (a National Register site) is located here. Protection of this site is currently difficult, and with a major development close by, it would become impossible.

Site 3 lacks the visual character of site 2, but it could readily support development. It is an ideal site to set aside for future development in the event that other facilities in the area reach capacity.

Although none of the three study sites was found adequate for all the functions recommended in the Master Plan, sites 2 and 3 were considered adequate for specific functions. These sites--site 2, the Tyler Bend portion of the river, and site 3, Arnold Bend to the west--together comprise the main Tyler Bend developed area as described in the following section. The specific facilities,

programs, and uses planned for the selected sites are also delineated in that section. Consistent with the provisions of the National Environmental Policy Act, the National Historic Preservation Act, and other pertinent directives, alternative development concept plans and designs were identified, anticipated impacts of the proposal and the alternatives were analyzed, and cost estimates were developed.



**SITES
CONSIDERED**



TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

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the proposal

D E S C R I P T I O N

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

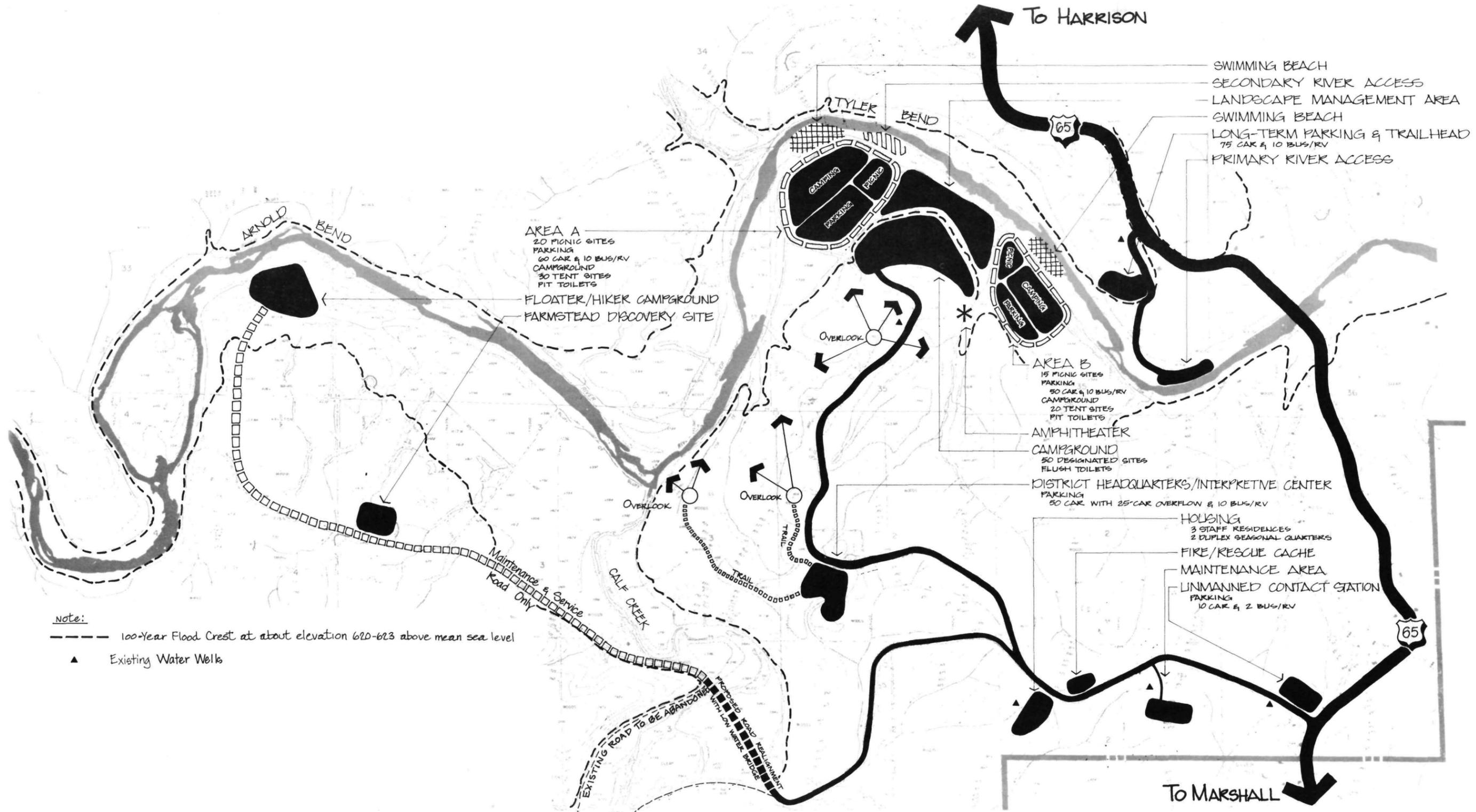
A 50-site campground with potable water and flush toilets will be located above the floodplain. Five of the 50 sites will be designed to accommodate groups of up to 50 persons each. An amphitheater will be built in association with the campground.

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

Along the existing unimproved road leading to Arnold Bend (see Proposed Development map) are several buildings listed as discovery sites. These sites could be used in the interpretation of farmstead life along Buffalo River. The area will be evaluated for appropriate interpretive uses. The unimproved road 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.

A 20-site floater/hiker campground will be designated along the river at Arnold Bend, which will not be opened to autos. Visitor access will be by foot along a dirt track or by boat from the river.

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



Note:
 - - - 100-Year Flood Crest at about elevation 620-623 above mean sea level
 ▲ Existing Water Wells

PROPOSED DEVELOPMENT



DEVELOPMENT CONCEPT PLAN TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

United States Department of the Interior / National Park Service

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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 floater/hiker primitive campground 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.

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.

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

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

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

Floater/Hiker Campground

- Provide for maintenance road access
- Provide pit toilets and trash receptacles

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

	<u>Acres</u>
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	<u>27.0</u>
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,

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 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.

The old structures used as discovery sites will offer a multitude of interpretive opportunities such as living history, early period building techniques, and demonstrations.

