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FINAL

WATERSHED PLAN  
AND  
ENVIRONMENTAL IMPACT STATEMENT  
FOR  
BOIS d'ARC BAYOU WATERSHED



U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

JAN 1979



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BENEFIT COST RATIO OF PROJECT

BOIS d'ARC WATERSHED  
ARKANSAS

This addendum shows the results of using an interest rate of 6 7/8 percent, current normalized prices, and 1978 construction costs.

Average Annual Benefits	\$ 84,150
Annual Cost	67,000
Benefit Cost Ratio	1.25:1

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## PREFACE

The watershed plan and environmental impact statement for Bois d'Arc Bayou Watershed has been combined into a single document. The document describes the planned project and other alternatives which were considered and discusses anticipated environmental impacts.

This document was prepared under the authority of the Watershed Protection and Flood Prevention Act, Public Law 83-566, as amended (16 USC 1001-1008) and in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, Public Law 91-190, as amended (42 USC 4321 et seq).

The sponsoring local organizations which developed the plan are the Bois d'Arc Bayou Improvement District and the Little River Conservation District. The U.S. Department of Agriculture, Soil Conservation Service and Forest Service provided technical assistance to the sponsors in plan formulation. Financial assistance for plan development was provided by the State of Arkansas, Department of Commerce, Soil and Water Conservation Commission. Responsibility for compliance with the National Environmental Policy Act rests with the Soil Conservation Service.





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WATERSHED PLAN AND  
USDA ENVIRONMENTAL IMPACT STATEMENT <sup>1/</sup>

Bois d'Arc Bayou Watershed

Little River County

Arkansas

SUMMARY

- I. Draft
- II. Soil Conservation Service
- III. Administrative
- IV. Description of project purpose and action

The Bois d'Arc Bayou Watershed Project in Little River County, Arkansas, has been planned to achieve watershed protection, flood prevention, and drainage. The project will be implemented under authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Statute 666), as amended. The planned works of improvement include conservation land treatment, 7.6 miles of channel work, 19.7 miles of associated onfarm measures, and a water-level control structure. The channel work will involve 0.1 mile of clearing and debris removal within existing channels, 2.2 miles of new channel construction, and 5.3 miles of channel enlargement by excavation. The planned project installation period is three years at a total estimated cost of \$652,680.

The average annual benefits accruing to structural measures are \$84,150, and the average annual cost of structural measures is estimated to be \$56,460. The ratio of average annual benefits to average annual cost of structural measures is 1.5 to 1.

Land treatment and associated onfarm practices will be installed and maintained by the owners and operators with assistance from federal and state agencies. Structural measures will be installed, operated, and maintained by the Bois d'Arc Bayou Improvement District with assistance from the Soil Conservation Service.

The Bois d'Arc Bayou Improvement District has the power under state law to secure and repay loans, assess benefits, and levy taxes.

<sup>1/</sup> All information and data, except as otherwise noted by references to sources, were collected during watershed planning investigations by the Soil Conservation Service.

The district will provide the funds needed to meet its obligations and will obtain a watershed loan administered by the Farmers Home Administration.

#### V. Summary of Impacts

The following impacts will result from the implementation of the selected plan; these impacts are based on future-without project conditions versus future-with project conditions.

##### Adverse Impacts

1. Convert 0.8 mile of natural intermittent streams to man-made channels.
2. Convert 52 acres of bottomland forest wildlife habitat to channel right-of-way.
3. Reduce Type 1 wetlands by 16 acres.
4. Convert 145 acres of bottomland forest to cropland, resulting in a loss in forested wildlife habitat and a gain in open land wildlife habitat. The quality of this open land habitat will be lower than the quality of the existing forest land habitat.
5. Convert 45 acres of land classified as prime farmland to channels.
6. Reduce quality of wildlife habitat on 200 acres of native pasture due to conversion of this area to improved pasture.

##### Favorable Impacts

1. Reduce the suspended sediment load of the stream by 10 percent.
2. Reduce average sheet erosion by 15 percent.
3. Preserve 20 acres of Type 5 wetlands.
4. Reduce flooding damages by 78 percent.
5. Annually provide flood prevention benefits of \$66,070, drainage benefits of \$9,940, and employment benefits of \$8,140.
6. Provide seasonal flooding of 40 acres of cropland for a waterfowl feeding area.
7. By providing improved drainage and reduction in flooding, improve productivity of 3,918 acres of cropland and pastureland classified as prime farmlands.

## VI. Alternatives

Six alternatives were considered during project formulation. Alternative 1 is the plan which optimizes national economic development (NED), Alternative 2 is the plan which emphasizes environmental quality (EQ), and Alternative 3 is the selected plan for the project. When comparing Alternatives 4 and 5 to the selected plan, Alternative 4 tends to contribute more to the national economic development objectives and Alternative 5 tends to contribute more to environmental quality objectives. Alternative 6 was a no project alternative which was studied to determine if the favorable impacts of the selected plan could be achieved at a lesser environmental cost.

## VII. Comments on the draft statement were received from the following agencies:

Department of Commerce  
Department of Interior  
Department of Health, Education and Welfare  
Environmental Protection Agency  
Advisory Council on Historic Preservation  
Arkansas Department of Local Services, State Planning and  
Development Clearinghouse  
Arkansas Soil and Water Conservation Commission  
Arkansas Historic Preservation Program

## VIII. The draft statement was transmitted to EPA on August 4, 1978.

## PROJECT SETTING

The Bois d'Arc Bayou Watershed is composed of 10,540 acres (approximately 7 miles long and 3 miles wide) and is located entirely within Little River County which is in the southwest corner of Arkansas. The watershed is geographically situated in the apex of a triangle formed by the Little River to the north and the sprawling Red River to the south. These two major rivers merge just east of the Bois d'Arc Bayou Watershed. Bois d'Arc Bayou, the principal watershed drainage, rises in the gently rolling upland plains along the west boundary and flows generally eastward about 9.5 miles across the flat alluvium-filled bottomland before entering Hudson Creek. Included within the watershed is Bear Lake, a small (20 acres) oxbow lake of the Red River.

The watershed is in the Arkansas-White-Red Water Resource Region. The water resource region has differences in vegetation from short grasses to pine-hardwood forests. Soils within the region vary from sandy coastal plain soils to heavy poorly drained river bottom land soils. Land use and management vary as the physical characteristics of the area change. The watershed is in the southeastern part of the region and is characterized by high rainfall, a forested vegetation, and deep, poorly to excessively drained soils.

The watershed is in the central portion of the Lower Red Water Resource Subregion. This region includes the area draining into the Mississippi River between Durant, Oklahoma, and Ashdown, Arkansas. The eastern part of the subregion consists of steep, mountainous, forested areas bounding the narrow, level alluvium along the Red River. The western part of the subregion consists of rolling hills with some upland farming on each side of the alluvial areas along the Red River and its tributaries.

The Bois d'Arc Bayou Watershed is located approximately 10 miles north of Texarkana, Arkansas, in the West Gulf Coastal Plain Physiographic Province, a subdivision of the Coastal Plain. Temple, the only community in the watershed, is located approximately 13 miles southeast of Ashdown, the county seat, which has a population of 3,522. The watershed population is 350.

The major problem area is located in the flood plain of Bois d'Arc Bayou where frequent flooding and drainage problems cause agricultural crop losses. Inadequate land treatment and management practices on cropland also cause problems by increasing erosion.

The topography of the watershed varies from relatively flat river bottom in the central part to somewhat sloping terrain in the northern and western portions. Elevations range from 250 feet above mean sea level in the bottomland to 350 feet at the highest elevation in the watershed.

The upland portion of the watershed is underlain by alluvial terrace deposits of Pleistocene age and the bottomland consists of Recent alluvium from present streams. These materials are underlain at depth by marl and sand of Cretaceous age.

The soils in the central and southern portions belong to the Hebert, Severn, Moreland, and Rilla series. These soils are deep, poorly to well drained, permeable to slowly permeable, and acid to neutral in pH.

The coastal plains soils in the western portion of the watershed belong to the Cahaba and Kalmia series. These soils are deep, well drained, gently sloping, and moderately acid.

The Red River terrace soils, which lie mainly along the north side of the watershed, belong to the Wrightsville, McKemie, Acadia, Morse, Gore, and Muskogee series. These soils are deep, poorly to well drained, and slowly permeable.

The Bois d'Arc Bayou Watershed has a continental type of climate with extremes of temperature and precipitation occasionally occurring throughout the annual climatic cycle. Winters are seldom severe; however, brief cold periods do occur. The average frost-free period in Little River County is 226 days, extending from March 19 to November 8 (1). The average January temperature is 46.3°F (7.9°C) while the average July temperature is 82.7°F (28.2°C) (1). Temperature extremes of -9°F (22.8°C) and 117°F (47.2°C) have been recorded (1). Precipitation in Arkansas is predominantly of the shower type except for occasional periods of general rain during the late fall, winter, and early spring. The average number of days with measurable precipitation averages about 100 per year. Rainfall is normally abundant and well distributed throughout the year, assuring well-sustained agricultural production and making possible rapid reforestation. Winter and spring are the wettest times of the year. The fall of the year is uniformly the dry time of the year when monthly precipitation totals average 2 to 3 inches. The State is subject to heavy local rains which frequently give storm totals of from 5 to 10 inches over extensive areas and occasionally heavy local rains will produce totals in excess of 10 inches over extensive areas (U.S. Department of Commerce, Climates of the United States - Arkansas, Washington, D.C., June 1969).

The mean annual rainfall for the closest long record gage at Okay is 50.34 inches (U.S. Department of Commerce, Climatological Data - Arkansas, USGPO, Washington, D.C.). The maximum recorded annual rainfall at Okay was 79.51 inches in 1974; the minimum was 25.89 inches in 1936.

The normal monthly rainfall is as follows:

<u>Month</u>	<u>Inches</u>	<u>Month</u>	<u>Inches</u>
January	4.04	July	3.49
February	3.97	August	3.56
March	4.79	September	3.74
April	5.61	October	3.51
May	6.07	November	3.95
June	3.67	December	3.94

For the purpose of watershed planning, land uses within the Bois d'Arc Bayou Watershed were divided into the four major categories of cropland, pastureland, forest land, and other. Based on these four categories, land uses in the watershed are distributed as follows: 2,603 acres of cropland, 2,012 acres of pastureland, 5,536 acres of forest land, and 389 acres of other land uses. Within the benefited area there are approximately 2,213 acres of cropland, 900 acres of pastureland, 1,245 acres of forest land, and 152 acres of other land uses. All lands in the watershed are privately owned.

#### PROJECT FORMULATION

Alternatives examined during plan formulation were of two basic types. The first involved those which would satisfy goals identified by the public for national economic development and environmental quality. (See the "Project Goals" section.) And the second dealt with alternatives which would further reduce or avoid adverse impacts to the environment resulting from the selected plan.

#### PROJECT GOALS

Two broadly-based objectives, national economic development (NED) and environmental quality (EQ), guided the planning of this project. The NED objective advocates increasing the value of the nation's output of goods and services or improving economic efficiency. The EQ objective promotes the conservation and/or preservation of the nonmonetary aspects of man's surroundings such as cultural resources, ecological systems, or quality aspects of the nonrenewable natural resource base.

The sponsors considered a broad range of resource problems and potentials in establishing planning goals under the two objectives. Significant opportunities for public involvement, as well as input from federal, state, and local agencies, were provided during the goal setting process. The following goals were identified:



Objective

Goal

National Economic Development

Increase income through -

- a. reduction in flood damages on cropland, pastureland and the transportation system within the 4,510 acres identified as the water problem area.
- b. improved drainage on cropland within the 4,510 acres identified as the water problem area.
- c. reduction in erosion on 900 acres of eroding cropland.
- d. reduction in sediment damages to stream channels and cropland.
- e. improved grazing conditions on 500 acres of existing pastureland.

Environmental Quality

1. Protection of resource base through a reduction in average annual erosion rates.
2. Improvement in stream water quality through a reduction in suspended solids (sediment and associated pollutants).
3. Enhancement and creation of wildlife habitat through -
  - a. restoration of Bear Lake to its original size.
  - b. planting of hedgerows and food plots within pastureland and cropland areas.
4. Minimize damages to -
  - a. Bear Lake (Type 5 wetlands).
  - b. bottomland hardwoods.
  - c. threatened and endangered species.
  - d. Type 1 wetlands.

- e. stream fisheries.
- f. archeological and historical resources.
- g. prime farmland.
- h. visual resources.

## PLANNING CONSIDERATIONS

Project formulation was begun by first identifying those measures which had the potential for satisfying one or more of the identified goals. Identified measures were channel work, land treatment, restrictive easements, land use adjustments, and a water-level control structure. Preliminary plans for each of the measures were developed and an analysis made to determine the expected impacts on each of the goals. Table I (page 9) shows the results of this analysis. This analysis provided guidance in plan formulation by displaying tradeoffs required to achieve certain goals.

One of the first alternatives to be examined was that of converting cropland and grassland in the water problem area to uses more compatible with the existing flow regime. However, this initial alternative was dropped from consideration due to the lack of public support and a means for implementation.

A second initial alternative which included only measures which were complimentary to the environmental quality goals was also examined. This initial alternative included the following measures:

1. Apply needed conservation land treatment for erosion control.
2. Develop 80 miles of fencerows of natural vegetation for wildlife food and cover.
3. Manage natural vegetation for wildlife food and cover on 150 acres of idle fields, ditch banks, odd areas in crop fields, and forest land borders.
4. Plant 200 acres of trees and shrubs especially suited for providing wildlife food and cover and improving the quality of the visual resource.
5. Create 40 acres of farm ponds to provide fish habitat.
6. Restore Bear Lake to its original size of 69 acres.

This initial alternative which included only EQ measures was also deleted early in the planning process due to the lack of a public who was willing to provide monetary support for such measures.

Table I - Impacts of Measures on Project Goals For

## Bois d'Arc Bayou Watershed

Goal	MEASURES				
	Accelerated : Land : Treatment :	Channel : Work 1/:	Water-Level : Control : Structure 2/:	Restrictive : Easements :	Land Use : Adjustments
1. Increase income through...					
a. reduction of flood damages on cropland and pastureland and the transportation system within 4,510 acres identified as water problem area.	+	+	-	-	-
b. improved drainage on cropland within 4,510 acre water problem area.	+	+	-	-	-
c. reduction in erosion on 900 acres of eroding cropland.	+	+	+	+	+
d. reduction in sediment damages to stream channels and cropland.	+	+	+	+	+
e. improved grazing conditions on 500 acres of pastureland.	+	N	N	N	N
2. Protection of resource base through a reduction of average annual erosion rates on cropland.	+	N	N	N	+
3. Improvement in quality of streamflow through a reduction of suspended solids (sediment and associated pollutants).	+	+	+	N	+
4. Enhancement and creation of fish and wildlife habitat through...					
a. restoration of Bear Lake to its original size	N	N	+	N	N
b. planting of hedgerows, trees, and food plots.	+	N	N	N	+
5. Minimize damages to...					
a. Bear Lake (Type 5 wetland)	N	N	+	N	N
b. bottomland hardwoods	N	-	N	+	+
c. threatened and endangered species.	N	N	N	N	N
d. type 1 wetlands.	N	-	+	+	+
e. stream fisheries.	+	-	N	+	+
f. cultural resources of national significance.	N	N	N	N	N
g. prime agricultural land.	+	+ and -	-	N	N
h. visual resources.	+	-	+	+	+

(+ ) Favorable impact

(-) Adverse impact

(N) No impact

1/ Includes needed grade stabilization structures, necessary water level control structure or design modifications to protect Bear Lake and associated on farm drainage on cropland.

2/ Structure to increase water level in Bear Lake.

May 1978

The two previously described initial alternatives were considered to be nonviable since viable alternatives are considered to be those plans which the USDA considers acceptable and those which have sponsors for implementation. Therefore, remaining planning efforts were focused on deriving viable alternatives which in this case involved formulating plans which contained measures to satisfy both NED and EQ goals. Although it was conceivable to derive an NED plan with no EQ measures and vice versa, there was no public interest to sponsor plans of these types.

Investigations indicated that the only practical means of reducing flooding and improving drainage was through channel work and onfarm drainage systems. The maximum channel work found to be needed was 4.8 miles on the mainstem and 8.5 miles on four laterals. Appendix G shows the location of this channel work with the exception of one lateral (Lateral 1-D), which was located approximately halfway between Lateral 1-A and 1-B. It was also found that grade control structures were needed at the upper end of Lateral 1-C and the mainstem to assure a stable channel. In addition, a water level control structure or a modification of the channel design was needed on Lateral 1-B to maintain the existing 20-acre Bear Lake (Type 5 wetlands). The modified design would provide for the elevation of the channel bottom to be at 254.0 msl at Bear Lake.

Formulation of planning measures to reduce flood damages and increase drainage benefits were based on the premise that mainstem channel work could be installed without the laterals, but the laterals could not be installed without the mainstem channel work. Therefore, alternative planning measures for flood reduction and drainage benefits consisted of determining the effects of various combinations of lateral ditches along with enlargement of the main channel.

Land treatment consisting of accelerated technical assistance to land-users in the planning and application of resource management systems was determined to be complementary (not in conflict) with planning goals. Economic benefits were not specifically evaluated but were assumed in keeping with Service policy to equal or exceed their costs. Monetary benefits to those onfarm drainage systems dependent upon channel work for an outlet presented an exception to this rule and were evaluated.

## ALTERNATIVES

As a result of the plan formulation process, six final alternatives, including a "no project action," were derived. Alternative 1 emphasizes NED and Alternative 2 emphasizes EQ more than any other of the alternatives. Alternative 3 was selected by the sponsors as the plan which they would be most willing to implement. A description of the features of each of the alternative plans follows:

Alternative 1 (NED Plan) - This alternative has more project measures which emphasize net national economic development and includes channel enlargement of Bois d'Arc Bayou and the construction of four new lateral ditches. The Project Map in Appendix G shows the extent of channel work except for that on Lateral 1-D which was located approximately halfway between Lateral 1-A and 1-B. Two grade stabilization structures would be installed with one each at the upper ends of the Main Ditch and Lateral Ditch 1-C. The bottom of Lateral Ditch 1-B would enter Bear Lake at an elevation of about 258.0 (msl), which would not alter the present condition of the lake but would furnish drainage for the surrounding land. This alternative would include technical assistance for accelerated application and continued maintenance of conservation land treatment measures throughout the watershed area. The measures would be established and maintained by the landowners and operators in the watershed in cooperation with the Little River Conservation District's going program.

Formulation of the NED plan was approached by adding laterals to the main channel. Using this procedure, it was found that the additional benefits generated by adding Lateral 1-D as a last increment exceeded the additional cost which would be incurred.

This alternative would have an estimated construction cost of \$382,300.

Alternative 2 (EQ Plan) - This Alternative has more project measures which emphasize environmental quality and includes only the enlargement of Bois d'Arc Bayou and Lateral Ditch 1-C. Since both of these channels are existing drainageways, no new ditches would be constructed. Grade stabilization structures would still be installed at the upper ends of these two ditches. This alternative would also include technical assistance for an accelerated land treatment program as have all alternatives. However, this alternative would emphasize more land treatment measures for fish and wildlife habitat. A water-level control structure would be constructed at Bear Lake to re-establish it to its original level (about 69 acres). The lake would be managed for fish and wildlife. Approximately 150 acres of wildlife areas would be established and preserved. This would include development of fence rows of natural vegetation, preserving odd areas, idle fields, etc., and establishing varieties of vegetation that would not only control erosion but would also provide food and habitat for wildlife.

This alternative would have an estimated construction cost of \$334,600.

Alternative 3 (Selected Plan) - This alternative is identical to the NED Plan with the following exceptions: (1) only three new lateral ditches (Lateral Ditches 1-A, 1-B, and 1-C) would be constructed, (2) Lateral Ditch 1-B would be constructed at a lower elevation so as to enter Bear Lake at an elevation of 254.8 (msl), and (3) a water-level control structure would be installed at the upper end of Lateral Ditch 1-B. This alternative requires 7.6 acres less clearing of bottomland forest. The water-level control structure would be built to maintain a 20-acre permanent pool in Bear Lake. An additional 40 acres within the original

boundary of Bear Lake would be used for crop production during the summer and flooded during the winter to provide wetland wildlife habitat.

This alternative would have an estimated construction cost of \$380,700.

Alternative 4 - This alternative is identical to the NED Plan except that three rather than four new lateral ditches would be installed. This alternative would require the same amount of land use conversions as the Selected Plan. No water-level control structure would be installed.

This alternative would have an estimated construction cost of \$359,700.

Alternative 5 - This alternative is identical to the Selected Plan except that the water-level control structure installed at the outlet of Bear Lake would maintain a permanent body of water over an area covering about 40 acres instead of 20 acres. This would create a permanent lake with a maximum water depth of about four feet. This lake size would take out of production very little land that is presently being farmed. Since the lake would be shallow and susceptible to pollutants from agricultural runoff, it would not be considered a good fishing lake.

This alternative would have an estimated construction cost of \$382,100.

Alternative 6 (No Project Action) - With no project action, flood damages will continue to occur and land treatment measures will continue to be installed at about the present rate. Fish habitat will remain in its present state. Approximately 890 acres of forest land wildlife habitat and 20 acres of wetland habitat will be converted to openland wildlife habitat within the next 25 years.

The net annual monetary benefits that will be foregone by not implementing the project will be \$27,690.

Economic, environmental, and social impacts believed to be of greatest significance to decisionmaking are presented for each of the six alternatives in Table II (page 13).

## PLAN SELECTION

Nonviable initial alternatives were eliminated early in the planning process. Alternatives 1 through 5 were all considered viable. Plan selection was made from these viable alternatives following a public meeting.

## PLANNED PROJECT

The planned project consists of an accelerated land treatment program and 7.6 miles of channel work with appurtenances for the purposes of watershed protection, flood prevention, and drainage. The planned project is to be installed over a three-year period.



## LAND TREATMENT

The planned land treatment program consists of accelerated technical and financial assistance to watershed landowners and/or operators. This program calls for accelerated application and continued maintenance of conservation land treatment throughout the watershed. Land treatment consists of the application of resource management systems (RMS) that will protect the quality of the resource base, improve the standard of living, and maintain and improve the quality of the environment. The accelerated program will involve technical assistance for the application of practices which would not be installed with the present ongoing conservation program. Table 1 (page 54) includes estimates of the acreage in each major land use which will be adequately treated during the project installation period.

Table III (page 15) shows some typical resource management systems which are expected to be applied in the watershed. This table is not intended to be all inclusive. Practices included will depend upon actual situations and landusers' objectives.

Evaluations by the U.S. Forest Service revealed no need for an accelerated forestry assistance program. During the project installation period, the going conservation program will result in landowners utilizing the technical assistance provided by the Arkansas Forestry Commission through cooperation with the U.S. Forest Service to install approximately 60 acres of tree planting on open and understocked stands, 80 acres of stand improvement measures, 120 acres of timber marking, 5,536 acres of fire protection, and 5 management plans.

The Little River Conservation District has passed a resolution to urge all landowners in the Bois d'Arc Bayou Watershed to participate in the "Arkansas Acres for Wildlife" program sponsored by the Arkansas Game and Fish Commission and the Cooperative Extension Service. Landowners who participate in this program will receive free packages of seeds and bundles of plants to be used for establishing wildlife food and cover plots. In addition, participating landowners will receive publications relating to wildlife management and recognition from the sponsors of the program. Landowners will be encouraged to contact the Cooperative Extension Service or the Arkansas Game and Fish Commission for more information about the "Arkansas Acres for Wildlife" program.

## STRUCTURAL MEASURES

Planned structural measures include approximately 7.6 miles of channel work. Appurtenances to the structural measures include two concrete grade stabilization structures, approximately 50 pipe overfall and drop inlet structures, and one water-level control structure. All but about one mile of the proposed channel work will be done in areas where defined



TABLE III - TYPICAL RESOURCE MANAGEMENT SYSTEMS

Land Areas	Typical RMS No. 1	Typical RMS No. 2	Typical RMS No. 3
Cropland	<ol style="list-style-type: none"> <li>1. Conservation Cropping System (2 yr. soybeans, 1 yr. cotton)</li> <li>2. Crop Residue Management</li> <li>3. Drainage Field Ditches</li> <li>4. Wildlife Wetland Habitat</li> </ol>	<ol style="list-style-type: none"> <li>1. Conservation Cropping System (3 yr. cotton, 1 yr. soybeans)</li> <li>2. Minimum Tillage</li> <li>3. Drainage Field Ditches</li> <li>4. Grassed Waterways</li> </ol>	<ol style="list-style-type: none"> <li>1. Conservation Cropping System (3 yr. rice, 2 yr. soybeans)</li> <li>2. Land Leveling</li> <li>3. Irrigation Systems</li> <li>4. Crop Residue Management</li> <li>5. Drainage Field Ditches</li> </ol>
Pastureland	<ol style="list-style-type: none"> <li>1. Pasture and Hayland Management</li> <li>2. Fencing</li> <li>3. Water Facilities</li> <li>4. Brush Management</li> </ol>	<ol style="list-style-type: none"> <li>1. Pasture and Hayland Planting</li> <li>2. Pasture and Hayland Management</li> <li>3. Brush Management</li> <li>4. Planned Grazing System</li> </ol>	<ol style="list-style-type: none"> <li>1. Pasture and Hayland Management</li> <li>2. Brush Management</li> <li>3. Planned Grazing System</li> </ol>
Forest Land	<ol style="list-style-type: none"> <li>1. Fire Protection</li> <li>2. Tree Planting</li> <li>3. Woodland Site Preparation</li> </ol>	<ol style="list-style-type: none"> <li>1. Fire Protection</li> <li>2. Woodland Improved Harvesting</li> <li>3. Woodland Improvement</li> <li>4. Proper Woodland Grazing</li> </ol>	<ol style="list-style-type: none"> <li>1. Fire Protection</li> <li>2. Improved Harvesting</li> <li>3. Wildlife Upland Habitat Management</li> </ol>

channels are practically nonexistent. Associated onfarm measures will include 19.7 miles of surface drainage ditches and 60 grade stabilization structures.

The proposed channel work consists of one main ditch and three lateral ditches (designated Lateral 1-A, Lateral 1-B, and Lateral 1-C). These planned structural measures are shown on the project map (Appendix G). The grade stabilization and pipe structures will be installed as appurtenances to ditches for grade stabilization and erosion control. The water-level control structure will be installed at the upper end of Lateral 1-B to regulate the water level in Bear Lake.

The planned construction consists of clearing and removal of loose debris within the channel section of the lower 0.1 mile of the main ditch. The remaining 4.6 miles of work on the main ditch will consist of enlargement and realignment by excavation. Work on 2.2 miles of Lateral Ditches 1-A and 1-B will consist totally of new channel construction; work on Lateral Ditch 1-C will consist of about 0.7 mile of enlargement and realignment of the existing channel. A small section of channel on the lower end of the main ditch will be riprapped for stabilization purposes. This riprapping will be done in a curving section of the channel adjacent to a bridge. Approximately 52 acres of clearing will be required for channel construction. This channel construction area will be revegetated with grasses, legumes, and shrubs which will provide food and cover for wildlife. Where wildlife or fisheries habitat or visual resources will be degraded, existing channels will be excavated from one side to preserve vegetation and provide a natural screen. In addition, trees will be left in portions of the construction area where such trees will not interfere with construction (see Appendix D).

The channel work will be in clay soils which will permit the construction of a stable channel without special stabilization measures.

The two grade stabilization structures located at the upper ends of the Main Ditch and Lateral Ditch 1-C will be used to control water entering the upper ends of these ditches. The pipe overfall and drop inlet structures will be used to control water entering the ditches from the sides.

The water-level control structure located at the upper end of Lateral Ditch 1-B will be used to control the water level in Bear Lake. The control structure will preserve the existing 20 acres of Type 5 wetland and will be used to flood an additional 40 acres of cropland in the winter months to mitigate losses to Type 1 wetland. The flooding of the cropland will occur after fall harvest of crops, and the water will be drained from this area prior to spring planting season (not earlier than March 1). The Bois d'Arc Bayou Improvement District will be responsible

for regulating the lake level and for obtaining 60 acres of easements needed for insuring that the structure will function as planned. Access to Bear Lake for hunting and fishing purposes will be controlled by the landowner.

All channels will serve both flood prevention and drainage purposes. The channels have been designed to remove approximately the 2-year, 24-hour frequency storm event in 24 hours. Each channel and appurtenant structures have been planned to serve more than one landowner. No ditch was planned for the primary purpose of bringing new land into agricultural production. Approximately 100 acres of easements and rights-of-way will be required to construct the channels and appurtenances. Of the 100 acres, approximately 50 acres are forest land, 30 acres are pastureland, and 20 acres are cropland.

Onfarm drainage systems, which are interrelated and needed to assure realization of benefits from project measures, are identified as associated onfarm measures in the "Structural Measures" portion of Tables 1 and 2 (pages 54 and 56). These associated onfarm measures include approximately 19.7 miles of surface drainage ditches and about 60 pipe overfall and drop inlet structures. These measures will be installed on individual farms and used to move surface water into the main and lateral ditches.

## COSTS

The total installation cost of the project is estimated to be \$706,250. Included in the total installation cost are \$73,690 for land treatment, \$559,460 for structural measures, and \$73,100 for project administration costs (Table 1, page 54). The Agreement (see Appendix A) shows actual cost sharing between Public Law 566 funds and other funds.

The total cost for land treatment includes \$53,570 for the going program and \$20,120 to accelerate the going program. Funds through other programs will provide \$6,800 for technical assistance for the going land treatment program. Public Law 566 funds will provide \$1,000 for technical assistance to accelerate installation of land treatment measures.

The estimated installation cost of structural measures is \$559,460. Included in the total structural measures costs are \$422,360 for construction, \$42,100 for engineering, and \$95,000 for land rights. Construction cost includes \$380,700 for channel work and \$41,660 for associated onfarm measures.

The cost of engineering services is estimated to be \$42,100, which includes the direct cost of engineers and other technicians for survey investigation, design, and preparation of plans and specifications for structural measures.

The land rights costs are estimated to be \$95,000. Included in land rights costs are \$30,000 for right-of-way and flowage easements, \$20,000 for the modification of two county bridges, \$35,000 for farm road crossings, and \$10,000 to replace farm fences.

The construction cost estimates include a contingency allowance of 12 percent, which is considered reasonable and provides an allowance for solving any unusual or unexpected construction problems.

Project administration costs are estimated to be \$73,100. Included in project administration costs are \$34,100 for construction inspection and \$39,000 for other administrative costs associated with the installation of structural measures such as cost for contract administration and government representatives. These costs are treated as project costs but are not considered applicable to individual purposes served by the project, nor are they a part of the cost of individual measures.

All structural measures are planned to serve two purposes, flood prevention and drainage. Costs for all structural measures are allocated to purposes based on areal relationships of wet and nonwet land in the watershed. That portion of the cost of channel improvement which is allocated to flood prevention is equal to the ratio of the area of nonwet land to the area of the entire watershed. For the purpose of allocating cost, all land outside the benefited area is considered nonwet. The remainder of the cost is allocated equally to flood prevention and drainage. This method results in allocating 85.8 percent of the cost to flood prevention and 14.2 percent to drainage. There are 2,994 acres of wet soils in the 4,510-acre benefited area and the remaining 7,546 acres in the watershed are considered as nonwet only for allocating cost to purposes.

#### ECONOMIC BENEFITS

The estimated average annual benefits accruing to the structural measures are \$84,150 (Table 6, page 62). These benefits include: flood prevention, \$66,070; drainage, \$9,940; and employment, \$8,140.

The estimated average annual direct and indirect floodwater damages (Table 5, page 61) will be reduced from \$84,700 to \$18,630. This is a reduction of 78 percent.

Annual flood reduction benefits will accrue as follows:

Crop and Pasture	\$60,060
Indirect	<u>6,010</u>
TOTAL	\$66,070

Drainage benefits of \$9,940 are based on more intensive use of the benefited area after project installation.

Flood prevention and drainage benefits have been appropriately discounted to allow for flooding of the benefited area from structure release of Milwood Lake.

Employment benefits of \$8,140 are based on the use of local labor during the construction period. In 1970, the unemployment rate for Little River County was 7.5 percent.

The average annual cost of structural measures is estimated to be \$54,600. These measures are expected to produce average annual benefits of \$83,900. The ratio of average annual benefits to average annual costs is 1.5 to 1.

### INSTALLATION AND FINANCING

The watershed project is planned for a three-year installation period. Landowners and operators in cooperation with the Little River Conservation District will establish land treatment measures throughout the entire installation period. The district with additional help from the Soil Conservation Service will assist with the planning and application of these measures. This assistance will be accelerated to assure application of planned measures within the project installation period. The Soil Conservation Service will provide the additional technical assistance for conservation planning, land use capability mapping, and application of resource management systems on cropland, pastureland, and wildlife areas. Needed forestry protection and management services will be provided under the ongoing programs by the Arkansas Forestry Commission in cooperation with the U.S. Forest Service.

The Little River Conservation District will assume active leadership in establishing the land treatment program. The directors of the district, by scheduled meetings and individual contacts, will encourage watershed landowners and operators to establish a complete soil and water conservation program. The Soil Conservation Service's district conservationist in Little River County will also have an active role in contacting landowners and operators and providing technical assistance in the planning and installation of resource management systems.

The Little River Conservation District will make a concerted effort to interest local landowners in establishing additional wildlife food and cover plants that will benefit quail, deer, rabbit, wild turkey, and dove. The conservation district will also encourage cooperators to participate in the "Acres for Wildlife Program" sponsored by the Arkansas Game and Fish Commission and the Cooperative Extension Service.

The cost of the land treatment program will be financed by landowners and operators with assistance from federal and/or state programs.

Public Law 566 funds will be provided for technical assistance to accelerate the planning and installation of the resource management systems.

The Little River County Agricultural Stabilization and Conservation Committee will cooperate with the governing body of the conservation district by selecting those Agricultural Conservation Program practices which will accomplish the conservation objectives in the shortest possible time.

The Cooperative Extension Service will assist with the educational phase of the program by conducting general information meetings for local farmers; preparing radio, television, and press releases; and using other methods of conveying information to the watershed landowners and operators.

Structural measures will be installed during the second and third years of the project installation period. The channel work will be accomplished by contract. The Soil Conservation Service will administer the contracts and provide all other technical assistance associated with design, preparation of contract payment estimates, final inspections, execution of certificates of completion, and other tasks relating to channel construction.

Public Law 566 funds will provide the federal share of the construction cost and all installation service costs incurred by the Soil Conservation Service in the installation of the structural measures. Federal assistance will be provided under the authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83d Congress, 68 Statute 666), as amended. This assistance is subject to appropriation of funds. The Bois d'Arc Bayou Improvement District plans to obtain a watershed loan from the Farmers Home Administration to finance their share of the construction cost.

The associated onfarm measures will be installed by landowners and operators during the second and third years of the project installation period. The Little River Conservation District, with additional help from the Soil Conservation Service, will assist with the planning and installation of these measures.

The Bois d'Arc Bayou Improvement District has all of the necessary authority to discharge local responsibilities associated with installation of the structural measures. The Improvement District will acquire all land rights in the first two years of the project installation period and has the power of eminent domain and will use it, if necessary, to obtain the required land rights. A letter of intent to obtain a watershed loan has been filed with the Farmers Home Administration. The Bois d'Arc Bayou Improvement District has the power under state law to secure and repay loans, assess benefits, and levy taxes. Funds for the repayment of loans and for operation and maintenance costs will be obtained from taxes levied on the benefited area.

The Bois d'Arc Bayou Improvement District will make application to the U.S. Army Corps of Engineers, Tulsa District, for a permit to discharge dredged or fill material in accordance with Section 404 of Public Law 92-500.

The Arkansas Archeological Survey made a reconnaissance investigation of the Bois d'Arc Bayou Watershed Project in August 1975 and prepared a report of their findings and recommendations (see Project Impacts section, page 37).

As pointed out in the report, it is unlikely that the eleven archeological sites will be adversely affected by the proposed project; therefore, recovery, protection, and/or preservation are not anticipated (2). If archeology resources are discovered during construction, the Soil Conservation Service will notify the Arkansas Archeological Survey, the State Historic Preservation Officer and the Heritage Conservation and Recreation Service. Archeological resources discovered during construction will be treated in accordance with procedures established in published Soil Conservation Service guidelines, 7 CFR, Part 656.

Installation of structural measures will be contingent upon all land rights having been obtained, project agreements having been executed, and the operation and maintenance agreement having been executed.

The estimated schedule of obligations for the three-year project installation period is as follows:

Fiscal Year :	Measures	:Public Law : :566 Funds : (dollars)	Other : : Funds : (dollars)	: Total : (dollars)
First	Land Treatment	300	24,370	24,670
	Engineering Services	21,000	1,000	22,000
	Land Rights Cost	XXX	55,000	55,000
Second	Land Treatment	300	24,160	24,460
	Engineering Services	15,600	1,500	17,100
	Land Rights Cost	XXX	40,000	40,000
	Construction: Channel Work	353,700	27,000	380,700
	Construction: Associated Measures	XXX	10,000	10,000
Third	Land Treatment	400	24,160	24,560
	Engineering Services	1,500	1,500	3,000
	Construction: Associated Measures	XXX	31,660	31,660
Subtotal		392,800	240,350	633,150
Project Administration		71,400	1,700	73,100
TOTAL		464,200	242,050	706,250

This schedule may be adjusted from year to year on the basis of any significant changes in the plan found to be mutually desirable and in the light of appropriations and accomplishments actually made.