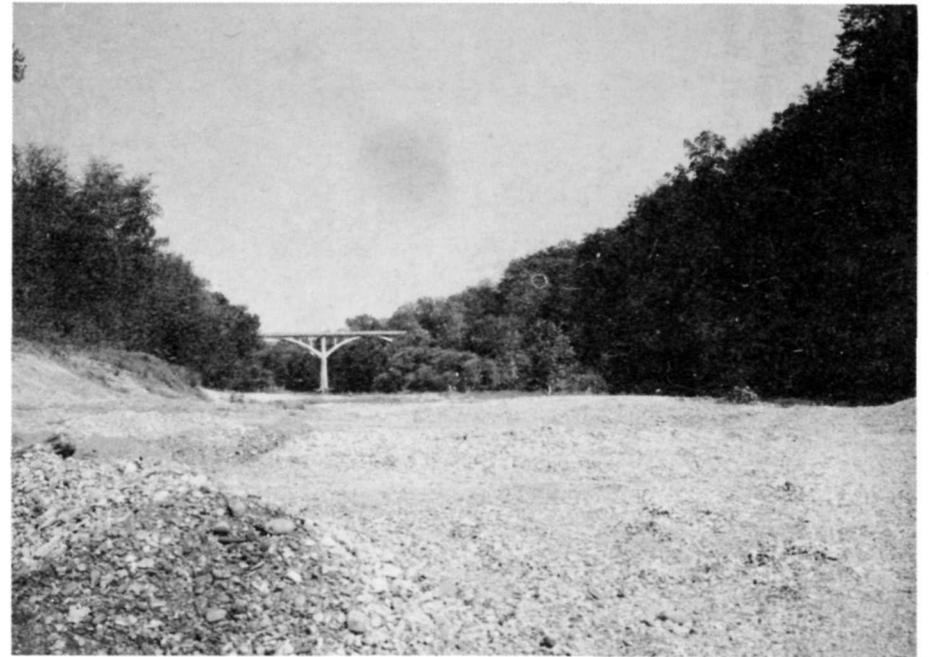
Small, covered, unmanned kiosks will be located at the Tyler Bend campground and the primary river access point upriver from the U.S. 65 bridge. These kiosk displays will provide up-to-date information on water levels, weather reports, naturalist program information, official park and visitor-related notices, and a visitor note panel. The kiosks at the primary river access will be located



Areas A and B



Primary Put-In, U.S. 65 Bridge



Areas A and B

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.

ENVIRONMENTAL IMPACTS

In order to clearly identify the anticipated impacts of the proposal, the impacts section is organized according to the same topic headings used in the "Description of the Environment" section. Under each topic, the relevant impacts of the proposal on various components of the environment are analyzed and, where appropriate, compared. The mitigating measures, unavoidable adverse effects, short-term and long-term relationships, and irreversible and irretrievable commitments of resources are discussed in separate sections following the impacts.

NATURAL ENVIRONMENT

Geology/Topography/Soils

Most of the proposed development will occur on sites already cleared or disturbed during construction of existing buildings, roads, parking areas, or pasturelands. Under the proposal, small amounts of land will revert to natural conditions as existing development is removed. Excavating, grading, and compaction associated with new development will disturb about 125 acres of land.

The following list indicates how the land will be used in the proposal:

	<u>Acres</u>
Existing disturbed area to be upgraded	2.34
Currently undisturbed land to be developed	141.0
Area to be cleared and allowed to revegetate	<u>-18.0</u>
Total (net area to be disturbed)	125.34

Increased erosion will occur during the construction period and until revegetation takes place. The extent of this erosion will depend upon the amount of rainfall during the period of disturbance. An unknown amount of eroded soil will cause a temporary rise in the silt level in Calf Creek and Buffalo River.

The impacts on soils during the postdevelopment operational phase will be minimal. Slightly more runoff will occur where roads are

improved or additional construction takes place. Where necessary, existing structures will be removed, and the areas will be allowed to return to natural conditions. This conversion will slightly reduce runoff in those areas.

Climate

Development will not cause any change in local climatic conditions.

Air Quality

Implementation of the proposal is expected to affect air quality as follows:

Vehicle exhaust emissions--Concentrations of carbon monoxide, nitrogen oxides, particulates, and hydrocarbons are expected to increase during the construction phase and as a result of increased vehicle use after completion. Based upon modeling studies elsewhere, no national ambient air quality standards or prevention of significant deterioration (PSD) class I or class II increments will be exceeded by peak traffic volumes up to approximately 1,000 vehicles per hour.

Atmospheric dust--An increase in dust load will occur because of soil disturbance during construction. This will lead to temporary impairment of visibility at times during this phase. Continued use of unpaved roadways will also lead to higher concentrations of airborne dust.

Campfire smoke--Increased camping activity will produce greater amounts of campfire smoke. This smoke may impair visibility during times of poor atmospheric mixing.

Water Resources

Development will require the use of existing wells and additional new sources of water for visitor use. To estimate the demand, it has been determined that visitor water use per person will be about 0.1 gallon/day for drinking and an average of 7.5 gallons/day for comfort station use, picnicking, etc.

Daily drinking water and sanitary water volumes, as projected from table 3 (see "Visitation Patterns and Statistics" section), are as follows:

<u>District Headquarters</u>	<u>Area A</u>	<u>Area B</u>
2,350	105	70
1,400	216	144
240	189	126
8	126	126
245	22	22
100	300	240
20	210	210
18	140	140
<u>4,381</u>	<u>24</u>	<u>48</u>
x 7.6	1,332	1,136
33,295.6 gal/day	x 7.6	x 7.6
	10,123.2 gal/day	8,633.6 gal/day

Vegetation

Some modification of vegetation will occur during development of the proposed visitor use and access facilities. About 125 acres of land or less than 1 percent of the total acreage of the national river system may be affected by various recreational uses as identified in the proposal. A portion of the vegetation in these areas will be removed to provide parking, buildings, picnicking, campsites, and hiking trails. Increased use of the streambanks and trails will have adverse effects on sensitive plants, for example, lichens and wild flowers, in the immediate area. However, the overall impact on vegetation will be moderate.

Wildlife

Increased visits in the developed area and additional people floating the river will affect behavioral patterns of wildlife species. Development may indirectly affect an endangered bat species in the area. The gray bat, Myotis grisescens, is known to inhabit Peter Cave. This cave overlooks the Buffalo River approximately 26.5 kilometers (16.5 miles) upstream from Tyler Bend. The development at Tyler Bend will increase the canoe traffic past this cave at a time when the females and their young are in the cave. This increase could result in a higher mortality of the M. grisescens young if more people enter Peter Cave.

Increased fishing may result in a decline in the quality and/or size of game fish populations.

Aesthetic Quality

Under the proposal, the primary river access will be relocated to the northwest side of the U.S. 65 bridge. Visitor parking will be provided, reducing congestion. Other developments will be located away from the highway and will not visually intrude upon the river scene.

CULTURAL ENVIRONMENT

Although archeological remains of prehistoric Indian occupation are relatively widespread in the Silver Hill district, only one site, the Calf Creek site, is listed on the National Register of Historic Places. During the period of March 12 - 15, 1979, the Southwest Cultural Resources Center, National Park Service, conducted an archeological survey of the Silver Hill district. The purposes of this survey were to determine if any other known archeological sites met the eligibility requirements for listing on the National Register of Historic Places and if any proposed developments would affect archeological resources.

The survey covered two development areas that included 28 separate proposed facilities. Ten archeological sites were recorded and evaluated during the survey. None of these sites met the criteria for inclusion on the National Register of Historic Places (36 CFR 60.6). The survey located archeological resources, mostly lithic scatter, in 14 of the 28 proposed facility areas. Most of these sites were exposed in abandoned fields on primary terraces immediately adjacent to Buffalo River.