#### OPERATION, MAINTENANCE, AND REPLACEMENT

The landowners and operators in cooperation with the Little River Conservation District will maintain land treatment and associated onfarm structural measures. Representatives of the district and the Soil Conservation Service will make periodic inspections of land treatment and associated onfarm structural measures, and the district will encourage farmers to perform needed maintenance on these measures.

The channels and appurtenances will be operated and maintained by the Bois d'Arc Bayou Improvement District after construction is completed at an estimated annual cost of \$4,000. Funds for paying maintenance cost on the channels and appurtenances will be obtained from taxes levied on the benefited area. Maintenance will be performed with contributed labor, district-owned equipment, by contract or force account, or a combination of these methods. The Improvement District will be responsible for the regulation of the water-level control structure at Bear Lake.



The maintenance work on the channels should consist mainly of vegetative control and the removal of debris and sediment which would significantly reduce the channel capacity. The channel section below Station 88+00 on the main ditch will be maintained as needed to insure an adequate outlet for the project. This maintenance work should consist mainly of loose debris removal. Operation and maintenance of the water-level control structure will require special attention to regulate the water level in Bear Lake. The original easement will provide free access to make inspections and perform maintenance.

A reasonable vegetative establishment period (not to exceed two growing seasons) will be allowed after initial vegetative installation. The need for maintenance will be determined by inspection. For the first three years after construction is complete, the Soil Conservation Service and the sponsors will make joint inspections at least annually, or more frequently if circumstances warrant, to determine operation and maintenance needs. Inspections after the third year will be made annually by the sponsors. The Soil Conservation Service will provide assistance, as needed, after the third year.

The sponsoring local organizations will maintain a record of all maintenance inspections and maintenance performed and have the record available for review by the Soil Conservation Service. They fully understand their obligations for maintenance and will execute an operation and maintenance agreement prior to signing a project agreement. This operation and maintenance agreement will contain a reference to the Soil Conservation Service's publication, "State of Arkansas Watersheds Operation and Maintenance Handbook," and a plan for operation and maintenance of the structural measures will be prepared. The operation and maintenance agreement will include specific provisions for retention and disposal of property acquired or improved with Public Law 566 financial assistance.

#### PROJECT IMPACTS

During the assessment process, analyses of impacts on a broad range of environmental, economic, and social factors were made, and the significance of these impacts to decision making was evaluated (see Table IV, page 24).

From these analyses, it was found that the project would have no significant impacts on groundwater, irrigation, endangered or threatened plants and animals, or mineral resources. Therefore, these factors are not discussed in this report although basic data concerning these items have been collected in order to determine the magnitude of project impacts. For those environmental, social, and economic factors which will be impacted by the selected plan, a discussion of baseline data and impacts follows. A listing of major planned project impacts is provided in the "Summary" section, page 2. Areas of impact believed to be of key importance are summarized for all alternatives in Table II.

Table IV - Analysis of Impacts for Bois d'Arc Bayou Watershed

Economic, Environmental and Social Factors	: Degree : of : Impact 1/	: Significant : to : Decisionmaking 2/	: Remarks
Floodwater and Drainage	Major	Yes	
Erosion and Sedimentation	Major	Yes	
Land Use and Flora	Moderate	Yes	
Prime Agricultural Land	Minor	Yes	
Streams	Minor	Yes	
Lakes and Wetlands	Minor	Yes	
Wildlife	Moderate	Yes	
Groundwater	None	No	
Fish	Minor	Yes	
Water Quality	Minor	Yes	
Irrigation	None	No	
Visual Resource	Minor	No	
Endangered and Threatened Plants and Animals	None	No	None Present
Transportation	Minor	No	
Economic and Social	Major	Yes	
Air Quality	Minor	No	
Mineral Resources	None	No	None Present
Cultural Resources	Minor	No	
Recreation	Minor	No	

- 1/ Degree of impact was used as a basis for achieving balance in the presentation of project impact data (see Impacts section).
- 2/ Factors believed to be important to decisionmaking were used as a basis for preparing the Summary Comparison Table (Table II, page 13).

Appendix B displays the NED, EQ, regional development, and social well-being accounts for the selected plan.

### LAND USE AND PRIME FARMLAND

For the purpose of watershed planning, land uses within the Bois d'Arc Bayou Watershed were divided into the four major categories of cropland, pastureland, forest land, and other. "Other" is a category used to lump together miscellaneous land uses of small acreages such as roads, borrow pits, levees, streams, lakes, cemeteries, homesteads, etc. The categories of cropland, pastureland, and forest land, as their names imply, are areas used for crop, pasture, and forest production. Native and improved pastureland were lumped together under the heading of pastureland. Based on the four previously defined categories, Table V shows present, future "without project," and future "with project" land use changes.

Table V - Land Use Distribution for Present, Future "Without-Project," and Future "With Project" Conditions in Bois d'Arc Bayou Watershed

Land Use	Present (acres)	Future :Without Project: (acres)	Future : With Project (acres)	1/
<b>Cropland</b>				
Water Problem Area	2,213	2,873	3,018	
Entire Watershed	2,603	3,263	3,408	
<b>Pastureland</b>				
Water Problem Area	900	900	900	
Entire Watershed	2,012	2,262	2,262	
<b>Forest Land</b>				
Water Problem Area	1,245	605	408	
Entire Watershed	5,536	4,646	4,449	
<b>Other</b>				
Water Problem Area	152	132	184	
Entire Watershed	389	369	421	
<b>Total</b>				
Water Problem Area	4,510	4,510	4,510	
Entire Watershed	10,540	10,540	10,540	

1/ Water problem area for future "with project" conditions identified as the 4,510 acres within the floodplain which will receive floodwater reduction and drainage benefits if the project is installed.

All land in the watershed except 195 acres would be classified as prime farmland. Prime farmland is defined as land best suited for producing food, feed, forage, fiber, and oilseed crops, and also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land but not urban builtup land or water). When treated and managed (including water management) according to modern farming methods, prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops.

### Impacts

By examining Table V (page 25), one can see that the major land use changes will involve the conversion of forest land to cropland and pastureland. Without project installation, approximately 890 acres of forests and 20 acres of other land (wetland) will be converted to cropland and pastureland. Reductions in flooding and improvements in drainage caused by project installation will result in the additional conversion of 145 acres of forest land to cropland. Approximately 52 acres of forest land will be cleared for channel construction. The 20 acres of wetland will be preserved with project installation.

Enlargement of Bois d'Arc Bayou and construction of new lateral ditches will cause the permanent conversion of 45 acres of prime farmland to channels. This impact will be offset by the fact that flooding will be reduced and drainage will be improved on 3,918 acres of prime farmland to be used for cropland and pastureland within the water problem area.

### FLOODWATER AND DRAINAGE

About 4,510 acres of bottom land are damaged by flooding caused by water runoff from rainfall within the watershed. At times, Bois d'Arc Bayou is over one-fourth mile wide, often preventing some residents from leaving their homes by vehicle. The major portion of damage results in reduced crop yields. In addition to reduced yields, the flooding causes increased production costs through frequent replanting and associated cultural practices.

About 71 percent of the soils in the watershed are poorly drained. This condition restricts the timing of planting, tillage, harvesting, choice of crops, and the overall efficiency of farming operations. The local people have spent considerable time and money in an effort to improve drainage on their farms; however, these efforts have been unsuccessful due mainly to inadequate drainage outlets. Once outlets have been provided, there will still be a need for additional onfarm drainage and associated land treatment measures. Associated onfarm measures will include about 19.7 miles of surface drainage ditches and about 60 pipe overfall and drop inlet structures.

## Impacts

Flood protection and improved drainage conditions provided by the project will allow more efficient farm operations. The cost of production will decrease as a result of fewer trips over the land in seedbed preparation, less frequent replanting, smaller expenditures for weed and grass control, and fewer difficulties in harvesting. Timely planting and harvesting of crops will produce higher yields with improved quality.

Land treatment and structural measures will provide benefits on 4,510 acres of land. Floods will continue to inundate large portions of the watershed; however, the inundation period will be shorter and this will significantly reduce the probability of crop losses. The project will produce an overall reduction in evaluated flood damages of 78 percent. The total area receiving benefits from flood reduction will be 4,510 acres. The project will not cause increased flooding downstream from Bois d'Arc Bayou. Average annual drainage benefits of \$9,940 will result from more intensified agricultural use of 2,994 acres in the benefited area.

## EROSION AND SEDIMENTATION

The following table displays gross erosion rates for present, future "without project," and future "with project" conditions:

Land Use	Erosion Rates		
	Present (tons/acre/year)	Without Project (tons/acre/year)	With Project (tons/acre/year)
Cropland	7.7	6.5	5.4
Pastureland	0.3	0.25	0.2
Forest Land	0.05	0.05	0.04
Other Land	0.8	0.7	0.5
Roads	10.3	10.3	6.9
Average Gross Erosion	2.2	1.85	1.5
Average Sheet Erosion	2.0	1.72	1.4

Gross erosion rates presently vary from an average of 0.05 tons per acre per year (t/ac/yr) on forest land to 10.3 t/ac/yr on roadsides. However, cropland erosion is responsible for 87 percent of the 22,881 tons per year of gross erosion. There are no areas where erosion is severe enough to be classified as critical sediment sources. However, soil loss on cropland and roadsides exceeds soil tolerance levels of 3 to 5 tons per acre per year.

The average annual sediment yield at the outlet of Bois d'Arc Bayou is 8,000 tons as calculated by applying a delivery ratio to gross erosion values. The average annual sediment concentration is 314 milligrams per liter as computed by using a ratio between the suspended portion of the sediment load and the average annual runoff.

The effects of erosion and resulting sedimentation include loss of the soil resource, reduction in crop yields, poor water quality due to the transport of pesticides and nutrients and increased water turbidity, and loss of channel capacity due to soil deposition.

Landowners in the watershed are provided technical assistance relating to erosion control by the Soil Conservation Service's field office at Ashdown. About 18 landowners in the watershed presently cooperate with the Little River Conservation District. Conservation plans that cover 83 percent of the privately owned land (excluding 2,000 acres owned by private timber companies) have been developed for these cooperators, and about 53 percent of the planned conservation land treatment measures representing an expenditure of \$105,770 have been applied (see Table 1A, page 55). At the present time, approximately 79 percent of the land is adequately protected with respect to erosion.

### Impact

"Without project" estimates indicate that the average gross and sheet erosion rates will be reduced by 16 percent and 14 percent, respectively. Project installation will result in an additional decrease of 15 percent in the average gross erosion and average sheet erosion rates. These reductions in erosion rates will cause the sediment yield and sediment concentration at the Bois d'Arc Bayou outlet to decrease by 10 percent for future "without project" conditions and by 20 percent for future "with project" conditions.

Such decreases in erosion rates will result in several impacts. Fewer pesticides and fertilizer nutrients, which readily attach to soil particles, will be transported downstream. The overall decrease in suspended sediment will reduce the turbidity of the water, thereby improving water quality.

By the end of the project installation period, the application of conservation measures will result in 81 percent of the land being adequately protected with respect to erosion. Land treatment measures will not result in any changes in land use.

### WATER QUALITY

From June 11 to September 30, 1976, water quantity measurements and water quality samples were collected from Bois d'Arc Bayou at two stations (1). Station 1 and Station 2 were located approximately 2.8 and 5.2 miles, respectively, upstream from the bayou's confluence with Hudson Creek and Little River. Table VI (page 29) summarizes the water quantity and quality data which were obtained by sampling at these two stations.

These data indicate that Bois d'Arc Bayou is a warm water stream which lacks flow during most of the year. Wide fluctuations in values for pH, turbidity, dissolved solids, suspended solids, total solids, and nitrate

Table VI - Maximum, Minimum, and Mean Values for Quality Data From Nine Biweekly Samples Collected in Bois d'Arc Bayou During June 11 Through September 30, 1976 (1)

Item	Station 1			Station 2		
	Maximum	Minimum	Mean	Maximum	Minimum	Mean
Water Temperature (Degrees Centigrade)	29	22	24.7	32	22	25.2
Stream Discharge (Cubic Feet Per Second)	1.86	0	*	28.4	0	*
pH (pH Units)	7.9	6.2	7.1	8.1	2.8	7.0
Turbidity (Formazin Turbidity Units)	91	0	35.9	140	8	49.7
Suspended Solids (Milligrams Per Liter)	430	30	145.5	160	10	75.6
Dissolved Solids (Milligrams Per Liter)	290	10	157.8	760	30	220.0
Total Solids (Milligrams Per Liter)	610	120	303.3	920	40	295.6
Nitrate Nitrogen (Milligrams Per Liter)	0.34	0.05	0.144	1.05	0.00	0.229
Phosphate Phosphorus (Milligrams Per Liter)	0.25	0.00	0.120	0.16	0.00	0.069

\*Water flow was present only on June 23, 1976. On this day, flow was 1.86 and 28.4 cubic feet per second for Stations 1 and 2, respectively.

nitrogen were attributed to the fact that cattle frequently wade in the stream pools where they disturb the stream bottom and excrete wastes (1). Fluctuations in levels of phosphate-phosphorus were only slight and do not indicate significant biological activity (1). A very low pH value of 2.8 occurred at a time when there was no water flow in Bois d'Arc Bayou, and a high suspended solids concentration on this date indicated that cattle had been wading in the sampling area. Waste excreted into the stream by these cattle could have caused this very low pH value of 2.8.

### Impacts

The conversion of forested areas to cropland will contribute to the increase of sediment and the increased use of agricultural chemicals, but the reduction in flooding and the installation of conservation land treatment measures will result in an overall decrease in sediment transport. Fewer chemicals which readily attach to soil particles will enter the water. Improvement in surface drainage will cause an increase in the rate of transport of those chemicals which are not strongly adsorbed by soil particles. This increase will be partially offset by land treatment practices which increase the rate of water infiltration into the soil.

Construction associated with channel enlargement will result in a temporary increase in the suspended sediment concentration of the water within the stream. Once construction has been completed, the channel banks will be revegetated to avoid future erosion problems.

### STREAMS, LAKES, AND WETLANDS

Surface water resources in the watershed include 9.3 miles of ephemeral flowing streams with practically no defined channels, 2.4 miles of intermittently flowing streams, 1.2 miles of ephemeral flowing man-made channels, 20 acres of natural lake (Bear Lake) and 15 acres of man-made ponds. The only tributaries to Bois d'Arc Bayou are one small unnamed stream and a man-made ditch.

Only two types of wetlands as described in Wetlands of the United States (S.P. Shaw and C.G. Fredline, U.S. Fish and Wildlife Circular 39) occur within the Bois d'Arc Bayou Watershed. Type 1 wetlands, seasonally flooded basins and flats, occur on an estimated 250 acres (1). Type 1 wetlands are located adjacent to the main channel within the flood plain of Bois d'Arc Bayou. Type 5 wetlands, shallow ponds and reservoirs, comprise a total of about 35 acres and consist of 16 farm ponds and Bear Lake (1). Bear Lake is an oxbow lake of Red River which now covers about 20 acres and sometimes contains no water.

### Impacts

The implementation of the selected plan will result in channel construction on 4.6 miles of ephemeral flowing streams with practically no defined channel and 0.8 mile of natural intermittent stream with a



well defined channel. In addition, 2.2 miles of channel will be constructed where no streams presently exist. Where streams presently exist, work will be confined to one side of the channel.

Future "without project" predictions indicate a 5-acre surface water increase brought about by pond construction. The total future wetland acreage at this time will include about 250 acres of Type 1 wetland caused by seasonal flooding of the Bois d'Arc Bayou flood plain, about 20 acres of Type 5 wetlands within Bear Lake, and about 20 acres of Type 5 wetlands within farm ponds. The selected plan will result in a 56 acre decrease in the Type 1 wetland within the Bois d'Arc Bayou flood plain. This reduction will be due to the enlargement of the main channel and Laterals 1-A, 1-B, and 1-C. The water-level control structure at the junction of Lateral 1-B and Bear Lake will be constructed such that the existing 20 acres of permanently standing water will be preserved and an additional 40 acres of cropland can be flooded during the winter to create Type 1 wetlands. Overall, the selected plan will cause a loss of 16 acres of Type 1 wetland due to the fact that 56 acres of this type wetland will be lost in the floodplain and 40 acres will be created around the periphery of Bear Lake.

#### SOCIAL AND ECONOMIC

The urban population of Little River County increased from 4,562 in 1960 to 5,648 in 1970. The rural population decreased from 6,632 to 5,546 during this same period (3). Total population in the county increased from 9,211 in 1960 to 11,194 in 1970. Projected population for the year 2000 is 14,320. Of the projected population, 7,450 residents are rural and 6,870 urban.

The average age of farm operators in the county is 52.5 years (4). Median age of county residents is 28 years (5). Median school years completed by county residents age 25 and over are 9.8 (6).

The population of the watershed is presently 350. Approximately 170 minority persons live within the watershed. Projected population for the watershed is 420 in the year 2000.

Currently, land in the watershed is privately owned with 10 percent of the area belonging to minority persons. The major source of income is from the sale of crops and livestock. Major farm enterprises are soybeans, cattle, and livestock supporting crops.

The 70 farms in the watershed average 150 acres per farm unit. Minority families own 27 farms which average 48 acres in size. About 68 percent of the farms are in the benefited area. A system of county roads provides access to most of the watershed.

In order to describe the present economic resources of the area, data from Little River County were used. This county data should be representative of conditions within the Bois d'Arc Bayou Watershed.

From 1964 to 1969, the average value of land and buildings in Little River County increased from \$31,084 to \$59,196 per farm unit (4).

Land in the bottomland of the watershed is valued at about \$500 per acre. The upland is valued at about \$300 per acre.

Of the 463 farm operations in the county, 58 percent reported 200 or more days of work off the farm (4). The market value of all agricultural products sold per farm averaged only \$9,710 in 1969, about \$6,400 below the state's average. These statistics reflect the need for the farmers to supplement their income.

From 1964 to 1969, the number of farms in Little River County decreased from 618 to 463; however, the average size of farms increased from 291 acres to 366 acres. In 1969, about 133 or 29 percent of the farms in Little River County had agricultural sales under \$1,000. Farms with sales under \$2,000 constituted 48 percent of the total (4).

Of the total number of farms in the county, 327 were fully owner-operated, 95 were part-owner operated, and 41 percent were tenant-operated in 1969 (4). Minority farm operators accounted for 9 percent of all farm operators (4).

Per capita income for Little River County in 1970 was \$2,158 (5). This was about equal to the state's average of \$2,155 (5). However, approximately 24 percent of all families receive less than poverty level incomes (5). In 1970, the unemployment rate for the county was 7.5 percent (5).

Little River County is located in the Southwest Arkansas Planning and Development District. The county is eligible for public works grants and business loans under Titles I and IV of the Economic Development Act of 1965. The primary purpose of this act is to improve economic and social conditions in economically depressed areas.

Little River County is also included in the Southwest Arkansas Resource Conservation and Development Project. This project encompasses a twelve-county area and was established under the provision of Title I of the Food and Agriculture Act of 1962. In the multicounty area, the project provides federal assistance for projects that will conserve, improve, develop, or more efficiently utilize land, water, and other natural resources.