Although none of the sites recorded and evaluated during the survey were considered eligible for National Register status, all archeological resources will be treated in accordance with current National Park Service management policies, which generally call for preservation of such resources. If it becomes necessary to salvage any archeological resources as a last resort, this will be carried out by professional archeologists in accordance with current National Park Service management policies, activity standards, and guidelines. It is the intent of the National Park Service to preserve the Calf Creek site. In addition, the National Park Service will comply with section 106 of the 1966 National Historic Preservation Act by consulting with, and requesting comments from, the Arkansas state historic preservation officer and the Advisory Council on Historic Preservation on any undertaking that will affect the site.

SOCIOECONOMIC ENVIRONMENT

A substantial portion of NPS-budgeted construction funds for the Tyler Bend developed area will be spent in Searcy County and the surrounding counties of Baxter, Boone, Marion, and Newton. NPS payroll funds will be added to the local economy and will have some economic impact on the region.

A most important source of an economic impact will be the increased purchase of supplies by recreationists while visiting the area. There will also be a tourist demand for services and facilities, which will spur expansion of existing facilities and construction of new ones.

M I T I G A T I N G M E A S U R E S

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.

U N A V O I D A B L E A D V E R S E E F F E C T S

Unavoidable adverse effects on the natural environment will include increased local air pollution as a result of anticipated increases in automobile traffic, minor local traffic congestion, and disturbance of the primitive character of the area during initial construction of park facilities and trails. These impacts, however, should be minor in scope.

Some soil erosion will occur during construction or other improvement of the site.

Increased runoff will occur near areas where new structures and compacted parking areas are built.

A temporary, localized increase in noise and decrease in air quality will occur during the period of construction.

SHORT - TERM / LONG - TERM RELATIONSHIPS

Short-term uses will be the development of visitor facilities and road accesses. These short-term uses of the environment will result in visitor use being channeled into small, defined, developed areas; thus, long-term preservation of the remaining lands in an undisturbed state will be encouraged.

IRREVERSIBLE / IRRETRIEVABLE
COMMITMENTS OF RESOURCES

NPS commitments to certain land uses (recreational development) will preclude other possible uses and associated economic benefits. Past uses of the land and the river--other than those compatible with plan proposals--will be irretrievably precluded because of national river designation.

C O S T E S T I M A T E S - P R O P O S A L

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
Floater/hiker campground	
Establish facility (20 sites)	19,000
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	<u>324,000</u>
Total Gross Amount	\$3,588,250

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.

assessment of alternatives

A L T E R N A T I V E A - N O A C T I O N

DESCRIPTION

Under this alternative, the status quo would be maintained in terms of administration and visitor use. The only use of the site at present occurs immediately downstream from the U.S. 65 bridge, where the previous landowner allowed entry and use for a nominal fee. No figures are available on the numbers of visitors now using this area. All other land has been in private ownership up to the present time, with no public access.

Currently, housing consists of one staff residence, one house trailer, and one substandard seasonal residence. The district headquarters/contact station is located adjacent to the staff residence in the Silver Hill district. These facilities would remain here under this alternative, and current efforts to upgrade them would continue.

River access would remain at its present location, immediately southeast of the U.S. 65 bridge. Poor visibility combined with the substandard condition of the roadbed and surface currently make this a hazardous intersection; road improvement and signing would not improve access. Other existing, unimproved roads within the Tyler Bend area would either be maintained for administrative purposes or abandoned. Existing structures not meriting national landmark status would either be removed or destroyed.

LAND USE

	<u>Acres</u>
Parking area/district headquarters/contact station	4.5
Staff residences	
River access/day use area (including roads)	<u>18.0</u>
Total	22.5

IMPACTS

Natural Environment

Under the no-action alternative, major facility construction as suggested in the proposal would continue to be deferred; therefore, all construction and subsequent use impacts on site stability, aesthetics, vegetation, and wildlife would be eliminated.

Cultural Environment

The lack of an interpretive program for cultural resources in the area could result in vandalism due to public indifference. The Calf Creek archeological site could be subject to vandalism.

Socioeconomic Environment

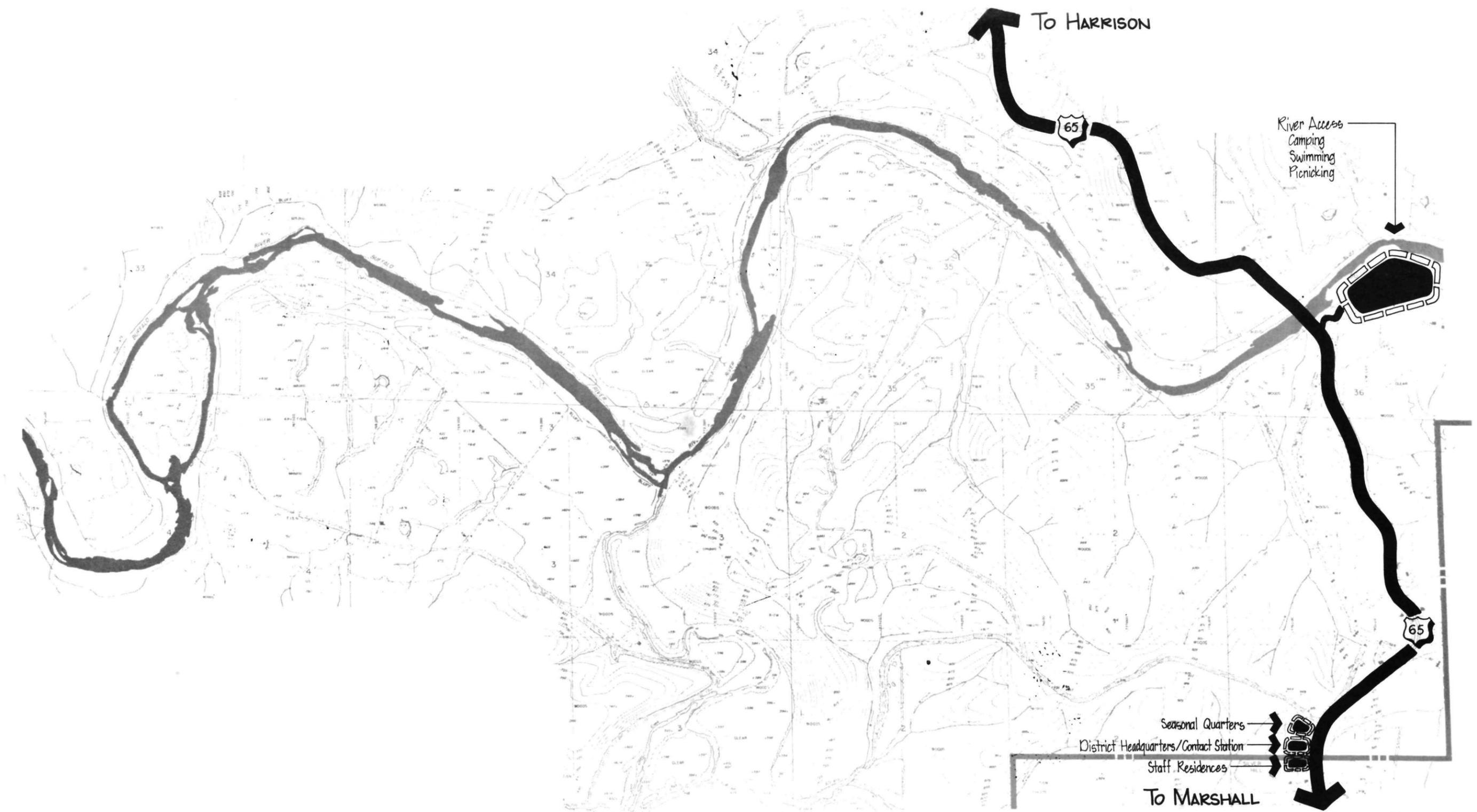
Under the no-action alternative, visitors would continue to have minimum interpretive and informational contact with the park staff. Without the visitor interpretive center, visitors would be minimally informed of the variety of park activities. Visitors would also receive minimal information concerning safety and flooding, often too late to avoid a safety problem or resource management violation. Visitors would continue to be exposed to the hazardous intersection at the U.S. 65 bridge.

MITIGATING MEASURES

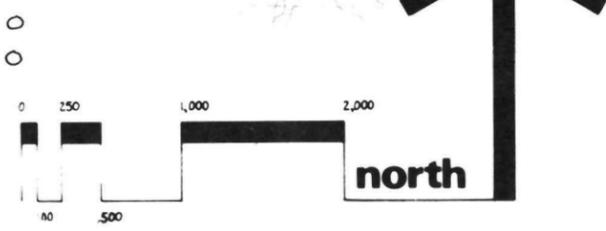
Present housing facilities could be upgraded. Visitor control measures would continue, which include prevention of visitor-related impacts such as littering, vandalism, unauthorized parking on road shoulders, removal of vegetation, harassment of wildlife, and hazardous river use.

UNAVOIDABLE ADVERSE EFFECTS

The primary adverse effects under the no-action alternative would be related to controlling visitation, and because visitation is expected to rise progressively in the future, it is assumed that the frequency of visitor-related impacts would also increase. This would include damage, littering, vandalism, and wildlife disturbance. Safety and sanitation problems would also arise.



**ALTERNATIVE A
NO ACTION**



**DEVELOPMENT CONCEPT PLAN
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SHORT-TERM/LONG-TERM RELATIONSHIPS

With no major actions taken to accommodate the expected numbers of visitors along Buffalo River and in the absence of decisive action to improve recreational and interpretive facilities, visitors to the area would be denied a rewarding experience.

Management of the area in general would remain difficult. Over the long term, with visitor demands on existing facilities and natural resources, it might be necessary to restrict the numbers of visitors to the area.

IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES

Under the no-action alternative, there would be no irreversible and/or irretrievable commitments of resources.

A L T E R N A T I V E B

DESCRIPTION

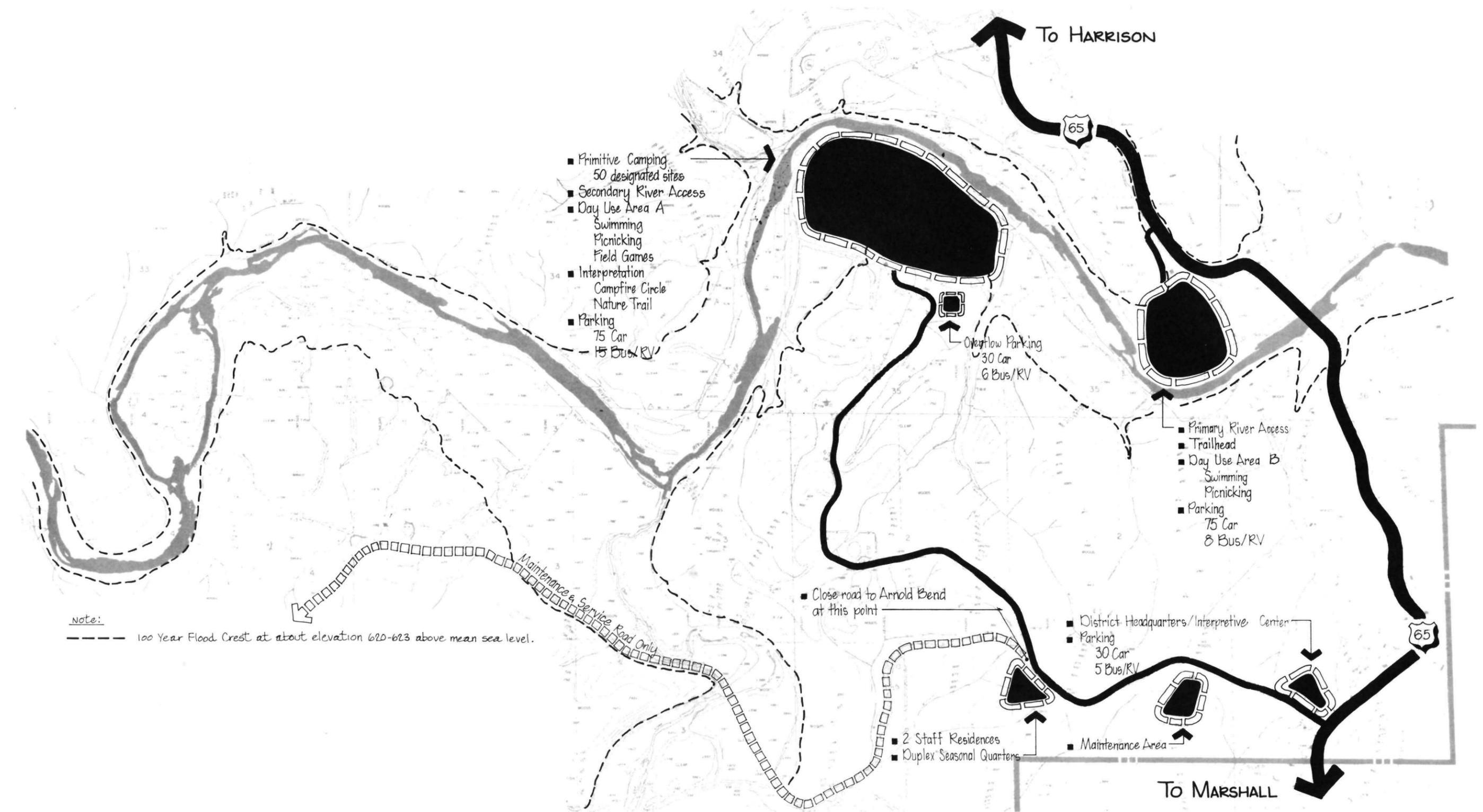
Under this alternative, all existing functions would be moved and expanded to coincide with land acquisition and anticipated visitation. The district headquarters/contact station would be moved some 500 feet north to a point immediately north of the intersection of U.S. 65 and the existing road leading to Tyler and Arnold bends. The contact station would be upgraded to an interpretive center. A 30-car/5-bus parking area would be constructed in association with this facility. The existing dirt road to Tyler Bend would be upgraded to a 20-foot-wide paved road.