### Impacts

The installation of the planned land treatment and structural measures will serve as a stimulus to the local economy. The planned features of the project will reduce flood damages and help solve water management problems. These features will also provide additional employment and increased income, thereby improving the social and economic welfare of the people. The protection afforded by the project will enhance the potential of the area for agricultural expansion.

The increased farm production will require an increase in the purchase of items or services needed to produce and market the expanded production. This represents new income to the local farm supply dealers, transporters, and processors and is considered as part of external effects of the project. This new income will generate additional consumer expenditures for basic necessities, items that improve the standard of living, and other goods and services. These expenditures will initiate a chain of spending whereby each successive recipient spends a portion of the amount received. Business activity in other sectors of the local economy will increase as this new income is spent and re-spent. These regional external benefits are estimated to be \$15,590 annually.

The primary beneficiaries of the project will be the owners and operators of the estimated 48 farms in the benefited area; however, all 350 watershed residents will benefit from project installation.

The project's impact on national economic development is reflected through the value to users of increased output of goods and services and improvement in national economic efficiency. The estimated average annual damage reduction and agricultural water management benefits are \$76,010.

Agricultural yields per acre in the benefited area consist of soybeans, 22 bushels; grain sorghum, 40 bushels; improved pasture, 6 animal unit months; and native pasture, 2 animal unit months. Yields per acre in the upland areas of the watershed are improved pasture, 4 animal unit months; and native pasture, 2 animal unit months.

Firms contracting for installation of the project will hire a large percentage of the needed labor from the immediate locality. At present, there are approximately 40 minority persons available for employment.

It is estimated that the project will result in the addition of 20 permanent semi-skilled jobs and 15 semi-skilled jobs for 3 years. Some of these jobs will be filled by minorities and persons in the poverty level groups, thus improving employment conditions in Little River County.

Employment opportunities include: 15 semi-skilled jobs for 3 years for project construction; 0.5 permanent semi-skilled jobs for project operation and maintenance; 14.5 permanent semi-skilled jobs resulting from employment in induced activities, i.e., jobs that will be created in the business sectors of the area economy; and utilization of 5 man-years of employment in agricultural production.

Increased employment will mean an increase in income for the community. Benefits amounting to \$8,140 will accrue annually by providing employment opportunities for the unemployed and underemployed during the installation period.

In addition to the monetary gains resulting from new employment opportunities in the community, additional income will be received by farmers from increased sales of farm products due to flood damage reduction and agricultural enhancement. These benefits will be received by both minority and nonminority families who farm within the area where flooding is reduced.

#### PLANT AND ANIMAL RESOURCES

The study area is located within the Oak-Hickory association of the North American Deciduous Forest (1). Within portions of the watershed, plant communities are influenced by the presence of the Red River and its accompanying delta (1). Normal plant succession in the area would include these steps: 1) bare earth vegetated with lichens, mosses, and herbaceous plants; 2) herbs replaced by shrubs; 3) shrubs replaced by trees; 4) pine-oak-hickory forest type eventually dominates.

Approximately 46 percent of the watershed is cropland and pastureland. The most commonly occurring crop species is soybeans. Cotton, rice, corn, and truck crops are also grown. Principal pasture species include Bermudagrass, tall fescue, dallisgrass, and little bluestem. Plant succession has been halted on these two land uses due to continuous cultivation, herbicide usage, and livestock grazing.

The conversion of forest land to cropland and harvesting of timber have eliminated the true oak-hickory climax forests (1). The remaining tracts of forests are in various sub-climax stages of plant succession. Major tree species within the forests include shortleaf and loblolly pine, black willow, mockernut hickory, hackberry, winged elm, osage orange, and white oak (1). Representative species comprising the understory are Bermudagrass, dallisgrass, sedges, buttonbush, and white snakeroot (1).

Uncontrolled burning and indiscriminate cutting of timber are the major factors contributing to poor forestry management. These practices have allowed a high proportion of unmerchantable and cull trees to become established resulting in a need for woodland improvement practices. About 60 acres of tree planting on open and understocked stands, 80 acres of stand improvement measures, 120 acres of timber marking, 5,536 acres of fire protection, and 5 forestry management plans are needed in the watershed. These needs can be met by the ongoing conservation program in the county.

Idle fields, roadsides, and field borders contain such species as milkweed, purple verbena, ragweed, ironweed, sensitive briar, pigweed, blackberry, Bermudagrass, Johnsongrass, and dallisgrass (1). Presently, these areas are in the herb and shrub stages of plant succession.

The riparian (stream and streambank) plant community is only well defined along the lower reaches of Bois d'Arc Bayou. This portion of Bois d'Arc Bayou acts as a backwater area for Hudson Creek.

From May to October 1976, only 12 species of fish representing 8 families were collected during sampling of Bois d'Arc Bayou (1). The species collected were longnose gar, carp, golden shiner, red shiner, smallmouth buffalo, black bullhead, pirate perch, mosquitofish, green sunfish, bluegill, longear, and slough darter (1). The mosquitofish, a small minnow-like fish, was by far the most abundant species (1).

Backwater from Hudson Creek and Little River keeps the lower reaches of Bois d'Arc Bayou stocked with only a few individuals of such species as gar, carp, and buffalo (1). Factors contributing to the relatively low number of fish species include the small size of the creek, excessive turbidity due to cattle visiting the stream along its entire length, and the lack of water during drier periods of the year (1). With respect to a sport or commercial fishery, Bois d'Arc Bayou would be considered very poor with little to no potential for improvement due to the lack of structure sites upstream to store water for release to maintain stream flow. The lower portion of Bois d'Arc Bayou does provide seasonal fish spawning and nursery areas as well as fish food organisms which are utilized by the fish of Hudson Creek and Little River.

Approximately 8 species of amphibians, 14 species of reptiles, 37 species of birds, and 18 species of mammals have been documented as occurring in the watersheds (1). Commonly occurring animal species include the bullfrog, leopard frog, cottonmouth, red-eared turtle, mourning dove, house sparrow, starling, Virginia opossum, northern raccoon, eastern cottontail, white-tailed deer, and gray squirrel.

Approximately 4,615 acres of openland, 5,536 acres of forest land, and 389 acres of roadsides, ponds, lakes, streambanks, idle fields, and miscellaneous land uses provide habitat for a variety of wildlife species. The seasonal flooding of about 250 acres of openland and forest land wildlife habitat, as well as 15 acres of farm ponds and 20 acres of natural lake provide wetland habitat for migratory waterfowl, wading birds, and other animals.

The greatest alteration in wildlife habitat has been due to the conversion of forest land to cropland and pastureland. This change in land use has resulted in a reduction in the quantity of habitat for those species of wildlife which require a predominately woodland environment. At the same time, quantity of habitat for those species of wildlife which utilize an openland environment has increased. However, the quality of habitat provided by the culture of large fields of a single species of crop or grass would be considered less than the quality of the original forest that contained a variety of wildlife plant foods before being cleared. In addition, the conversion of forest land to cropland has reduced the quantity of edge habitat on which open land wildlife species depend for food and cover.

The quality and quantity of roads are adequate to provide access to any portion of the watershed for the purposes of hunting, trapping, fishing, and observing nature.

## Impacts

Wildlife habitat management will be conducted on 175 acres of forest land. This will improve the quality of forest land wildlife habitat on these 175 acres. The conversion of 200 acres of native pasture to improved pasture due to land treatment practices will decrease the quality of openland wildlife habitat on this area.

According to future "without project" conditions, 605 acres of bottomland hardwood wildlife habitat will remain if the planned project is not installed. The planned project will result in an additional 32 percent (197 acres) of bottomland hardwood wildlife habitat being converted to other land uses--52 acres to channels and 145 acres to cropland. Forest land wildlife habitat quality was rated by Soil Conservation Service and Arkansas Game and Fish Commission biologists on the following scale of 1 to 5 for 8 species of wildlife which commonly utilize wooded areas:

<u>Rating</u>	<u>Description of Habitat</u>
1	Unsuited
2	Low
3	Moderate
4	Good
5	Excellent

According to the rating system, the average quality of the forested habitat would be considered moderate. Therefore, this project will be responsible for converting 197 acres of moderate forested wildlife habitat to openland wildlife habitat. Approximately 408 acres of bottomland hardwood wildlife habitat of moderate quality will remain after project installation. Overall, watershed populations of forest land wildlife species such as deer, squirrel, raccoon, woodpeckers, and bobcat will be decreased.

Channel bottoms, sides, and rights-of-way will be planted with species of plants which provide food and cover for wildlife. Along 19.7 miles of within-field surface drainage ditches, natural vegetation that will provide wildlife food and cover will be established. Such strips of vegetation along ditches will provide a wildlife "edge" effect within cropland and help offset the "edge" effect lost by clearing woodland. Therefore, the quality of openland wildlife habitat should not be significantly reduced but the quantity of this habitat will be increased by 197 acres. Overall numbers of openland wildlife species such as mourning dove, bobwhite quail, cottontail rabbit, and blackbirds within the watershed should increase; but the numbers of individuals of each of these species per unit area should not be changed.

The elimination of small stagnant stream pool areas within the upper portions of Bois d'Arc Bayou will cause a slight habitat loss for fish, amphibians, reptiles, and those species of mammals and birds which

forage for food in shallow water areas. The larger pools in the lower reaches of the bayou will not be disturbed.

Construction activities associated with channel enlargement will not have a significant impact on the riparian plant and animal community since this community is only well established in the lower stream reaches of Bois d'Arc Bayou where no construction is planned.

### CULTURAL RESOURCES

A search of the National Register of Historic Places and consultation with the Arkansas State Historical Preservation Officer revealed that no property of historical or architectural significance will be affected by the project.

During a reconnaissance survey conducted by the Arkansas Archeological Survey, eleven previously unrecorded archeological sites were discovered (2). The reconnaissance survey points out that locations of the recorded sites relative to the proposed channel modifications make it unlikely that they will be adversely affected. In each case the archeological sites were located either on edges of the terraces paralleling Bois d'Arc Bayou or well away from the construction area.

The report stated that unrecorded archeological sites could be buried in the alluvial deposits of the flood plain or where lateral ditches cross the terraces. The greatest potential for damage to unrecorded sites would exist in these areas.

### Impacts

The project is not expected to have a significant impact on archeological resources. The following steps will be taken to minimize possible impacts to these resources:

The Soil Conservation Service project engineer will be provided with a map showing the location of recorded archeological sites. The engineer will restrict heavy equipment travel so as not to damage these sites.

If it becomes apparent at the time final designs are complete that a known site may be damaged from heavy equipment or construction, proper steps will be taken to determine significance; and if necessary, recovery, protection, or preservation will be undertaken.

The Arkansas Archeological Survey will be notified when construction begins on the project. Soil Conservation Service personnel and the contractor will be encouraged to watch for possible buried archeological resources during construction. If archeological resources which appear significant are discovered during construction, procedures established in published Soil Conservation Service guidelines, 7 CFR, part 656 will be followed.

## RECREATION

Directly within the watershed boundaries, there are no private or public recreational developments; however, there are 12 public recreational developments within a 50-mile radius from the center of the watershed. These developments include six lakes, four wildlife management areas, one national forest, and one state recreation area. According to an analysis of the recreational supply and demand, future "without project" conditions reveal a need for additional tent camping and picnicking facilities. For all other activities, recreational supply equalled or exceeded the demand for future "without project" conditions.

Recreation within the watershed is limited to fishing in farm ponds and hunting, hiking, camping, and observing nature. All of these activities are conducted on private lands and recreational use is incidental to major uses of the land.

### Impact

The clearing of forest land will reduce the quantity of areas available for recreational uses such as hunting for forest land game species, hiking, and observing nature which are activities often associated with wooded areas. The project will have no significant impact on recreational developments outside the watershed.

## VISUAL RESOURCES

The visual resource includes all visible elements in the landscape. These elements are preferred by mankind and are necessary for the enjoyment of the landscape. The four elements which compete for dominance in any landscape include form, line, color, and texture. All four elements are usually present but exert differing degrees of visual influence, power, or dominance. The diversity of elements and the contrast between these elements are important factors in assessing visual quality. For example, an area which contains a variety of land uses in an irregular pattern has a higher visual quality than a large area of one land use.

Within the Bois d'Arc Bayou Watershed, the landscape is low to moderately diverse. This low to moderate landscape diversity is attributed to the fact that the area contains only two pattern types, openland and forest land, and that borders of openland fields form straight lines rather than curving or irregular lines. The landscape diversity quality has been further reduced by attempts to drain Bear Lake. Such attempts have resulted in this lake lacking water during drier periods of the year.

### Impacts

The project will have only a small impact on the visual resource. The construction of the water-level control structure at the mouth of Bear



Lake will result in the preservation of a 20-acre permanent pool of water. This water will add diversity to the landscape. The straightening of existing channels will cause a slight decrease in the visual quality of the landscape. By confining construction to one side of the existing channel, trees and vegetation can be preserved along the edge of Bois d'Arc Bayou. This will result in retaining the existing form, color, and pattern of the landscape within the openland areas.

### AIR QUALITY

Presently air quality in the watershed is affected by blowing dust and exhaust fumes from farming equipment and from vehicles traveling on roads. No other significant source of air pollution is known.

#### Impacts

Air quality will be temporarily degraded by dust and exhaust fumes caused by channel construction equipment. Land treatment practices such as crop residue management will help protect the air quality by reducing quantities of dust associated with wind erosion.

### TRANSPORTATION

U.S. Highway 71 passes through Ogden, Arkansas, approximately one mile east of the watershed boundary. The watershed is connected to this main transportation route by one paved road and a series of gravel roads.

#### Impacts

During channel construction, watershed traffic will be temporarily disrupted. Two county bridges and seven farm crossings will require modifications. The county judge is aware of these modifications. The reduction in flooding due to the project will reduce the frequency of road inundation and the length of time which roads are impassable. Costs for maintaining the roads will be reduced but were not included in economic evaluations. During bridge modification activities, the suspended sediment concentration of Bois d'Arc Bayou will temporarily increase. Following bridge modification, streambanks will be stabilized in these areas by vegetation or riprap, and suspended sediments will be decreased.

### ADVERSE IMPACTS

Implementation of the selected plan will result in the following adverse impacts:

1. Conversion of 0.8 mile of natural intermittent stream to manmade channel.
2. Conversion of 52 acres of bottomland forest wildlife habitat to channel right-of-way and 145 acres of bottomland forest wildlife habitat to cropland.
3. Reduction of Type 1 wetlands by 16 acres.

4. Conversion of 45 acres of land classified as prime farmland to channels in order to improve the productivity of 3,918 acres of cropland and pastureland classified as prime farmland.
5. Reduction in the quality of wildlife habitat on 200 acres of native pasture due to the conversion of this area to improved pasture.

#### SHORT-TERM VS. LONG-TERM USE OF RESOURCES

This watershed is located within the Red River (Below Denison Dam) Basin. This river basin comprises 29,500 square miles of land in Texas, Oklahoma, Louisiana, and Arkansas. Watershed protection and flood prevention projects which cover approximately 8.5 percent (2,518 square miles) of the river basin have been constructed, are in various stages of construction, or have been planned with no construction begun. Intensified land use for crop production is common to much of the river basin, and such use is expected to continue.

The project will help to reduce the immediate problems of flooding, drainage, and erosion. Agricultural efficiency will be increased. The reduction of damages will help in providing the stimulus for long-range planning concerning the wise use of the resources of the area.

The planned resource management systems will do much to solve both short-term and long-term problems in the area. These systems will permit continued use of the land to serve the present generation and future generations.

Following project installation, farmers will have a wider selection of crops and cropping patterns from which to choose. Farmers will be able to grow crops for which there is a greater demand. Acreages of surplus crops will decrease as other crops are introduced. These effects are compatible with the maintenance and needs of long-term productivity.

Channels will be effective and operate as planned as long as they are properly maintained; however, the sponsors are not obligated to maintain the channels after their project life. The channels will become less effective each year without proper maintenance.

#### IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The implementation of this project will result in the irreversible and irretrievable commitment of the following resources:

1. Conversion of 52 acres of bottomland forest wildlife habitat to channel and channel right-of-way. These acres will be planted with grasses, legumes, and shrubs which provide wildlife food and cover which will mostly benefit wildlife species which prefer a predominantly openland habitat. In addition to wildlife habitat losses on this 52 acres, the area will no longer be available for recreational activities associated with forest land.

2. The visual quality of 4.6 miles of existing drainageways with no defined channel and 0.8 mile of stream will be degraded by the construction and straightening of channels and the clearing of trees from one bank.
3. The project will preserve 20 acres of existing Type 5 wetlands which will provide habitat for aquatic plants and animals. This preservation will prevent the draining of this area for crop production. Overall, Type 1 wetlands will be reduced by 16 acres due to reduced flooding.
4. Approximately 45 acres of prime farmland will be converted to channels. However, improved drainage and flood damage reductions on 3,918 acres of cropland and pastureland will offset this loss.
5. Planning and construction time, material, labor, equipment depreciation, fuel, and cost of implementation and action will be irretrievably committed resources.

#### RELATIONSHIPS TO LAND USE, PLANS, POLICIES, AND CONTROLS

Bois d'Arc Bayou Watershed is located adjacent to Little River and downstream from Millwood Lake, a project of the Corps of Engineers on the Little River. The outlet for the Bois d'Arc Bayou Watershed is Hudson Creek, a tributary of Little River. A portion of the benefited area is subject to flooding from structure release from Millwood Lake which controls 97 percent of the Little River drainage area. Such flooding is a result of backwater entering Hudson Creek and moving upstream into Bois d'Arc Bayou.

There is no monthly operating schedule for Millwood Lake. Releases are made on a day-to-day basis with basin hydrologic conditions dictating the release schedule. The minimum release from Millwood Lake is 155 cubic feet per second and the maximum release is dependent upon Millwood Lake pool elevation and inflow. The easement area below Millwood Lake is subject to flooding at any time during the year. The fact that water released from Millwood Lake could cause flooding in a portion of the project area was considered in evaluating this project.

Except for the fact that the watershed is subject to flooding by water released from the U.S. Army Corps of Engineers' Millwood Lake, there are no known conflicts between this project and the objectives or specific terms of approved or proposed federal, state, or local land use plans, policies, or controls.

#### CONSULTATION

Application for planning assistance for the Bois d'Arc Bayou Watershed was approved in March 1974, by the Arkansas Soil and Water Conservation Commission who provided a portion of the funds needed to develop this plan. The Administrator of the Soil Conservation Service authorized

planning assistance in January 1975. The Bois d'Arc Bayou Improvement District, which was legally formed on September 13, 1973, and the Little River Conservation District are sponsors of the project.

Preliminary investigation studies for this watershed helped identify watershed resources and associated problems. Alternative plan measures to solve existing problems were derived. Consultation with project sponsors and state and other federal agencies resulted in five preliminary alternative plans being formulated. In February 1977, a public meeting was held in Ogden, Arkansas, to present preliminary investigation data and the five alternatives.