A 1½-acre maintenance compound would be developed on the north side of the entrance road some 1,500 feet west of U.S. 65, and two staff residences and a duplex for seasonals would be constructed about 3,000 feet from this highway. An integrated utility system would serve the district headquarters/interpretive center, maintenance area, and staff housing area.

Under alternative B, the Tyler Bend section of the river would be developed to include the following facilities: 50 designated primitive campsites, a day use area, a secondary river access, a nature trail, a campfire circle, and a parking area for 75 cars and 15 buses. Approximately 16 acres within this day use area would be maintained as meadow for field games. Because much of this site is within the 100-year floodplain, no utility system or other permanent structures would be built. A 30-car/6-bus parking lot would be constructed on the next higher plateau, which could serve as an overflow parking area or be used by floaters intending to be absent for several days.

Primary river access would be identical to that in the proposal except that under this alternative a day use area would be provided, which would include picnicking and swimming.

Under alternative B, the roads leading to Arnold Bend and upstream from the U.S. 65 bridge would be maintained for administrative use but would not be open to the public. Structures not listed on the National Register, including those currently used for staff housing and visitor contact, would be removed.



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

ALTERNATIVE B



DEVELOPMENT CONCEPT PLAN TYLER BEND

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LAND USE

	<u>Acres</u>
District headquarters/interpretive center/ parking lot	6.0
Maintenance area	2.0
Staff housing	6.5
Tyler Bend area	77.5
Overflow parking area	1.0
Primary river access area (including roads)	<u>27.0</u>
Total	120.0

IMPACTS

Natural Environment

Most of the proposed development would occur on sites already cleared or disturbed during the construction of existing buildings, roads, parking areas, or pasturelands. Under this alternative, small amounts of land would revert to natural conditions as existing development was removed.

Excavating, grading, and compaction associated with development would disturb 107 acres. The following list indicates the acreages that would be involved in alternative B:

	<u>Acres</u>
Existing disturbed area to be upgraded	6.0
Currently undisturbed land to be developed	119.0
Area to be cleared and allowed to revegetate	<u>-18.0</u>
Total (net area to be disturbed)	107.0

Increased erosion would occur during the construction period and until revegetation took place. The extent of this erosion would depend upon the amount of rainfall during the period of disturbance. An unknown amount of eroded soil would cause a temporary rise in the silt level in Calf Creek and Buffalo River.

The impact on soils during the postdevelopment operational phase would be minimal. Slightly more runoff would occur where roads were improved or additional construction took place.

Under alternative B, some existing structures would be removed, and the areas would be allowed to return to natural conditions. This conversion would slightly reduce runoff in those areas.

Alternative B would require drinking water and sanitary water volumes similar to those projected in the "Water Resources" impacts subsection of the proposal; however, under this alternative water to supply the floater/hiker campground would not be needed.

Under alternative B, there would be no impacts on climate.

Cultural Environment

Under alternative B, impacts on the cultural environment would be the same as those described in the proposal.

Socioeconomic Environment

Impacts on the socioeconomic environment would be the same as those for the proposal.

MITIGATING MEASURES

Mitigating measures would be the same as those detailed in the proposal.

UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects would be the same as those described in the proposal.

SHORT-TERM/LONG-TERM RELATIONSHIPS

Short-term and long-term relationships would be the same as those described in the proposal.

IRREVERSIBLE/IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable commitments of resources would be the same as those detailed in the proposal.

COST ESTIMATES - ALTERNATIVE B

Primary river access point	
Provide picnic sites	\$ 10,000
Construct parking area	145,000
Upgrade and pave access road	40,000
District headquarters/interpretive center	
Construct facility	400,000
Construct parking area	75,000
Maintenance area	
Construct compound	263,000
Housing area	
Construct staff residences (2)	131,000
Primitive camping area	
Establish camping area (50 sites)	44,000
Provide picnic sites	10,000
Construct parking areas	175,000
Upgrade access road	600,000
Construct overflow parking area	54,000
Upgrade and expand utilities	82,000
Remove buildings (3)	9,000
Revegetate areas	20,000
Landscape and develop site	<u>206,000</u>
Total Gross Amount	\$2,264,000

All costs are gross amounts and include actual expenses plus design and contract supervision.

description of the environment

T Y L E R B E N D

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.

Table 1

VISITATION SUMMARY

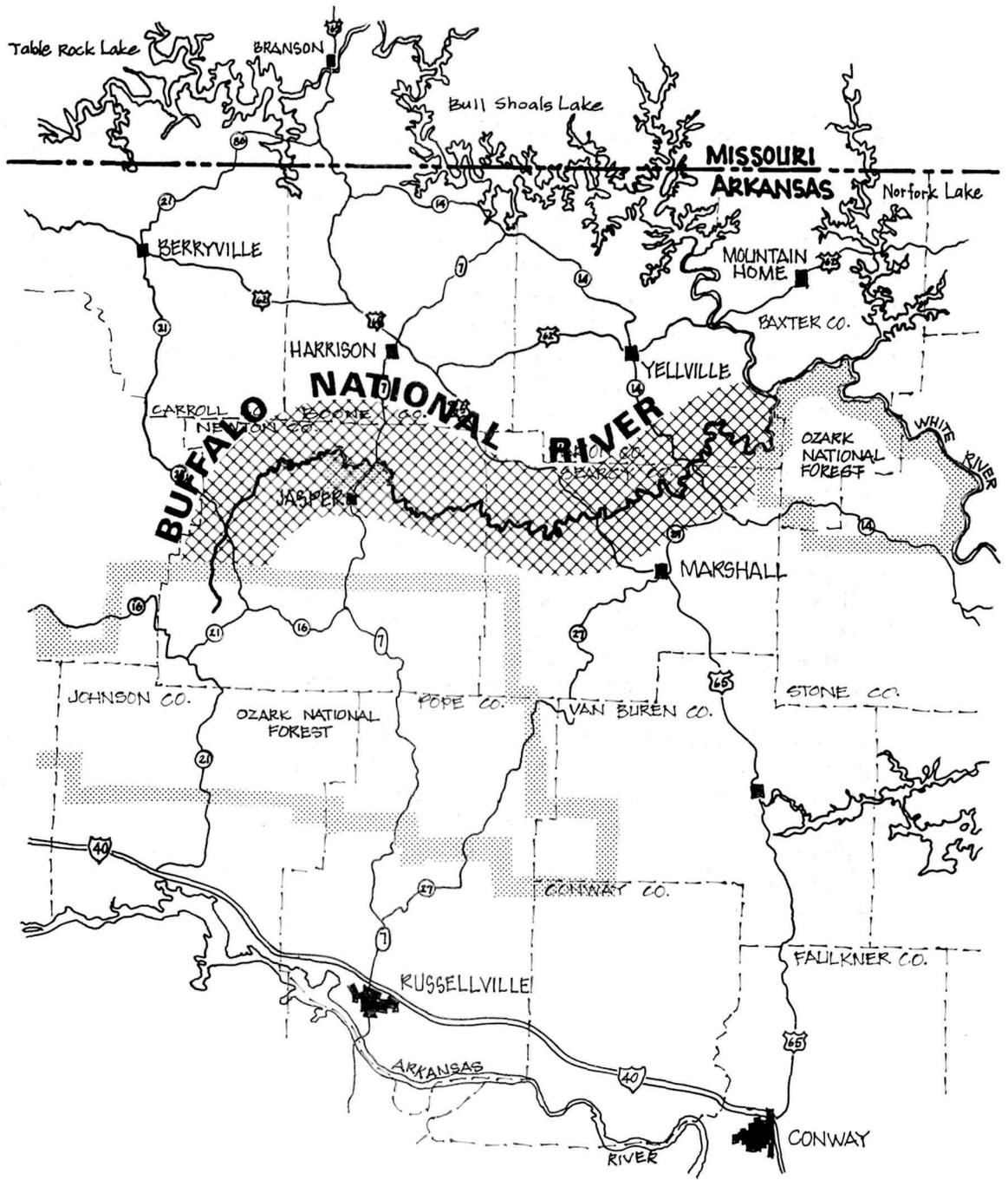
Buffalo National River

	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
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	<u>2,223</u>	<u>1,145</u>	<u>5,582</u>	<u>4,562</u>	<u>19,201</u>
Total	205,861	224,041	315,763	331,546	645,343

Table 2

DISTRICT VISITATION
1978

	<u>Buffalo Point District</u>	<u>Silver Hill District</u>	<u>Pruitt District</u>
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	<u>1,849</u>	<u>13,273</u>	<u>4,079</u>
Total	339,805	169,603	135,936



VICINITY

Buffalo National River, Arkansas



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 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).

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
<u>Area A</u>								
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	17,368
	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					
<u>Area B</u>								
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					
<u>District Headquarters</u>								
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
			333					
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

N A T U R A L E N V I R O N M E N T

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



0-5



5-10



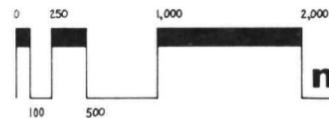
10-20



+20

Percent Slope

SLOPE ANALYSIS



north

TYLER BEND

BUFFALO NATIONAL RIVER, ARKANSAS

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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

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

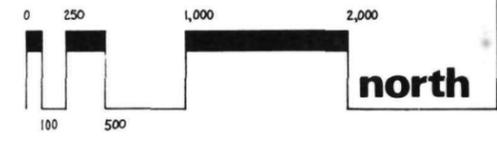
Lower - very gravelly silt clay

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



SOIL SURVEY



TYLER BEND
 BUFFALO NATIONAL RIVER, ARKANSAS
 United States Department of the Interior / National Park Service

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soil suitability

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

LIMITATIONS

- ☐ Slight
- ▣ Moderate
- Severe

tyler bend

DEVELOPMENT CONCEPT PLAN
Buffalo National River - Arkansas

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.

Table 4

MONTHLY AND ANNUAL PRECIPITATION

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

AIR QUALITY

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

In the floodplain area, the water table fluctuates in response to the level of the Buffalo River. Results of pumping performed in test holes sunk at Tyler Bend indicate that the infiltration rate is rapid.

In 1978 the National Park Service drilled five test holes in the area. Aquifer testing of the wells has not been completed to date. It is estimated, based on nearby wells that have been tested in the region, that a specific amount of 0.13 gallon per minute per foot of drawdown may be expected, with readily attainable yields of 10 to 20 gallons per minute.

Waste Discharge

Within the Buffalo River watershed there are two municipalities having central sewage collection and treatment facilities. Jasper, Arkansas, is served by an extended aeration plant with chlorination and tertiary filters. Marshall, Arkansas, is served by a single-stage trickling filter plant. In addition, there are four treatment plants discharging nonmunicipal domestic wastes into the watershed. A review of National Pollutant Discharge Elimination System discharge permits of the watershed identifies them as follows:

National Park Service
Buffalo Point (lower plant)
Buffalo Point (upper plant)
Nation's Camper Park
Recreational Enterprises, Inc., Arkansas (Dogpatch USA)

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.

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.