After this meeting, alternatives were revised to include public input. A Preliminary Investigation Report was completed and sent to several state and other federal agencies for review in April 1977. This report summarized information about the watershed's resources and problems and explained the preliminary alternative plans.

Suggestions received from the review of the Preliminary Investigation Report were considered for incorporation into the various alternatives. After further consultation with the sponsors, alternative plans were finalized and the sponsors chose a plan (the "selected plan") which they would be most willing to implement.

In order to obtain certain environmental assessment information, the Soil Conservation Service entered into a contract with Southern Arkansas University, Magnolia, Arkansas. As a result of this contract, personnel with Southern Arkansas University conducted environmental studies and submitted their findings to the Soil Conservation Service in a document entitled Environmental Inventory of the Bois d'Arc Bayou Watershed, Little River County, Arkansas. Information for this report was gathered during the summer of 1976, and the document was completed in November 1976.

In order to obtain archeological information, the Soil Conservation Service entered into a cooperative agreement with the Arkansas Archeological Survey. The cooperative agreement resulted in a report on the archeological resources of the watershed.

During the planning process, several state and other federal agencies have been contacted for their input into the planning process. Representatives of the Arkansas Game and Fish Commission and the U.S. Fish and Wildlife Service have assisted in conducting inventories of wildlife and fish resources. The U.S. Forest Service and Arkansas Forestry Commission provided technical assistance in the planning for forestry management needs. The U.S. Bureau of Mines has provided input concerning the present mineral resources of the watershed. The U.S. Army Corps of Engineers provided information concerning release of water from Millwood Lake.

Comments on the draft plan and environmental impact statement were requested from the following:

Department of the Army  
Department of Commerce  
Department of the Interior  
Department of Health, Education, and Welfare  
Department of Transportation  
Environmental Protection Agency  
Office of Equal Opportunity, USDA  
Federal Power Commission  
Advisory Council on Historic Preservation  
U.S. Army Corps of Engineers  
Arkansas Association of Conservation Districts  
Arkansas Soil and Water Conservation Commission  
Arkansas Department of Local Services, State Planning  
and Development Clearinghouse  
Southwest Arkansas Planning and Development District  
Arkansas Historic Preservation Program

Comments were received from the following agencies:

Department of Commerce  
Department of the Interior  
Department of Health, Education and Welfare  
Environmental Protection Agency  
Advisory Council on Historic Preservation  
Arkansas Soil and Water Conservation Commission  
Arkansas Department of Local Services, State Planning  
and Development Clearinghouse  
Arkansas Historic Preservation Program

Comments from the State Planning and Development Clearinghouse were received from the Arkansas Game and Fish Commission, Arkansas Archeological Survey, Arkansas Department of Pollution Control and Ecology, and Arkansas Soil and Water Conservation Commission. These comments were forwarded to the Soil Conservation Service by the Clearinghouse.

Copies of letters of response furnished during the review of the draft plan and EIS are contained in Appendix C. Comments and responses are presented as follows:

Department of Health, Education, and Welfare

Comment: (1) While we commend the author's intent to be brief, we feel this attempt at brevity has created some serious omissions which are needed for a thorough analysis of the EIS. For example, a location map with more detail should be included to aid the reviewers in pinpointing the affected area. The map provided on page 75 of the draft EIS only shows Little River County. A regional map showing the inter-relationship between the project and surrounding counties,

Millwood Lake, Little River and other related information is needed. A map showing very clearly those areas affected by each alternative and the extent of those effects would be quite useful.

Response: Although we agree that the additional maps which you have suggested would be useful, we feel that the location of the watershed is adequately described on page 4 in the Project Setting. This description contains enough detail so that readers can locate the watershed and refer to regional maps for further information. Within the third paragraph on page 9 of the Plan Formulation Section, the locations of various channel work are explained with respect to the project map (Appendix G). By comparing the channel work for each alternative (pages 10 and 11) to this map, the reader should be able to determine those areas affected by each alternative.

Comment: (2) It is noted from the list of agencies furnished review copies of the draft EIS, that the Arkansas Department of Health and the local health department were omitted. These agencies should be requested to offer comments before the final EIS is prepared.

Response: Copies of the plan and EIS were sent to the Arkansas Department of Local Services, State Planning and Development Clearinghouse, which is responsible for distributing copies of plans and EIS's to state agencies in Arkansas. Comments from state agencies were consolidated by a state technical review committee and sent to the SCS by the Clearinghouse. The Arkansas State Department of Health was provided the opportunity to comment during the review process. However, they did not provide any comments to the Clearinghouse. The local health department is a unit of the Arkansas Department of Health. Therefore, comments from the local health department are coordinated within the Department.

Comment: (3) The draft EIS is either inaccurate or else takes credit for a rejected alternative in the "Favorable Impacts Section" on page 2, item 4. It is stated that flooding damages will be reduced 78 percent. In fact, this is the benefit of alternative 1 which was rejected. The chosen alternative 3 only claims to reduce flooding 73 percent as noted in the table on page 12.

Response: The table on page 12 was in error. Changes have been made to reflect corrections.

Comment: (4) Other apparent inaccuracies occur in the brief discussion of alternatives. Favorable impact 7 on page 2 states

3,918 acres will be improved. The table on page 12 shows only 3,018 acres of prime agricultural land will have increased crop production, 500 existing acres of pasture will be improved and 250 additional acres of farm land will be added. These together only total 3,768 acres.

**Response:**

Please note that favorable impact 7 on page 2 states specifically that improved drainage and flood reduction will improve the productivity of 3,918 acres of cropland and pastureland classified as prime farmland. This acreage consists of 3,018 acres of cropland mentioned in the table on page 12 (Table II) of the draft EIS and 900 acres of pastureland in the water problem area which is not mentioned in Table II. We have added this 900 acres to the summary of impacts in Table II. Grazing conditions on 500 acres of pastureland will be improved due to land treatment practices. Such land treatment installation will not be dependent on improved drainage or flood-water damage reduction. The 250 acres of pastureland to be added is not within the water problem area and will not receive benefits from improved drainage and flood reduction (see Table V).

**Comment: (5)**

On page 9, paragraph 2, we take exception to the philosophy expressed and feel it violates the EIS process. All feasible alternatives should be discussed, a preferred alternative chosen, and the reasons for choosing that alternative discussed in the statement.

**Response:**

The SCS initially studied two alternatives which are not included within the final six alternatives. However, the consideration of these alternatives is discussed in the plan and EIS. The first of these initial alternatives was considered to be nonstructural and included the conversion of cropland and grassland to uses more compatible with the existing flow regime. The second initial alternative included only environmental quality measures. Since lack of support for these two initial alternatives was expressed early during the planning process, they were considered to be nonviable. In order to reduce planning costs, further study of these alternatives was not conducted. If support for these alternatives had been shown, they would have been studied in more detail and become final alternatives. We feel that the early deletion of alternatives is not a violation of the EIS process as long as these alternatives are presented to the public for consideration and are found to lack their support.

Comment: (6) In paragraph 2 on page 25, it is stated that the project will result in the additional conversion of 145 acres of forest land to crop land. Why must forest land be cleared and the land converted to crops for drainage control? This conversion will contribute to increased stream sediment and may result in increased use of agricultural chemicals which may in turn enter the water runoff. The potential effects of these agricultural chemicals downstream from the newly cleared land, as well as the chemicals from the other lands which would not become suitable for farming, are not mentioned.

Response: The EIS states that 145 acres of forest will be converted to cropland after project installation. These acres are not being cleared to improve drainage but as a result of improved drainage. In order to provide protection to existing cropland, improved drainage and flood reduction will also occur on areas now in forests. Because of this fact, the SCS predicted that private landowners will convert 145 acres of the forest to cropland. The project is not planned with the thought of bringing this cropland into production. However, we feel that this 145-acre conversion will occur. It is true that agricultural chemicals will be used on cropland areas. However, land treatment is expected to decrease the sediment concentration at the outlet of Bois d'Arc Bayou by 20 percent (see Erosion and Sedimentation Impacts). This reduction in sediment at the outlet should also reduce the transport of agricultural chemicals which readily attach to soil particles. Improvement in surface drainage will cause an increase in the transport of those chemicals which are not strongly adsorbed by soil particles. This increase will be partially offset by land treatment practices which increase the rate of water infiltration into the soil. Additional information concerning water quality impacts has been added to the Plan and EIS.

Comment: (7) The report does not consider all economic impacts by the project. On page 38 under transportation impacts, it is mentioned that "bridges will require modification due to channel work." No discussion is provided on the bridges other than stating that "the county judge has been informed of such modifications." What effect does bridge modification have on cost-benefit ratios? What additional environmental impacts will arise from bridge construction and modifications?

Response: More specific information has been added to the Transportation section. Hopefully, all of your questions have been answered by these revisions with the exception of



the question concerning cost-benefit ratios. Costs for bridge modifications were included in land rights costs under Other. These costs are included in the cost-benefit computations.

**Comment: (8)** On page 40, Millwood Lake is mentioned. It appears that some of the flooding problems are caused by the Corps of Engineers' lake above the drainage basin. A discussion of the relationship of water discharged from this lake upon the watershed should be included in the final EIS. To what degree does this water cause flooding in the Bois d'Arc Watershed? Can flooding be controlled in the watershed without extensive work through a better control of Millwood Lake.

A discussion of the sources of floodwaters is lacking. Obviously, some portion of the flooding comes from rainfall. Is the flooding coming from rain falling on the watershed itself or are there sources other than the Millwood Lake discharge to the watershed.

**Response:** The project was justified on reducing flooding caused by water runoff from rainfall within the watershed. This point has been clarified in the section on Floodwater and Drainage. Millwood Lake is not within the watershed but is located on Little River upstream from where Hudson Creek flows into this river. Bois d'Arc Bayou flows into Hudson Creek (see project map). Flooding of the Bois d'Arc Bayou Watershed by release of water from Millwood Lake occurs by water backing up Hudson Creek and Bois d'Arc Bayou. We have attempted to clarify this point in the section on Relationships to Land Use, Policies, and Controls. As stated in this section, release from Millwood Lake is made on a day-to-day basis with basin hydrologic conditions dictating the release. This fact was taken into consideration in evaluating the project, and it was found that the control of flooding caused by water runoff from rainfall within the watershed was economically justified. A better control of Millwood Lake would not affect the major flooding problem in the watershed.

**Comment: (9)** Further, wetlands often provide valuable storage until the water can be carried downstream. A discussion should be included on the downstream effects of the channel modifications. What problems will be created downstream by increased runoff flows from the Bois d'Arc Bayou Watershed?

**Response:** In the impact portion of the section on Floodwater and Drainage, it is stated that the project will not cause increased flooding downstream from Bois d'Arc Bayou.

Comment: (10) From a potential vectorborne disease standpoint, drainage improvements such as this can be beneficial to mosquito control because larval mosquito habitats found in stream beds during periods of reduced flow are eliminated by the drainage improvements. No discussion has been provided to indicate whether mosquitoes are a problem in the watershed.

Response: Mosquitoes are a problem from the standpoint of being pests. However, the problem in Bois d'Arc Bayou is no different than in most other lowland areas in Arkansas. In this watershed the slight decrease in any larval mosquito habitat caused by drainage improvements would be insignificant with respect to changing overall populations of mosquitoes in the watershed. Wet areas such as farm ponds, Bear Lake, and depressions in the channel will provide mosquito habitat. In addition, standing water is abundant within the lowland areas of Hudson Creek and Little River which are adjacent to the watershed.

#### United States Department of the Interior

Comment: (1) We note that the draft statement does not discuss impacts on minerals. Apparently no mineral investigation was made of the project area. However, we believe that the watershed improvements should have only minimal impacts on the mineral resource base. For example, terrace and alluvial gravels are found in the area, but they are abundant in this part of Arkansas. Further, we know of no active mineral development or pipeline crossing in the watershed area that might be affected by the project.

Response: An inventory of mineral resources of the project area was made. In addition, the Bureau of Mines furnished the SCS information on the mineral resources of the watershed in a letter dated February 21, 1975. This information is in our support files. In order for the plan and EIS to be brief, the discussion of mineral resources was deleted due to the lack of significant impacts on this environmental factor (see the second paragraph within the section on PROJECT IMPACTS).

#### United States Department of Commerce

Comment: Page 5 - Though the primary aim of the project is flood control, the climatic discussion in the impact statement gives little information about the rainfall events which cause flooding. An assessment of the type, duration, and frequency of storms which contribute to the problem

should be given, and data on extreme rainfall events associated with flooding would also be helpful.

**Response:** More detailed rainfall information has been included within the Project Setting portion of the plan and EIS.

#### Advisory Council on Historic Preservation

**Comment:** It is suggested that the final environmental statement contain the Arkansas State Historic Preservation Officer's concurrence in SCS's determination of no effect.

**Response:** The suggested letter of no effect, dated October 17, 1978, is included in the letters of comment.

#### Environmental Protection Agency

**Comment:** We classify your Draft Environmental Statement as L0-1. Specifically, we have no objections to the project as it relates to Environmental Protection Agency's (EPA) legislative mandates. The statement contained sufficient information to evaluate adequately the possible environmental impacts which could result from project implementation. Our classification will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

**Response:** No response necessary.

#### State of Arkansas Department of Local Services, State Planning and Development Clearinghouse

**Comment:** The State Planning and Development Clearinghouse is in receipt of the above referenced environmental assessment pursuant to the State of Arkansas Project Notification and Review System.

To carry out the review and comment process, this office has notified state agencies and interested organizations. Comments where appropriate are attached.

**Response:** No response necessary.

#### Arkansas Soil and Water Conservation Commission

**Comment:** Review by the Technical Review Committee of the cited document has been completed. It was the consensus of the Committee that no significant adverse impact upon the

environment would result from installation of the proposed project. Implementation of the Bois d'Arc Watershed plan would be in the best interest of the local area and the state. Comments made by the Pollution Control Commission, the Game and Fish Commission and the Archeological Survey are enclosed and should be considered.

Response: No response necessary.

Arkansas Department of Pollution Control and Ecology

Comment: (1) The last 2 sentences of the first paragraph which refer to the 20 acres of Type 5 wetlands in Bear Lake and the 40 acres of cropland that will be flooded for waterfowl during the winter is as follows: "The Bois d'Arc Improvement District will be responsible for regulating the lake level and for obtaining 60 acres of easements needed for insuring that the structure will function as planned. Access to Bear Lake for hunting and fishing purposes will be controlled by the landowner."

The access to hunting and fishing should be thrown open to use by the general public or turned over to the Game and Fish Commission as a management area.

Response: Bear Lake and the associated cropland to be seasonally flooded is presently under private ownership. Making this area available to the public would not increase its present potential for providing wetland wildlife habitat. The purpose of the development is to preserve wetland wildlife habitat. This purpose is not dependent on public use of the area. Therefore, the degree of public access to the area will be the landowners responsibility.

Comment: (2) A sentence in the middle of page 35 states, "Approximately 408 acres of bottomland hardwood wildlife habitat of moderate quality will remain after project installation."

This statement is only an estimate and there is no guarantee that a single acre of it will remain as woodlands. Perpetual easements should be obtained to assure that these wooded acres do remain wooded and that all of it be kept open to hunting and fishing by the general public.

Response: Interviews with landowners in the watershed provided a basis in predicting acreages of bottomland hardwood that would remain after project installation. Approximately 200 of the 408 acres is owned by large commercial timber companies and the remaining acres are in private ownership. We feel that the land use changes predicted in the

plan and EIS are accurate. Therefore, we do not see the necessity of the sponsors bearing the additional costs of obtaining easements on these 408 acres.

**Comment:** (3) The 4th paragraph on page 15 states that channel construction areas will be revegetated with grasses, legumes, and shrubs which will provide food and cover for wildlife. Grasses and legumes have considerable value for erosion control but, considering their availability in other areas, they possess very little value for wildlife in situations of this type. The establishment of trees and shrubs which do possess exceptional values for wildlife, such as sweet pecan and everbearing mulberry, would add wildlife values worth working for and would add a degree of permanency impossible to achieve with grasses and legumes.

**Response:** In order to provide for future operation and maintenance of the channel, an access road will be left along the channel. Since trees would interfere with the purpose of this road, grasses, legumes, and low growing shrubs will be planted in this area. However, selected trees which will not interfere with channel construction, operation, or maintenance will be left in portions of the construction area. Except in areas devoted to maintenance roads and channels, natural plant succession on those construction areas which were previously forested will be allowed to proceed so that trees will eventually replace grasses, legumes, and shrubs.

Arkansas Game and Fish Commission - Comments provided from Local Agency Review which preceded Interagency Review.

**Comment:** (1) On page 2, under V. Summary of Impacts, Adverse Impacts 4. - How will there be a gain in open land wildlife habitat? Is the open land gained to be managed for wildlife. If open land gained is to be used as pasture or other agricultural use, then wildlife benefits should not be claimed.

**Response:** Open land wildlife habitat will increase in quantity due to the conversion of forest to cropland. This open land will provide wildlife habitat but will be of a lower quality than the forest habitat which now exists. Neither the existing forest nor the future cropland is being managed specifically for wildlife.

**Comment:** (2) Page 4, next to last paragraph, the sentence which reads: "The major problem area is located in the flood plain of Bois d'Arc Bayou where frequent flooding and drainage

problems cause agricultural crop losses." Although the acreage in the flood plain of Bois d'Arc Bayou isn't given in the EIS, it must be relatively small as compared to the 10,540 acre watershed. It would seem that proper management of the flood plain may be a viable alternative to the expensive and destructive engineering scheme. Certainly, one could logically expect to have flooding problems in a flood plain. Flood plains, though risky for agricultural use, are extremely productive in timber and wildlife resources and, if dedicated to such use, there would be no economic losses when flooding occurred.

**Response:** The 100-year flood plain is equal to 4,510 acres. Under the section on Planning Considerations, a nonstructural alternative of converting cropland and grassland in the water problem area to uses more compatible with the existing flow regime is discussed. This initial alternative was deleted early during the planning process due to a lack of support from a public who was willing to implement this alternative.

#### Arkansas Archeological Survey

**Comment:** On page 36 of the EIS is a discussion of the archeological resources present in Bois d'Arc Bayou Watershed. The procedures that will be followed if archeological resources are endangered are itemized: project personnel will avoid known archeological sites and restrict use of heavy equipment at them, watch for buried archeological sites which may be exposed, and take steps to determine the significance of any sites exposed during construction. The procedures should adequately protect the cultural resources in the watershed.