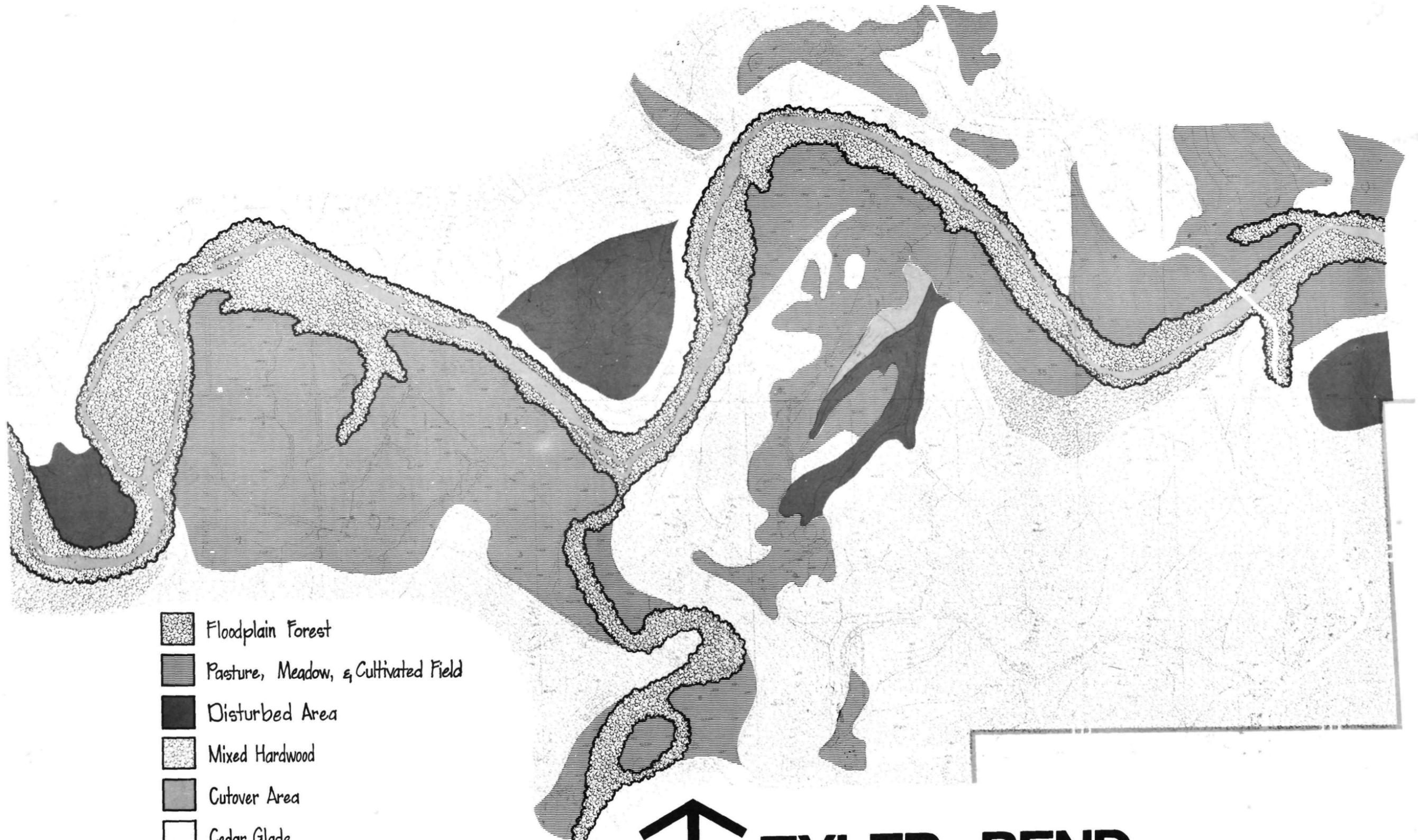
Cedar Glade

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

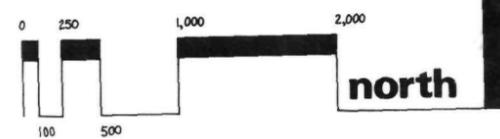
Occurring extensively on upland soils derived from sandstones or shales, these areas are usually dominated by oaks, although shortleaf pine can occur locally in almost pure stands. Generally, pines constitute from 10 to 40 percent of the total species composition. In some instances, pure or nearly pure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

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



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

VEGETATION



TYLER BEND
 BUFFALO NATIONAL RIVER, ARKANSAS
 United States Department of the Interior / National Park Service

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WILDLIFE

Wildlife present along Buffalo River is typical of the deciduous forest biome. In general, the forest habitat has decreased in recent decades as a result of continued clearing of forested lands for pastureland. Consequently, the quantity of wildlife has decreased.

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 is a protected species and may not be hunted. Mountain lion and black bear are also found in small numbers and, although not listed as game animals, are protected.

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, bobwhite quail, 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, walleye, suckers, catfish, bluegills, green perch, and sunfish. In a species survey from 1965 to 1973, there were 59 species of fish recorded in the Buffalo River. Among the more unusual are the studfish, chestnut lamprey, darters, and gar.

Over 250 species of birds have been reported in the Buffalo River area, 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 (Pipistrellus hesperus), red bat (Lasiurus borealis), and big brown bat (Eptesicus fuscus).

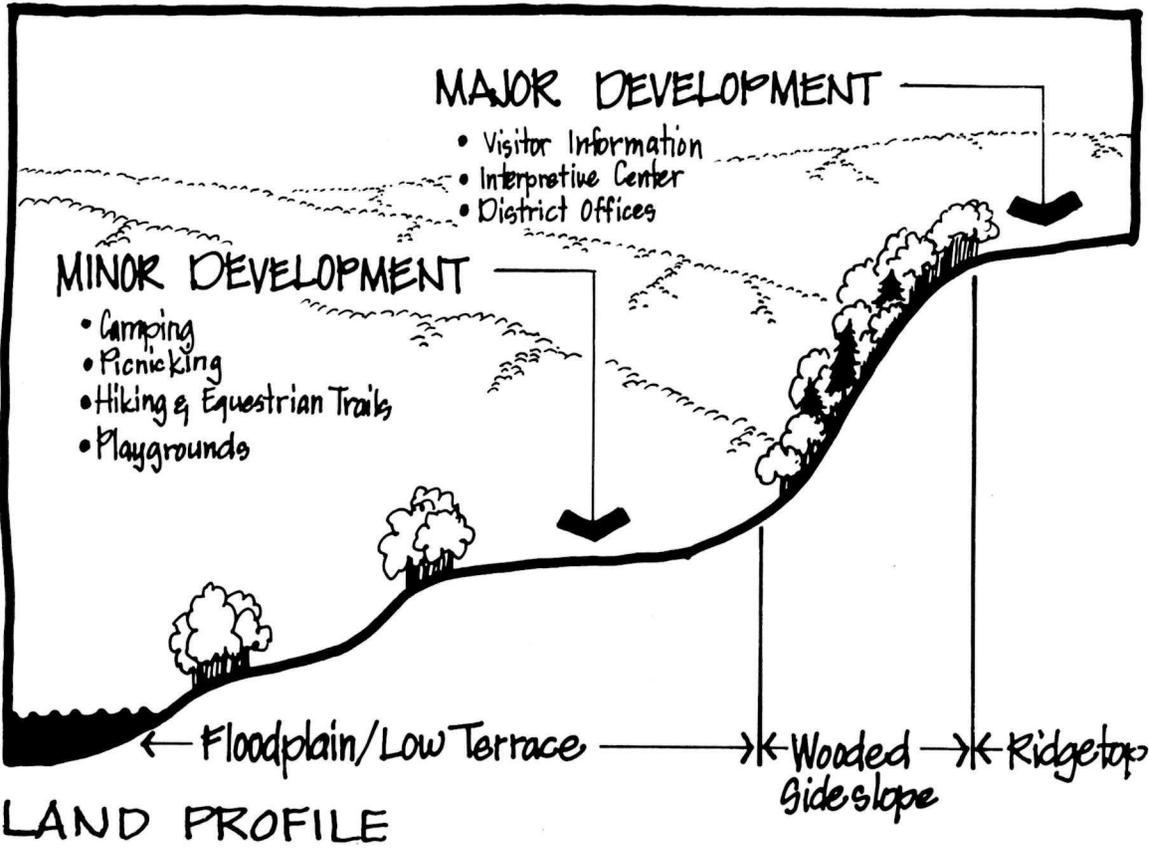
Boxley Bat Cave houses the largest known hibernating colony of Indiana bats in Arkansas, numbering about 2,000. The cave is heavily visited by people from the area and should be protected. Efforts in the past to have the cave designated as critical habitat for the Indiana bat have been to no avail.

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).

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



C U L T U R A L E N V I R O N M E N T

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, graters, and knives.

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

During the Woodland period (ca. 1,000 B.C.- A.D. 700), the basic resource exploitation pattern of the preceding period was retained, but the manufacture of pottery was added, along with an increasingly sedentary settlement pattern. Sometime after A.D. 1, the bow and arrow came into use in the Buffalo River area. Toward the close of the Woodland period, agriculture came into practice--a revolutionary development that continued into the following Mississippian period (ca. A.D. 700-1700).