**Response:** No response necessary.

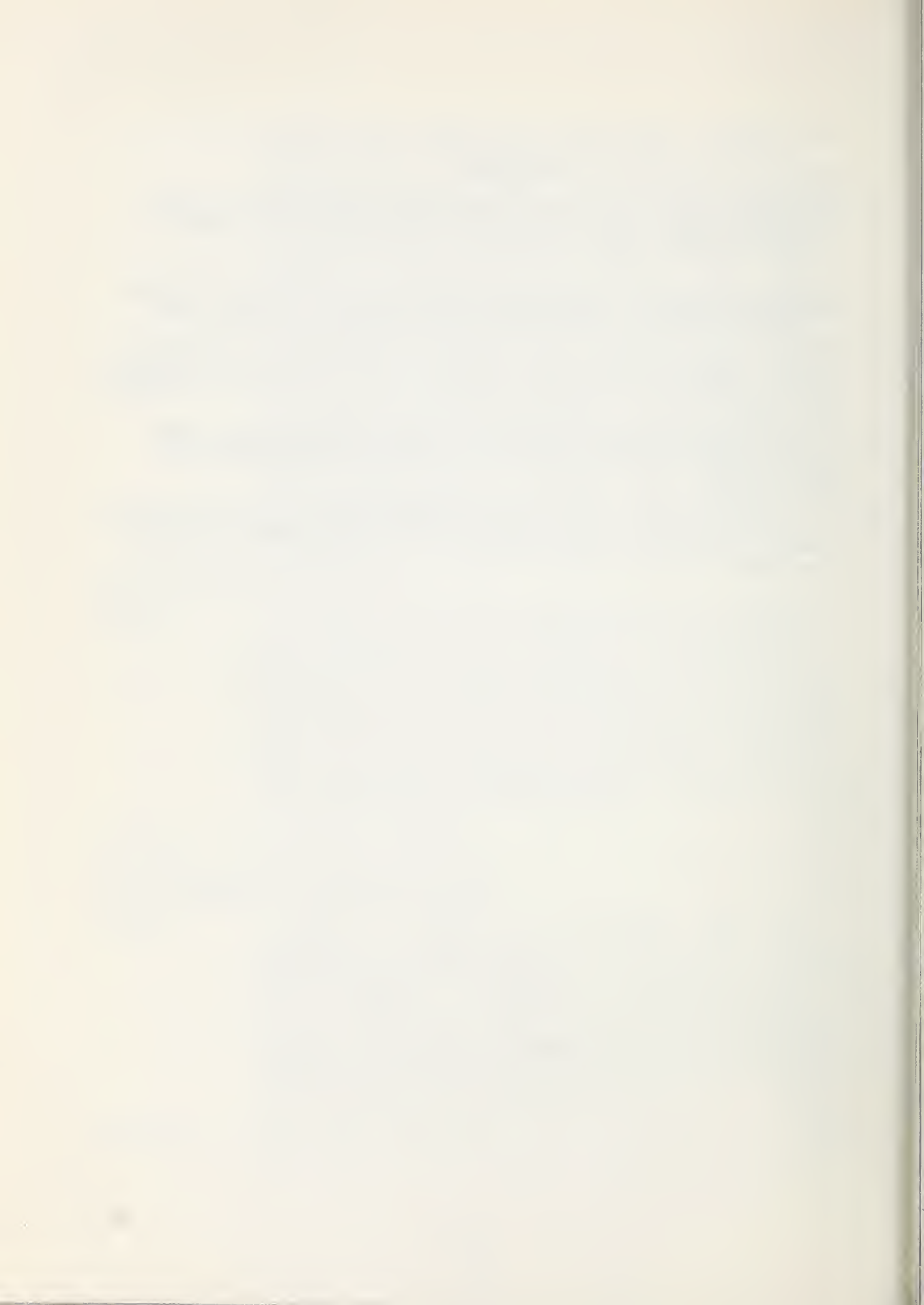
#### Arkansas Historic Preservation Program

**Comment:** I concur in the conclusion in the August, 1978, Draft Environmental Impact Statement on the Bois d'Arc Bayou Watershed project that there will be no effect on properties included in or eligible for inclusion in the National Register. I also concur in the State Archeologist's statement on August 28, 1978, that the measures provided in the Draft Environmental Impact Statement will adequately protect archeological resources which might be discovered as the work progresses.

**Response:** No response necessary.

## REFERENCES

1. Southern Arkansas University, Environmental Inventory of the Bois d'Arc Bayou Watershed, Little River County, Arkansas, November, 1976.
2. Taylor, Robert A., An Archeological Survey of the Bois d'Arc Bayou Watershed Project, Little River County, Arkansas, January, 1976.
3. United States Bureau of Census, United States Census of Population, 1970. Number of Inhabitants Final Rpt., PC(1)-A5 AR USGPO, Washington, D.C., 1971.
4. United States Bureau of the Census. Census of Agriculture, 1969 Vol. 1, Area Rpt. 24, AR Sec. 2., Co. Data. USGPO, Washington, D.C., 1972.
5. U. S. Bureau of the Census, U.S. Census of Population, 1970, "General Social and Economic Characteristics," Final Report PC-C5 AR USGPO, Washington, D. C., 1971.





## TABLES FOR PLANNED PROJECT

Table 1 - Estimated Installation Cost

Table 1A - Status of Watershed Works of Improvement

Table 2 - Estimated Cost Distribution

Table 2A - Cost Allocation and Cost Sharing Summary

Table 3 - Structural Data, Channel Work

Table 3A - Structural Data, Grade Stabilization Structures

Table 4 - Annual Cost

Table 5 - Estimated Average Annual Flood Damage Reduction Benefits

Table 6 - Comparison of Benefits Costs



TABLE 1 - ESTIMATED INSTALLATION COST  
Bois d'Arc Bayou, Arkansas

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) 1/				Total
			Public Law 566 Funds	Nonfederal Land	Nonfederal Land	Other	
			SCS 3/	FS 3/	SCS 3/	FS 3/	
<b>LAND TREATMENT - GOING PROGRAM</b>							
Land Areas 2/							
Cropland	Acre	450	-	-	12,360	-	12,360
Pastureland	Acre	400	-	-	28,000	8/	28,000
Forest Land	Acre	260	-	-	870	5,200	6,070
Other Land	Acre	60	-	-	340	-	340
Technical Assistance	XXXX	XXXX	-	-	3,000	3,800	6,800
<b>SUBTOTAL</b>		1,170	-	-	44,570	9,000	53,570
<b>LAND TREATMENT - ACCELERATED</b>							
Land Areas 2/							
Cropland	Acre	450	-	-	2,370	-	2,370
Pastureland	Acre	100	-	-	15,880	8/	15,880
Forest Land	Acre	0	-	-	870	-	870
Technical Assistance	XXXX	XXXX	-	-	-	-	1,000
<b>SUBTOTAL</b>		550	-	-	19,120	-	20,120
<b>TOTAL LAND TREATMENT</b>			1,000	-	63,690	9,000	72,690
<b>STRUCTURAL MEASURES</b>							
Channel Work 4/ 5/	Miles	7.6	387,800	-	122,000	-	509,800
(N) 0.8 Miles							
(O) 6.8 Miles							
Associated Onfarm Measures 6/	Miles	19.7	4,000	-	45,660	-	49,660
<b>SUBTOTAL Structural Cost</b>			391,800	-	167,660	-	559,460
<b>PROJECT ADMINISTRATION</b>							
Construction Inspection			34,100	-	-	-	34,100
Other			37,300	-	1,700	-	39,000
Relocation Assistance			-	-	-	-	-
Advisory Services			-	-	-	-	-
<b>SUBTOTAL - Administration</b>			71,400	-	1,700	-	73,100
for Structural Measures			464,200	-	188,480	-	652,680
<b>TOTAL PROJECT COSTS 7/</b>			464,200	-	233,050	9,000	706,250
<b>TOTAL ALL COSTS</b>							

1/ Price Base: 1977.  
 2/ Includes only areas estimated to be adequately treated during the project installation period. Treatment will be applied throughout the watershed, and dollar amounts apply to total land areas, not just to adequately treated areas.  
 3/ Federal agency responsible for assisting in installation of works of improvement.  
 4/ Type of channel before project: (N) - an unmodified, well defined natural channel or stream; (O) - none or practically no defined channel.  
 5/ Includes 2 grade stabilization structures, 50 pipe drop structures, and 1 water-level control structure.  
 6/ Includes surface drainage systems and about 60 pipe drop structures.  
 7/ Excludes going program - land treatment.  
 8/ Wildlife habitat improvement.

TABLE 1A - STATUS OF WATERSHED WORKS OF IMPROVEMENT  
(at Time of Plan Preparation)

Bois d'Arc Bayou Watershed, Arkansas

Land Adequately Treated <sup>2/</sup>	Unit	Applied to Date	Total Cost (Dollars) <sup>1/</sup>
<u>LAND TREATMENT</u>			
Cropland Adequately Treated	Acre	600	22,420
Pasture and Hayland Adequately Treated	Acre	900	64,700
Wildlife Land Adequately Treated	Acre	0	0
Forest Land Adequately Treated <sup>3/</sup>	Acre	1,000	18,450
<b>TOTAL</b>	Acre	2,500	105,570
<b>AREA ADEQUATELY PROTECTED <sup>4/</sup></b>	Acre	8,324	XXXX

- <sup>1/</sup> Price Base 1977. Dollar amounts apply to total land areas, not just to adequately treated areas.
- <sup>2/</sup> Data obtained from records covering approximately 10 years (1967 - 1977)
- <sup>3/</sup> Information furnished by the U.S. Forest Service in cooperation with the Arkansas Forestry Commission.
- <sup>4/</sup> Area adequately protected is land on which the soil, water, and related plant resources are adequately protected from deterioration.

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TABLE 2 - ESTIMATED COST DISTRIBUTION

Bois d'Arc Bayou Watershed, Arkansas

(Dollars) 1/

Item	Installation Cost - Public Law 566 Funds			Installation Cost - Other Funds			Total : Installation : Cost
	: Construction	: Engineering	: Total Public : Law 566	: Construction	: Engineering	: Land Rights	
<b>STRUCTURAL MEASURES</b>							
Channel Work 2/							
Main Ditch 1	242,800	23,400	266,200	18,600	0	84,200	369,000
88+00 - 130+00 (N) 3/							
130+00 - 335+00 (O) 3/							
Lateral 1-A (O) 3/	27,900	2,700	30,600	2,100	0	4,800	37,500
Lateral 1-B (O) 3/	43,000	4,200	47,200	3,300	0	3,300	53,800
Lateral 1-C (O) 3/	40,000	3,800	43,800	3,000	0	2,700	49,500
Associated Onfarm Measures							
Surface Drainage	0	2,700 4/	2,700	23,660	2,700 4/	0	29,060
Pipe Drop Structures	0	1,300 4/	1,300	18,000	1,300 4/	0	20,600
SUBTOTAL - Structural	353,700	38,100	391,800	68,660	4,000	95,000	559,460
PROJECT ADMINISTRATION	XXX	XXX	71,400	XXX	XXX	XXX	73,100
GRAND TOTAL	353,700	38,100	463,200	68,660	4,000	95,000	632,560

1/ Price Base 1977.

2/ Includes cost of appurtenant structures, i.e., grade stabilization structures, water-level control structures, and pipe drop structures.

3/ Type of channel before project: (N) - an unmodified, well defined natural channel or stream; (O) - none or practically no defined channel.

4/ Fifty percent of the technical assistance for installation of associated onfarm measures will be paid with Public Law 566 funds under the accelerated program and 50 percent will be paid with ongoing program funds.

TABLE 2A - COST ALLOCATION AND COST SHARING SUMMARY

Bois d'Arc Bayou Watershed, Arkansas

(Dollars) 1/

Item	C O S T A L L O C A T I O N		C O S T S H A R I N G			
	Purpose	Total	Public Law 566	Flood Prevention	Flood Prevention	Other
Structural Measures						
Channel Work	437,400	509,800	31,900	355,900	81,500	40,500
Associated On-Farm Measures	42,610	49,660	570	3,430	39,180	6,480
GRAND TOTAL	480,010	559,460	32,470	359,330	120,680	46,980

1/ Price base 1977.

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TABLE 3 - STRUCTURAL DATA

CHANNEL WORK

Bois d'Arc Bayou Watershed, Arkansas

Channel Name	Station	Drainage Area (sq. mi.)	Design Discharge (cfs)	Water Surface Elevation (ft.-msl)		Hydraulic Gradient (ft./ft.)	Channel Dimensions		Side Slopes (H/V)	"n" Value	Velocities (ft./sec)	Excavation Volume (cu. yds.)	Type of Work	Existing Channel Type	Present Flow Conditions
				Bottom Elevation	Width (ft.)		Bottom Elevation	Depth (ft.)							
Main Ditch (Bois d'Arc Bayou)	335+00	4.11	232	260.0	8.0	.00020	253.3	2.5:1	.035	1.45	-	II	0	E	
	308+00	4.72	266	259.8	8.0	.00020	252.8	2.5:1	.034	2.14	42,679	II	0	E	
	230+50	8.87	382	256.4	8.0	.00040	249.4	2.5:1	.034	2.25	43,866	II	0	E	
	170+00	12.89	497	254.0	10.0	.00040	246.5	2.5:1	.033	1.88	47,342	II	0	E	
	93+50	14.73	539	252.5	14.0	.00020	244.3	2.5:1	.031	1.95	15,556	II	N	I	
	83+00	15.01	547	252.4	5/	.00020	244.2	5/	.070	0.71	0	IV	N	I	
Lateral 1A	69+00	0.14	10	260.0	4.0	.00080	258.0	2.5:1	.045	1.07	-	I	0	E	
	2+80	0.79	42	254.7	4.0	.00080	251.8	2.5:1	.044	1.33	7,631	I	0	E	
	0+00	1.03	48	252.9	4.0	.00100	245.1	2.5:1	.044	1.52	2,318	I	0	E	
Lateral 1B	44+75	0.85	39	259.4	4.0	.00025	254.8	2.5:1	.043	0.87	-	I	0	E	
	0+00	1.40	59	257.3	4.0	.00100	250.3	2.5:1	.041	0.99	28,424	I	0	E	
Lateral 1C	38+00	2.10	120	261.0	6.0	.00100	258.7	2.5:1	.040	1.44	-	II	0	E	
	0+00	2.38	132	259.5	6.0	.00100	252.7	2.5:1	.039	1.49	17,640	II	0	E	

1/ Discharge was determined by using minimum H111 (Q=80M<sup>1.735</sup>) and coastal cultivated cultivated (Q=45M<sup>2.6</sup>/b) runoff curves; where Q is the discharge in cubic feet per second and M is the drainage area in square miles.

2/ Velocities associated with design discharge.

3/ I - Establishment of new channel including necessary stabilization measures.  
 II - Enlargement or realignment of existing channel or stream.  
 III - Cleaning out natural or manmade channel (includes bar removal and major clearing and snagging operation).  
 IV - Clearing and removal of loose debris within channel section.  
 V - Stabilization as primary purpose (by continuous treatment or localized problem areas--present capacity adequate).

4/ N - An unmodified, well defined natural channel or stream. 0 - None or practically no defined channel.

5/ I - Intermittent - continuous flow through some seasons of the year but little or no flow through other seasons.  
 E - Ephemeral - flows only during periods of surface runoff, otherwise dry.

6/ No excavation planned, the cross-sectional and wetted perimeter below hydraulic grade line is 720 square feet and 197 square feet, respectively.

TABLE 3A - STRUCTURAL DATA

GRADE STABILIZATION STRUCTURES

Bois d'Arc Bayou Watershed, Arkansas

Station	Drainage Area (sq. mi.)	Design Cap. Prin. Spill. (cfs)	Frequency and Duration of Storm (% chance and hours)	Drop (ft.)	Volume of Concrete (cu. yds.)	Type of Structure
Main Ditch Sta. 335+00	4.11	467	10% - 24 hr.	7.0	70	Drop <u>1/</u>
Lateral Ditch 1-C Sta. 38+00	2.10	187	10% - 24 hr.	4.0	40	Drop <u>1/</u>

1/ Type of structure will be a Type C straight drop spillway consisting of reinforced concrete. See Appendix E for typical structure.

May 1978



TABLE 4 - ANNUAL COST

Bois d'Arc Bayou Watershed, Arkansas

(Dollars) <sup>1/</sup>

Evaluation Unit	Amortization of :			Total
	Installation	Operation, Maintenance, and Replacement Cost 2/	3/	
Channel Work Main Ditch 1, Lateral 1-A, Lateral 1-B, Lateral 1-C, and Associated Onfarm Measures	46,400	4,000	50,400	
Project Administration	6,060	XXXXX	6,060	
GRAND TOTAL	52,460	4,000	56,460	

1/ Price Base: 1977.

2/ Amortized at 6-5/8 percent interest rate for 25 years.

3/ Includes \$940 for operation, maintenance, and replacement for associated onfarm measures.

May 1978

TABLE 5 - ESTIMATED AVERAGE ANNUAL FLOOD DAMAGE REDUCTION BENEFITS

Bois d'Arc Bayou Watershed, Arkansas

(Dollars) <sup>1/</sup>

Item	Estimated Average Annual Damage		Damage Reduction Benefit <sup>2/</sup>
	Without Project	With Project	
Floodwater			
Crop and Pasture	77,000	16,940	60,060
Indirect	7,700	1,690	6,010
Total	84,700	18,630	66,070

<sup>1/</sup> Price Base: Crop and pasture current normalized prices; all other 1977 prices.

<sup>2/</sup> Excludes effects of accelerated land treatment measures.

May 1978

TABLE 6 - COMPARISON OF BENEFITS AND COSTS

Bois d'Arc Bayou Watershed, Arkansas

(Dollars)

Evaluation Unit	AVERAGE ANNUAL BENEFITS 1/			Average Annual Cost	Benefit Cost Ratio
	Damage 2/ Reduction	Drainage	Employment: Total		
Channel Work - Main Ditch 1, Lateral 1-A, Lateral 1-B, Lateral 1-C, and Associated On-Farm Measures	66,070	9,940	8,140	50,400	1.7:1
Project Administration	XXXXXX	XXXXX	XXXXX	6,060	XXXXX
GRAND TOTAL	66,070	9,940	8,140	56,460	1.5:1

1/ Price Base: Crop and pasture current normalized prices; all other 1977 prices.

2/ From Table 5.

3/ From Table 4.

May 1978



APPENDIX A - AGREEMENT



## AGREEMENT

between the following local organizations:

Little River Conservation District  
Bois d'Arc Bayou Improvement District  
(Referred to herein as Sponsors)

State of Arkansas  
and the  
Soil Conservation Service  
United States Department of Agriculture  
(Referred to herein as SCS)

Whereas, application has heretofore been made to the Secretary of Agriculture by local organization(s) for assistance in preparing a plan for works of improvement for the Bois d'Arc Bayou Watershed, State of Arkansas, under the authority of the Watershed Protection and Flood Prevention Act (16 U.S.C. 1001-1008); and

Whereas, the responsibility for administration of the Watershed Protection and Flood Prevention Act, as amended, has been assigned by the Secretary of Agriculture to the Soil Conservation Service (SCS); and

Whereas, there has been developed through the cooperative efforts of local organizations and SCS this plan for works of improvement for the Bois d'Arc Bayou Watershed, State of Arkansas:

Now, therefore, in view of the foregoing considerations, the Secretary of Agriculture, through the Soil Conservation Service, and the Sponsors hereby agree on this plan and that the works of improvement for this project will be installed, operated, and maintained in accordance with the terms, conditions, and stipulations provided for in this watershed plan and including the following:

1. The Sponsors will acquire, with other than PL 566 funds, such land rights as will be needed in connection with the works of improvement. (Estimated Cost \$95,000.)
2. The Sponsors assure that comparable replacement dwellings will be available for individuals and persons displaced from dwellings, and will provide relocation assistance advisory services and relocation assistance, make the relocation payments to displaced persons, and otherwise comply with the real property acquisition policies contained in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646, 84 Stat. 1894) effective as of January 2, 1971, and the Regulations issued by the Secretary of Agriculture pursuant thereto. The costs of relocation payments will be shared by the Sponsors and SCS as follows:

	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Relocation Payment Costs</u> (dollars)
Relocation Payments	28.9	71.1	0 <sup>1/</sup>

1/ Investigation has disclosed that under present conditions the project measures will not result in the displacement of any person, business, or farm operation. However, if relocations become necessary, relocation payments will be cost shared in accordance with the percentages shown.

3. The Sponsors will acquire or provide assurance that landowners or water users have acquired such water rights pursuant to state law as may be needed in the installation and operation of works of improvement.

4. The percentages of construction costs to be paid by the Sponsors and by SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Construction Costs</u> (dollars)
Channel Work	7.1	92.9	380,700
Associated Onfarm Measures	100	0	41,660

5. The percentages of the engineering costs to be borne by the Sponsors and SCS are as follows:

<u>Works of Improvement</u>	<u>Sponsors</u> (percent)	<u>SCS</u> (percent)	<u>Estimated Engineering Costs</u> (dollars)
Channel Work	0	100	34,100
Associated Onfarm Measures	0	100	8,000

6. The Sponsors and SCS will each bear the costs of Project Administration which it incurs, estimated to be \$1,700 and \$71,400, respectively.

7. The Sponsors will provide assistance to landowners and operators to assure the installation of the resource management systems shown in the watershed plan.

8. The Sponsors will encourage landowners and operators to operate and maintain the resource management systems and associated onfarm measures for the protection and improvement of the watershed.



9. The Sponsors will be responsible for the operation, maintenance, and replacement of the works of improvement by actually performing the work or arranging for such work in accordance with agreements to be entered into prior to issuing invitations to bid for construction work.

10. The costs shown in this plan represent preliminary estimates. In finally determining the costs to be borne by the parties hereto, the actual costs incurred in the installation of works of improvement will be used.

11. This agreement is not a fund obligating document. Financial and other assistance to be furnished by SCS in carrying out the plan is contingent upon the fulfillment of applicable laws and regulations and the availability of appropriations for this purpose.

12. A separate agreement will be entered into between SCS and the Sponsors before either party initiates work involving funds of the other party. Such agreements will set forth in detail the financial and working arrangements and other conditions that are applicable to the specific works of improvement.

13. This plan may be amended, revised, or terminated only by mutual agreement of the parties hereto except that SCS may terminate financial and other assistance in whole, or in part, at any time it determines that the Sponsors have failed to comply with the conditions of this agreement. In this case, SCS shall promptly notify the Sponsors, in writing, of the determination and the reasons for the termination, together with the effective date. Payments made to the Sponsors or recoveries by SCS under projects terminated shall be in accord with the legal rights and liabilities of the parties.

14. No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this plan, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

15. The program conducted will be in compliance with all requirements respecting nondiscrimination as contained in the Civil Rights Act of 1964, as amended, and the regulations of the Secretary of Agriculture (7 CFR 15.1-15.12), which provide that no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any activity receiving federal financial assistance.



Bois d'Arc Bayou Improvement District

By \_\_\_\_\_

Title \_\_\_\_\_

Address \_\_\_\_\_ Zip Code \_\_\_\_\_

Date \_\_\_\_\_

The signing of this plan was authorized by a resolution of the governing body of the \_\_\_\_\_ adopted at a meeting held on \_\_\_\_\_

\_\_\_\_\_

Address \_\_\_\_\_ Zip Code \_\_\_\_\_

Date \_\_\_\_\_

Little River Conservation District

By \_\_\_\_\_

Title \_\_\_\_\_

Address \_\_\_\_\_ Zip Code \_\_\_\_\_

Date \_\_\_\_\_

The signing of this plan was authorized by a resolution of the governing body of the \_\_\_\_\_ adopted at a meeting held on \_\_\_\_\_

\_\_\_\_\_

Address \_\_\_\_\_ Zip Code \_\_\_\_\_

Date \_\_\_\_\_

Appropriate and careful consideration has been given to the environmental impact statement prepared for this project and to the environmental aspects thereof.

Soil Conservation Service

United States Department of Agriculture

Approved by:

\_\_\_\_\_  
M. J. Spears  
State Conservationist

\_\_\_\_\_  
Date



APPENDIX B

DISPLAY OF ACCOUNTS FOR SELECTED ALTERNATIVE

National Economic Development Account

Environmental Quality Account

Regional Development Account

Social Well-Being Account



SELECTED ALTERNATIVE

NATIONAL ECONOMIC DEVELOPMENT ACCOUNT

Bois d'Arc Bayou Watershed, Arkansas

Measures of Effects  
(Average Annual) 1/2/

Components

Measures of Effects  
(Average Annual) 1/2/

Components

Beneficial effects:

A. The value to users of increased outputs of goods and services:

1. Flood Prevention	\$ 66,070
2. Drainage	9,940
3. Utilization of underemployed labor sources	
a. Project construction	<u>8,140</u>

Total beneficial effects . . . . . \$ 84,150

Net beneficial effects . . . . . 27,690

Adverse effects:

A. The value of resources required for a plan:

1. Channel work and associated onfarm measures	
Project installation	\$46,400
OM&R	4,000
2. Project administration	<u>6,060</u>

Total adverse effects . . . . . \$56,460

NOTE: Land treatment beneficial effects were not evaluated. Land treatment costs are \$73,690.

1/ 25 years @ 6-5/8 percent interest.

2/ Price Base: Crop and pasture current normalized prices; all other 1977 prices.





SELECTED ALTERNATIVE  
ENVIRONMENTAL QUALITY ACCOUNT  
Bois d'Arc Bayou, Arkansas

Components

Measures of Effects

Beneficial and adverse effects:

A. Areas of natural beauty.

1. Convert 4.6 miles of ephemeral streams with no channel and 0.8 mile of natural intermittent streams to man-made channels.
2. Replace 52 acres of bottomland hardwood with channel right-of-way.

B. Quality consideration of water, land, and air.

1. Reduce present suspended sediment load of the stream by 10 percent.
2. Reduce average gross erosion by 15 percent by applying conservation cropping systems and crop residue management on 450 acres of cropland.
3. Conversion of 45 acres of prime farmland to channels. Improved productivity on 3,918 acres of prime farmland used for cropland and pastureland.

C. Biological resources and selected ecosystems.

1. Decrease Type 1 wetland by 16 acres.
2. Preserve 20 acres of Type 5 wetlands.
3. Loss of stream pool areas along 0.8 mile of intermittent stream.
4. Conversion of 197 acres of forest land wildlife habitat to openland wildlife habitat.
5. Replace natural vegetation on 200 acres of native pasture with improved pasture grasses.

D. Irreversible or irretrievable commitments.

1. Loss of 197 acres of forest land wildlife habitat which will be converted to channel and corresponding right-of-way and cropland.
2. Loss of 16 acres of Type 1 wetland.

SELECTED ALTERNATIVE  
REGIONAL DEVELOPMENT ACCOUNT  
BOIS D'ARC BAYOU WATERSHED  
ARKANSAS

	Measures of effects State of Arkansas	Rest of Nation
<u>Components</u>	<u>Components</u>	
Income:	(average annual) 1/ 2/	
<b>Beneficial effects:</b>		
A. The value of increased output of goods and services to users in the region		
1. Flood prevention	\$66,070	-
2. Drainage	9,940	-
3. The utilization of regional unemployed or underemployed resources		
a. Project construction and OH&R	8,140	-
B. The value of output to users residing in the region from pecuniary external economics		
1. Indirect activities associated with increased net returns from flood prevention and drainage	15,590	-
<b>Total beneficial effects</b>	<b>99,740</b>	<b>-</b>
<b>Adverse effects:</b>		
A. The value of resources contributed from within the region to achieve the outputs		
1. Channel work and associated onfarm measures	\$13,900	32,500
Project installation OM&R	4,000	-
2. Project administration	140	5,920
<b>Total adverse effects</b>	<b>18,040</b>	<b>38,420</b>
<b>Net beneficial effects</b>	<b>81,700</b>	<b>-38,420</b>

1/ 25 years @ 6-5/8 percent interest.

2/ Price Base: Crop and pasture current normalized; all other 1977 prices.

SELECTED ALTERNATIVE  
 REGIONAL DEVELOPMENT ACCOUNT (CONTINUED)  
 BOIS d'ARC BAYOU WATERSHED  
 ARKANSAS

<u>Components</u>	<u>State of Arkansas</u>	<u>Measures of Effects</u>	<u>Rest of Nation</u>
A. Employment			
Beneficial effects:			
1. Increase in the number and types of jobs			
a. Agricultural Employment		Utilization of 5 man-years of employment in agricultural production	-
b. Employment for project construction		15 semi-skilled jobs for 3 years	-
c. Employment for project OM&R		0.5 permanent semi-skilled jobs	-
d. Employment in induced activities		14.5 permanent semi-skilled jobs	-
Total beneficial effects		20 permanent semi-skilled jobs 15 semi-skilled jobs for 3 years	- -
Adverse effects:			-
Population Distribution			
Beneficial effects:		Creates 20 permanent semi-skilled jobs and 15 semi-skilled jobs for 3 years in a rural area that showed a steady population decline of 57.8 percent from 1940-1960 and an increase of 21.5 percent from 1960-1970.	
Adverse effects:			-

SELECTED ALTERNATIVE  
 REGIONAL DEVELOPMENT ACCOUNT (CONTINUED)  
 BOIS d'ARC BAYOU WATERSHED  
 ARKANSAS

<u>Components</u>	<u>Measures of Effects</u>	<u>Rest of Nation</u>
B. Regional Economic Base and Stability		
Beneficial effects:		
	1. The installation of structural measures will result in a 78 percent reduction in average annual flood damages and provide drainage benefits in an area where agriculture is the economic mainstay.	-
	2. The project creates 20 permanent semi-skilled jobs and 15 semi-skilled jobs for 3 years. The unemployment rate for the area is 7.5 percent. Families receiving less than poverty level incomes is 23.9 percent. The county is eligible for public works grants and business loans under Title IV of the Economic Development Act of 1965.	-
	3. The general flow of goods and services within the benefited area and economic activity will stabilize and improve. Transportation links will be interrupted less frequently.	-
Adverse effects		-

SELECTED ALTERNATIVE

SOCIAL WELL-BEING ACCOUNT

Bois d'Arc Bayou Watershed, Arkansas

Components

Measures of effects

Beneficial and adverse effects:

A. Real income distribution

1. Creates a net of 35 low to medium income jobs for area residents. There will be 20 permanent semi-skilled jobs. There will be 15 semi-skilled jobs for 3 years.
2. Create regional income benefit distribution of \$99,740. Data needed to determine distribution by income class is not readily available.
3. Local costs to be borne by the region total \$18,040. Data needed to determine distribution by income class is not readily available.

B. Life, health and safety

1. Provides a 78 percent level of flood protection. Provides drainage benefits. There are 48 farms in the benefited area. Land in benefited area is valued at \$300 per acre.
2. Knowledge of the protection afforded by the project will give the residents a greater sense of security.




APPENDIX C

Letters of Comment Received on Draft Plan  
and Environmental Impact Statement.







DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE  
CENTER FOR DISEASE CONTROL  
ATLANTA, GEORGIA 30333  
TELEPHONE: (404) 633-3311

September 27, 1978

Mr. M. J. Spears  
State Conservationist  
U. S. Department of Agriculture  
Soil Conservation Service  
Post Office Box 2323  
Little Rock, Arkansas 72203

Dear Mr. Spears:

We have reviewed the Watershed Plan and Environmental Impact Statement for Bois d'Arc Bayou Watershed, Little River County, Arkansas. We are responding on behalf of the Public Health Service.

While we commend the author's intent to be brief, we feel this attempt at brevity has created some serious omissions which are needed for a thorough analysis of the EIS. For example, a location map with more detail should be included to aid the reviewers in pinpointing the affected area. The map provided on page 75 only shows Little River County. A regional map showing the interrelationship between the project and surrounding counties, Millwood Lake, Little River, and other related information is needed. A map showing very clearly those areas affected by each alternative and the extent of those effects would also be quite useful.

It is noted from the list of agencies furnished review copies of the draft EIS that the Arkansas Department of Health and the local health department were omitted. These agencies should be requested to offer comments before the final EIS is prepared.

The draft EIS is either inaccurate or else takes credit for a rejected alternative in the "Favorable Impacts Section" on page 2, item 4. It is stated that flooding damages will be reduced 78 percent. In fact, this is the benefit of alternative 1 which was rejected. The chosen alternative 3 only claims to reduce flooding 73 percent as noted in the table on page 12.

Other apparent inaccuracies occur in the brief discussion of the alternatives. Favorable impact 7 on page 2 states 3,918 acres will be improved. The table on page 12 shows only 3,018 acres of prime agricultural land will have increased crop production, 500 existing acres of pasture will be improved and 250 additional acres of farm land will be added. These together only total 3,768 acres.

On page 9, in paragraph 2, we take exception to the philosophy expressed and feel it violates the intent of the EIS process. All feasible alterna-

tives should be discussed, a preferred alternative chosen, and the reasons for choosing that alternative discussed in the statement.

In paragraph 2 on page 25, it is stated that the project "will result in the additional conversion of 145 acres of forest land to cropland." Why must forest land be cleared and the land converted to crops for drainage control? This conversion will contribute to increased stream sediment and may result in increased use of agricultural chemicals which may in turn enter the water runoff. The potential effects of these agricultural chemicals downstream from the newly cleared land, as well as the chemicals from the other lands which would now become suitable for farming, are not mentioned.

The report does not consider all economic impacts by the project. On page 38 under transportation impacts, it is mentioned that "bridges will require modification due to channel work." No discussion is provided on the bridges other than stating that "the county judge has been informed of such modifications." What effect does bridge modification have on cost-benefit ratios? What additional environmental impacts will arise from bridge construction and modifications?

On page 40, Millwood Lake is mentioned. It appears that some of the flooding problems are caused by the Corps of Engineers' lake above the drainage basin. A discussion of the relationship of water discharged from this lake upon the watershed should be included in the final EIS. To what degree does this water cause flooding in the Bois d'Arc Watershed? Can flooding be controlled in the watershed without extensive work through a better control of Millwood Lake discharges?

A discussion of the sources of flood waters is lacking. Obviously, some portion of the flooding comes from rainfall. Is the flooding coming from rain falling on the watershed itself or are there sources other than the Millwood Lake discharge to the watershed?

Further, wetlands often provide valuable storage until the water can be carried on downstream. A discussion should be included on the downstream effects of the channel modifications. What problems will be created downstream by increased runoff flows from the Bois d'Arc Bayou Watershed?

From a potential vectorborne disease standpoint, drainage improvements such as this can be beneficial to mosquito control because larval mosquito habitats found in stream beds during periods of reduced flow are eliminated by the drainage improvements. No discussion has been provided to indicate whether mosquitoes are a problem in the watershed.

Page 3 - Mr. M. J. Spears

Thank you for the opportunity to comment on this draft. Please furnish this office three copies of the final EIS when it is completed.

Sincerely yours,

A handwritten signature in cursive script that reads "Frank S. Lisella". The signature is written in dark ink and is positioned above the typed name.

Frank S. Lisella, Ph.D.  
Chief, Environmental Affairs Group  
Environmental Health Services Division  
Bureau of State Services



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

PEP ER 78/750

OCT 18 1978

Mr. M. J. Spears  
State Conservationist  
Soil Conservation Service  
Department of Agriculture  
Post Office Box 2323  
Little Rock, Arkansas 72203


Dear Mr. Spears:

Thank you for the letter of August 4, 1978, requesting our views and comments on the draft environmental statement and watershed plan for Bois d'Arc Bayou Watershed, Little River County, Arkansas. We have reviewed the proposal and conclude the document adequately considers those areas within our jurisdiction and expertise.

We note that the draft statement does not discuss impacts on minerals. Apparently no mineral investigation was made of the project area. However, we believe that the watershed improvements should have only minimal impacts on the mineral resource base. For example, terrace and alluvial gravels are found in the area, but they are abundant in this part of Arkansas. Further, we know of no active mineral development or pipeline crossing in the watershed area that might be affected by the project.

We appreciate the opportunity to comment on this proposal.

Sincerely,



Larry E. Meierotto

~~Deputy Assistant Secretary~~ SECRETARY



UNITED STATES DEPARTMENT OF COMMERCE  
The Assistant Secretary for Science and Technology  
Washington, D.C. 20230  
(202) 377-3111 4335

September 15, 1978


Mr. M. J. Spears  
State Conservationist  
P.O. Box 2323  
Little Rock, Arkansas 72203

Dear Mr. Spears:

This is in reference to your draft environmental impact statement entitled "Bois d'Arc Bayou Watershed." The enclosed comments from the National Oceanic and Atmospheric Administration are forwarded for your consideration.

Thank you for giving us an opportunity to provide these comments, which we hope will be of assistance to you. We would appreciate receiving five (5) copies of the final statement.

Sincerely,

  
Sidney R. Galler  
Deputy Assistant Secretary  
for Environmental Affairs

Enclosure: Memo from Mr. Douglas LeComte, NOAA/EDS



SEP 8 1978

UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
ENVIRONMENTAL DATA SERVICE  
Washington, D.C. 20235

September 5, 1978

TO: A/PP - William Aron

FROM: OA/Dx61 - Douglas LeComte *Douglas LeComte*

SUBJECT: DEIS 7808.10 - Bois d'Arc Bayou Watershed, AR

Page 5: Though the primary aim of the project is flood control, the climatic discussion in the impact statement gives little information about the rainfall events which cause flooding. An assessment of the type, duration, and frequency of storms which contribute to the problem should be given, and data on extreme rainfall events associated with flooding would also be helpful.

Climatological data are available at the National Climatic Center, Asheville, NC 28801.