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. Calf Creek archeological site 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.

S O C I O E C O N O M I C E N V I R O N M E N T

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. 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).

consultation and coordination

This Development Concept Plan will be circulated to the following organizations and individuals for comments:

FEDERAL AGENCIES

Advisory Council on Historic Preservation
Department of Agriculture
 Forest Service
 Soil Conservation Service
Department of the Army
 Corps of Engineers
Department of Housing and Urban Development
Department of the Interior
 Bureau of Indian Affairs
 Bureau of Land Management
 Bureau of Mines
 Bureau of Reclamation
 Fish and Wildlife Service
 Geological Survey
 Heritage Conservation and Recreation Service
Environmental Protection Agency
Federal Power Commission

STATE AGENCIES

Arkansas Department of Parks and Tourism
State of Arkansas, Department of Planning
Arkansas State Historic Preservation Office
Arkansas Game and Fish Commission
Arkansas Committee on Stream Preservation
Arkansas Forestry Commission
Arkansas Archeological Survey, Water Resources Division
Northwest Arkansas Economic Development District, Inc.

INDIVIDUALS AND ORGANIZATIONS

Oxford Hamilton, Newton County, Chancery and Circuit Court
Bob Daniels, Newton County Assessor
Alton Campbell, Newton County Judge
Ray Watkins, Newton County Sheriff
Sierra Club, Group Chairman, Headwaters Group,
 Fayetteville, Arkansas
Sierra Club, Conservation Chairman, Headwaters Group,
 Fayetteville, Arkansas
Ozark Society, Pulaski Chapter
American Rivers Conservation Council
Ozark Society, Bayou Chapter
University of Arkansas, College of Engineering
American Rivers Resources Council

appendixes/bibliography/planning team

APPENDIX A : LEGISLATION

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

An Act

86 STAT. 44

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

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

Buffalo National River, Ark. Establishment.

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

Lands and waters, acquisition.

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

Retention rights.

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

"Improved property."

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

Hunting and fishing, rules and regulations.

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

Water resource projects, restriction.

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

Administration.

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

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

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

Area review;
report to
President.

SEC. 7. For the acquisition of lands and interests in lands, there are authorized to be appropriated not more than \$13,115,000. For development of the national river, there are authorized to be appropriated not more than \$283,000 in fiscal year 1974; \$2,923,000 in fiscal year 1975; \$3,643,000 in fiscal year 1976; \$1,262,000 in fiscal year 1977; and \$1,260,000 in fiscal year 1978. The sums appropriated each year shall remain available until expended.

Appropriation.

Approved March 1, 1972.

LEGISLATIVE HISTORY:

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

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

CONGRESSIONAL RECORD:

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

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

Feb. 9, Senate concurred in House amendment.

APPENDIX B : FLOODPLAIN MANAGEMENT

THE PRESIDENT

26951

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

THE PRESIDENT

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

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

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

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

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

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

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

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

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

THE PRESIDENT

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

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

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

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

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

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

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

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

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

THE PRESIDENT

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

Sec. 6. As used in this Order:

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

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

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

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

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

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

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

THE WHITE HOUSE,
May 24, 1977

APPENDIX 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.

APPENDIX D:
MEMORANDUM OF AGREEMENT

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

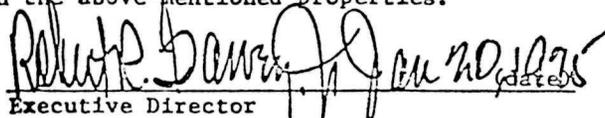
MEMORANDUM OF AGREEMENT

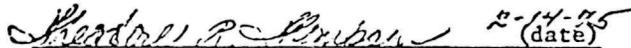
WHEREAS, the Department of the Interior, National Park Service proposes to adopt the Buffalo National River Master Plan and make a Wilderness Recommendation for the Buffalo National River; and,

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

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

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


Executive Director
Advisory Council on Historic Preservation

 2-14-75 (date)
National Park Service
Department of the Interior

 2-25-75 (date)
Arkansas State Historic Preservation
Officer

 3/13/75 (date)
Chairman
Advisory Council on Historic Preservation

APPENDIX 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.

APPENDIX F: WATER QUALITY
 ENVIRONMENTAL CONSULTANTS, INC.

391 NEWMAN AVE. · P.O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL (317) 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	<u><0.005</u> mg/l	Manganese	<u><0.008</u> mg.
Arsenic	<u><0.002</u> mg/l	Mercury	<u>0.008</u> mg.
Barium	<u><0.03</u> mg/l	Nitrate--Nitrogen	<u>1.22</u> mg.
Bicarbonate, as CaCO ₃	<u>115</u> mg/l	Nitrite--Nitrogen	<u>0.001</u> mg.
Cadmium	<u>0.092</u> mg/l	pH	<u>7.37</u>
Calcium	<u>118.185</u> mg/l	Phenols	<u><0.001</u> mg.
Carbonate, as CaCO ₃	<u>0</u> mg/l	Phosphates:	
Chloride	<u>14.68</u> mg/l	Total filterable (dissolved) and non-filterable phosphate	<u>0.092</u> mg.
Chromium, hexavalent	<u><0.008</u> mg/l	Total filterable and non-filterable ortho phosphate	<u>0.026</u> mg.
Copper	<u>0.024</u> mg/l	Total filterable and non-filterable acid hydrolyzable phosphate	<u>0.069</u> mg.
Cyanide	<u><0.03</u> mg/l	Total organic phosphate	<u><0.001</u> mg.
Fluoride	<u><0.1</u> mg/l	Selenium	<u><0.005</u> mg.
Iron	<u><0.01</u> mg/l	Silica, as SiO ₂	<u>0.53</u> mg.
Lead	<u><0.025</u> mg/l		
Magnesium	<u>2.0117</u> mg/l		

Remarks:

Analyses Reviewed By 

ENVIRONMENTAL CONSULTANTS, INC.

391 NEWMAN AVE. · P.O. BOX 37 · CLARKSVILLE, INDIANA 47130 · TEL. (317) 202-8401

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

Remarks:

Analyses Reviewed By 

Herbicides & Pesticides (ppb)

Aldrin	5	0	-	-
DDE	5	0	-	-
DDT	5	< 0.4	0	2.0
Dieldrin	5	0	-	-
Endrin	5	< 0.4	0	< 2.0
Lindane	5	< 0.2	0	< 1.0
Methyl Parathion	5	< 1.4	0	< 7.0
Toxaphene	5	< 0.2	0	< 1.0

Bacteriological (colonies/100 ml)

Diate Coliform	31	< 145	< 10	-	760
Fecal Coliform	22	< 80	< 7	-	830
Streptococci	16	< 79	< 4	-	704

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

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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
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

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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.

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