Advisory Council on  
Historic Preservation  
1522 K Street N.W.  
Washington, D.C. 20005

August 28, 1978

Mr. M. J. Spears  
State Conservationist  
Soil Conservation Service  
P. O. Box 2323  
Little Rock, Arkansas 72203

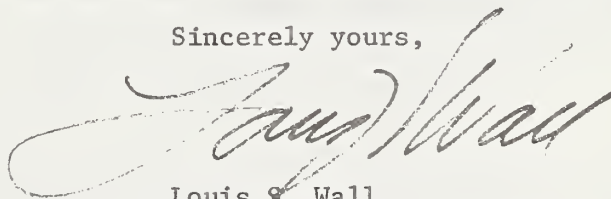
Dear Mr. Spears:

This is in response to your request of August 4, 1978, for comments on the draft environmental statement (DES) for the Bois d'Arc Bayou Watershed, Little River County, Arkansas.

The Council has reviewed the DES and notes that the Soil Conservation Service has determined that the proposed undertaking will not affect properties included in or eligible for inclusion in the National Register of Historic Places. Accordingly, the Council has no further comment to make at this time. It is suggested, however, that the final environmental statement contain the Arkansas State Historic Preservation Officer's concurrence in SCS's determination of no effect.

Should you have any questions or require additional information regarding this matter, please contact Michael H. Bureman of the Council staff at P. O. Box 25085, Denver, Colorado 80225, or at (303) 234-4946, an FTS number.

Sincerely yours,



Louis S. Wall  
Assistant Director, Office of  
Review and Compliance, Denver



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING  
1201 ELM STREET  
DALLAS, TEXAS 75270

August 9, 1978

Mr. M. J. Spears  
State Conservationist  
U.S. Dept. of Agriculture  
Soil Conservation Service  
P.O. Box 2323  
Little Rock, Arkansas 72203

Dear Mr. Spears:

On July 20, 1978, we originally commented on the preliminary statement of the proposed Bois d' Arc Bayou Watershed, inadvertently thinking it was the official statement. However, since we find no change in our view in the official statement, our comments remain as forwarded on July 20, 1978.

Thank you for your cooperation.

Sincerely,

*Clinton B. Spotts*  
Clinton B. Spotts  
Regional EIS Coordinator (6ASAF)





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FIRST INTERNATIONAL BUILDING  
1201 ELM STREET  
DALLAS, TEXAS 75270

July 20, 1978

Mr. M. J. Spears  
State Conservationist  
U.S. Department of Agriculture  
Soil Conservation Service  
P.O. Box 2323  
Little Rock, Arkansas 72203

Dear Mr. Spears:

We have reviewed the Draft Environmental Impact Statement (EIS) on the proposed Bois d' Arc Bayou watershed in Little Rock County, Arkansas, ten miles north of Texarkana, Arkansas. This project is for watershed protection, flood prevention, and drainage. The project will be implemented under authority of the Watershed Protection and Flood Prevention Act (Public Law 566, 83rd Congress, 68 Statute 666), as amended. The project consists of land treatment, 7.6 miles of channel work, 19.7 miles of associated on-farm measures, and a water level control structure. The channel work will involve 0.1 mile of new channel construction, and 5.3 miles of channel enlargement by excavation. Investigations indicated that the only practical means of reducing flooding and improving drainage was through channel work and an on-farm drainage system.

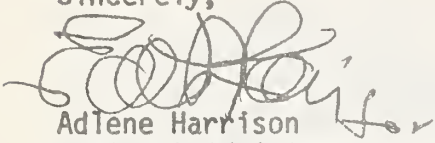
The project area was divided into four major categories: crop land - 2603 acres, pasture land - 2,012 acres, forest land - 5,536 acres, and 389 acres of other land. When completed, a total of approximately 10,540 acres will receive direct benefit from project measures.

We classify your Draft Environmental Impact Statement as LO-1. Specifically, we have no objections to the project as it relates to Environmental Protection Agency's (EPA) legislative mandates. The statement contained sufficient information to evaluate adequately the possible environmental impacts which could result from project implementation. Our classification will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the enclosure. Our procedure is to categorize the EIS on both the environmental consequences of the proposed action and on the adequacy of the Impact Statement at the draft stage, whenever possible.

We appreciated the opportunity to review the Draft Environmental Impact Statement. Please send our office two copies of the Final Environmental Impact Statement at the same time it is sent to the Office of Federal Activities, U. S. Environmental Protection Agency, Washington, D. C.

Sincerely,

A handwritten signature in cursive script, appearing to read "Adlene Harrison".

Adlene Harrison  
Regional Administrator (6A)

Enclosure

## ENVIRONMENTAL IMPACT OF THE ACTION

### LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

### ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

### EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

## ADEQUACY OF THE IMPACT STATEMENT

### Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

### Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

### Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make a determination.



STATE OF ARKANSAS  
DEPARTMENT OF LOCAL SERVICES

SUITE 900 • FIRST NATIONAL BUILDING  
LITTLE ROCK 72201

DAVID PRYOR  
GOVERNOR

RONALD R. COPELAND  
DIRECTOR

November 27, 1978

M. J. Spears  
State Conservationist  
Soil Conservation Service  
P. O. Box 2323  
Little Rock, AR 72203

REC'D	3	RO
Spears	1	
Davis		
Presley		
Clark		
*Dennis		
Edwards		
Canirell		
Russell		
Peters		
McGrew		
Wilson		
File		
*Action by:		

RE: EIS 0161 Watershed Plan & EIS for Bois D'Arc Bayou  
Watershed

Dear Mr. Spears:

The State Planning and Development Clearinghouse is in receipt of the above referenced environmental assessment pursuant to the State of Arkansas Project Notification and Review System.

To carry out the review and comment process, this office has notified state agencies and interested organizations. Comments where appropriate are attached.

The State Clearinghouse wishes to thank you for your cooperation in the Project Notification and Review System.

Sincerely,

Randy McNair, Director  
State Clearinghouse

RMc/JS/vp  
Enclosures  
cc: Jon Sweeney



ARKANSAS  
SOIL AND WATER  
CONSERVATION  
COMMISSION

1818 West Capitol ■ Building A ■ Little Rock, Arkansas 72202

John P. Saxton  
Director

Ph. 501 371-1611

October 25, 1978

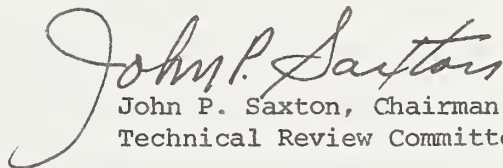
Mr. M. J. Spears  
State Conservationist  
Soil Conservation Service  
P. O. Box 2323  
Little Rock, Arkansas 72203

Re: Watershed Plan and EIS for Bois d'Arc Bayou Watershed

Dear Mr. Spears:

Review by the Technical Review Committee of the cited document has been completed. It was the consensus of the Committee that no significant adverse impact upon the environment would result from installation of the proposed project. Implementation of the Bois d'Arc Watershed plan would be in the best interest of the local area and the State. Comments made by the Pollution Control Commission, the Game and Fish Commission and the Archeological Survey are enclosed and should be considered.

Sincerely,

  
John P. Saxton, Chairman  
Technical Review Committee

JPS:JRY:JRS:mrg

Enclosures

DEPARTMENT OF POLLUTION CONTROL & ECOLOGY

MEMORANDUM

TO: John Saxton T.H.

FROM: Trusten Holder

DATE: October 19, 1978

SUBJECT: Watershed Plan and Environmental Impact Statement for Bois d' Arc Bayou Watershed

We can certify that this project will not violate the water quality criteria as established by this Department for the State of Arkansas. I am submitting, however, some recommendations which do not pertain to water quality. These recommendations, if adopted, would add substantially to the protection of the interests of the general public (who will be paying for most of out of the pocket costs) and also to the protection of environmental qualities:

1. The last 2 sentences of the first paragraph which refer to the 20 acres of Type 5 wetlands in Bear Lake and the 40 acres of cropland that will be flooded for waterfowl during the winter is as follows: "The Bois d'Arc Improvement District will be responsible for regulating the lake level and for obtaining 60 acres of easements needed for insuring that the structure will function as planned. Access to Bear Lake for hunting and fishing purposed will be controlled by the landowner."

The access to hunting and fishing on Bear Lake should be thrown open to use by the general public or turned over to the Game and Fish Commission as a management area.

2. A sentence in the middle of page 35 states, "Approximately 408 acres of bottomland hardwood wildlife habitat of moderate quality will remain after project installation."

This statement is only an estimate and there is no guarantee that a single acre of it will remain as woodlands. Perpetual easements should be obtained to assure that these wooded acres do remain wooded and that all of it be kept open to hunting and fishing by the general public.

3. The 4th paragraph on page 15 states that channel construction areas will be revegetated with grasses, legumes, and shrubs which will provide food and cover for wildlife. Grasses and legumes have considerable value for erosion control but, considering their availability in other areas, they possess very little value for wildlife in situations of this type. The establishment of trees and shrubs which do possess exceptional values for wildlife, such as sweet pecan and everbearing mulberry, would add wildlife values worth working for and would add a degree of permanency impossible to achieve with grasses and legumes.

jb

cc: Randy McNair

JUL 17 1978

SOIL AND WATER  
CONSERVATION COMMISSION

SOIL AND WATER  
CONSERVATION COMMISSION

ARKANSAS GAME AND FISH COMMISSION  
July 13, 1978

TO	INITIAL
SAXTON	JPS
YOUNG	
BYNUM	
EVANS	
GIBSON	
MCNEELY	
EVANS	
GIBSON	
NYITRAI	
BURNETT	
COLFORD	
EYE	
FILE	

MEMORANDUM TO: John P. Saxton, Chairman  
Technical Review Committee

FROM: Richard W. Broach, Member  
Technical Review Committee

SUBJECT: Watershed Plan and EIS for Bois d'Arc Bayou Watershed

Biologists of the U. S. Fish & Wildlife Service and this agency have made habitat evaluation tours of this watershed and concur that there is little significant wildlife habitat in the project area and the losses of wildlife resources which result from construction activities will be negligible.

For purposes of clarification, we ask the following questions:

On page 2, under V. Summary of Impacts, Adverse Impacts 4. - How will there be a gain in open land wildlife habitat? Is the open land gained to be managed for wildlife? If the open land gained is to be used as pasture or other agricultural use, then wildlife benefits should not be claimed.

Page 4, next to last paragraph, the sentence which reads: "The major problem area is located in the flood plain of Bois d'Arc Bayou where frequent flooding and drainage problems cause agricultural crop losses." Although the acreage in the flood plain isn't given in the EIS, it must be relatively small as compared to the 10,540 acre watershed. It would seem that proper management of the flood plain may be a viable alternative to the expensive and destructive engineering scheme. Certainly, one could logically expect to have flooding problems in a flood plain. Flood plains, though risky for agricultural use, are extremely productive in timber and wildlife resources and, if dedicated to such use, there would be no economic losses when flooding occurs.

RWB:DGC:ac

cc: U. S. Fish & Wildlife Service,  
Vicksburg

REC'D /	ROUTE
Spears	<i>[Handwritten initials]</i>
Davis	
Presley	
Clark	
*Dennis	<i>[Handwritten initials]</i>
Edwards	
Contrell	<i>[Handwritten initials]</i>
Russell	
Peters	
McGrew	
Wilson	
File	<i>[Handwritten signature]</i>
*Achan J...	

**TO:** Mr. John P. Saxton, Chairman  
 Technical Review Committee

**FROM:** Hester A. Davis, State Archeologist

**DATE:** August 28, 1978

**RE:** Draft Watershed Plan and Environmental Impact Statement for  
 Bois d'Arc Bayou Watershed

On page 36 of the EIS is a discussion of the archeological resources present in Bois d'Arc Bayou Watershed. The procedures that will be followed if archeological resources are endangered are itemized: project personnel will avoid known archeological sites and restrict use of heavy equipment at them, watch for buried archeological sites which may be exposed during construction, notify the Arkansas Archeological Survey when construction begins and of any sites exposed, and take steps to determine the significance of any sites exposed during construction. These procedures should adequately protect the cultural resources in the watershed.

**HAD/lcm**

**cc:** State Planning and Development Clearinghouse  
 State Historic Preservation Officer  
 Soil Conservation Service  
 Frank Schambach





ARKANSAS HISTORIC PRESERVATION PROGRAM

10, Continental Building - Markham and Main - Little Rock, Arkansas 72201

Phone: (501) 371-2763

October 17, 1978

Mr. M. J. Spears  
State Conservationist  
Soil Conservation Service  
P. O. Box 2323  
Little Rock, AR 72203

Re: Draft Environmental Impact Statement  
for Bois d'Arc Bayou Watershed  
(Little River County)

Dear Mr. Spears:

I concur in the conclusion in the August, 1978, Draft Environmental Impact Statement on the Bois d'Arc Bayou Watershed project that there will be no effect on properties included in or eligible for inclusion in the National Register. I also concur in the State Archeologist's statement of August 28, 1978, that the measures provided in the Draft Environmental Impact Statement will adequately protect archeological resources which might be discovered as the work progresses.

Sincerely,

*Barbara Woodard*

Anne Bartley  
State Historic Preservation Officer

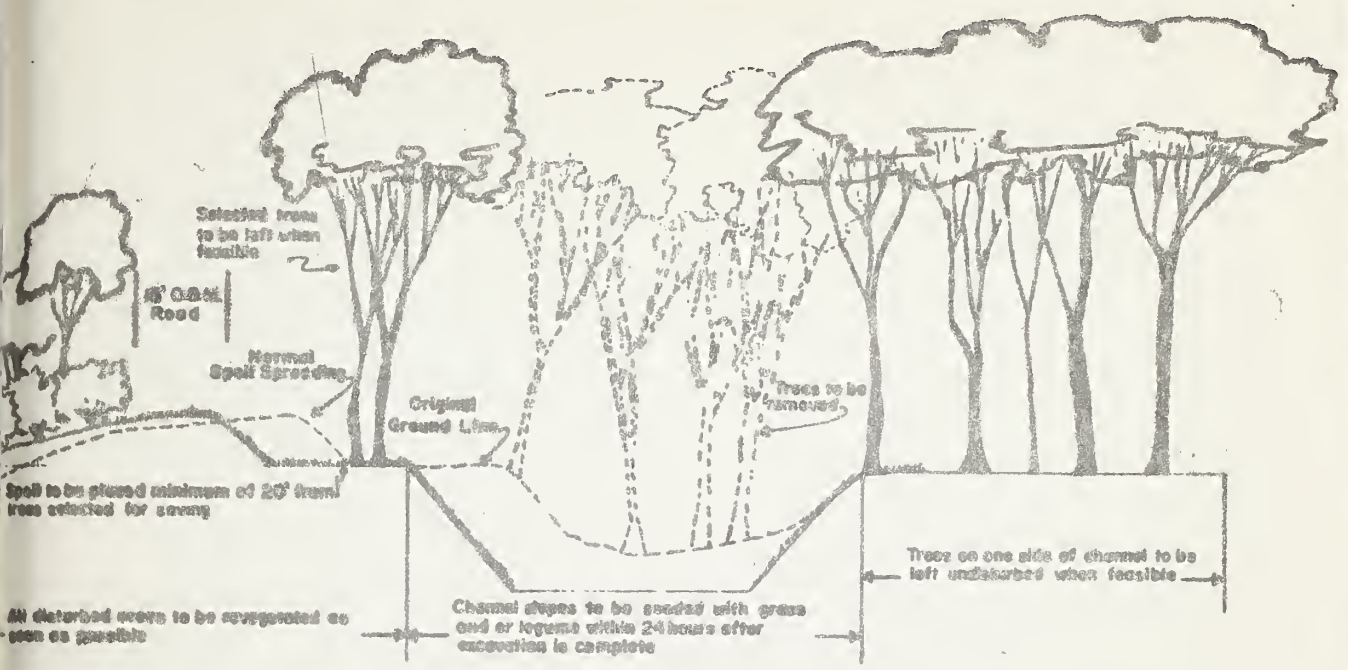
AB/JD/lg



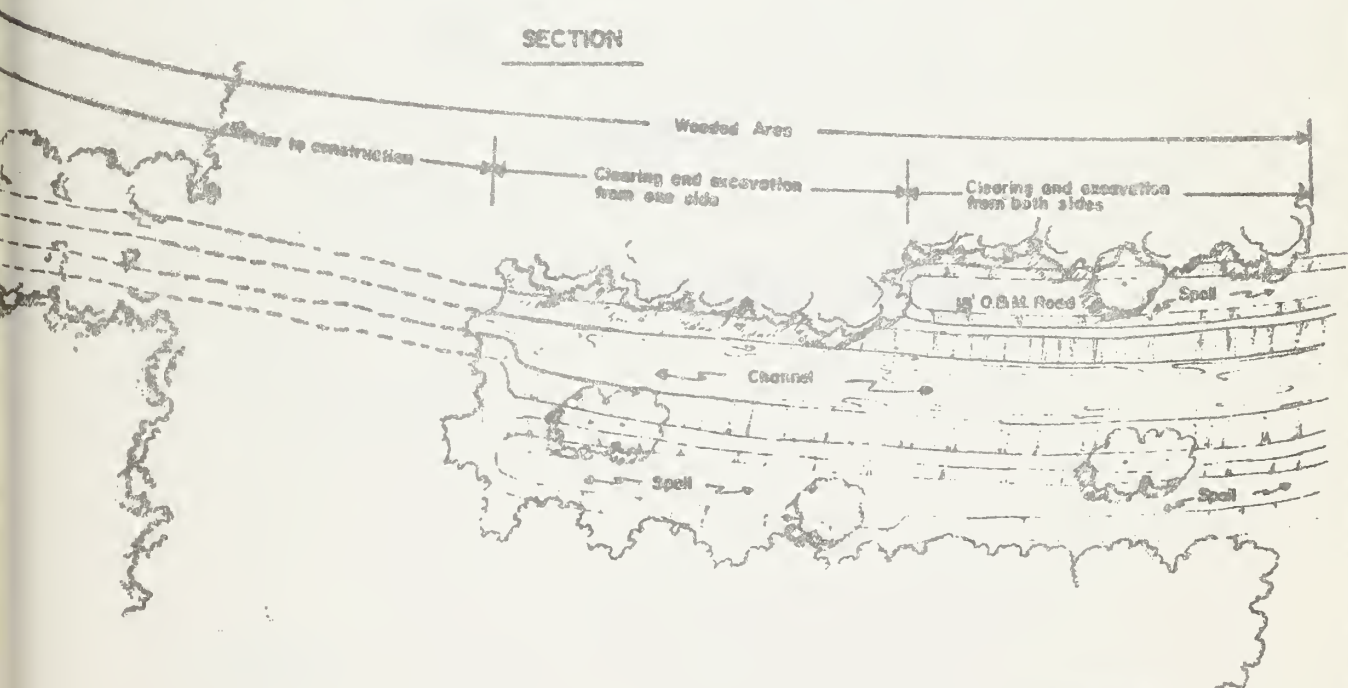
APPENDIX D

Typical Channel Modifications





**SECTION**



**PLAN**

**APPENDIX D**

**TYPICAL LANDSCAPE PLAN FOR CHANNEL MODIFICATION**

**U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE**

Project No.	Date	Approved by
Drawn		Title
Checked		Date
Reviewed	Sheet	Drawing No.
	No.	
	of	



APPENDIX E

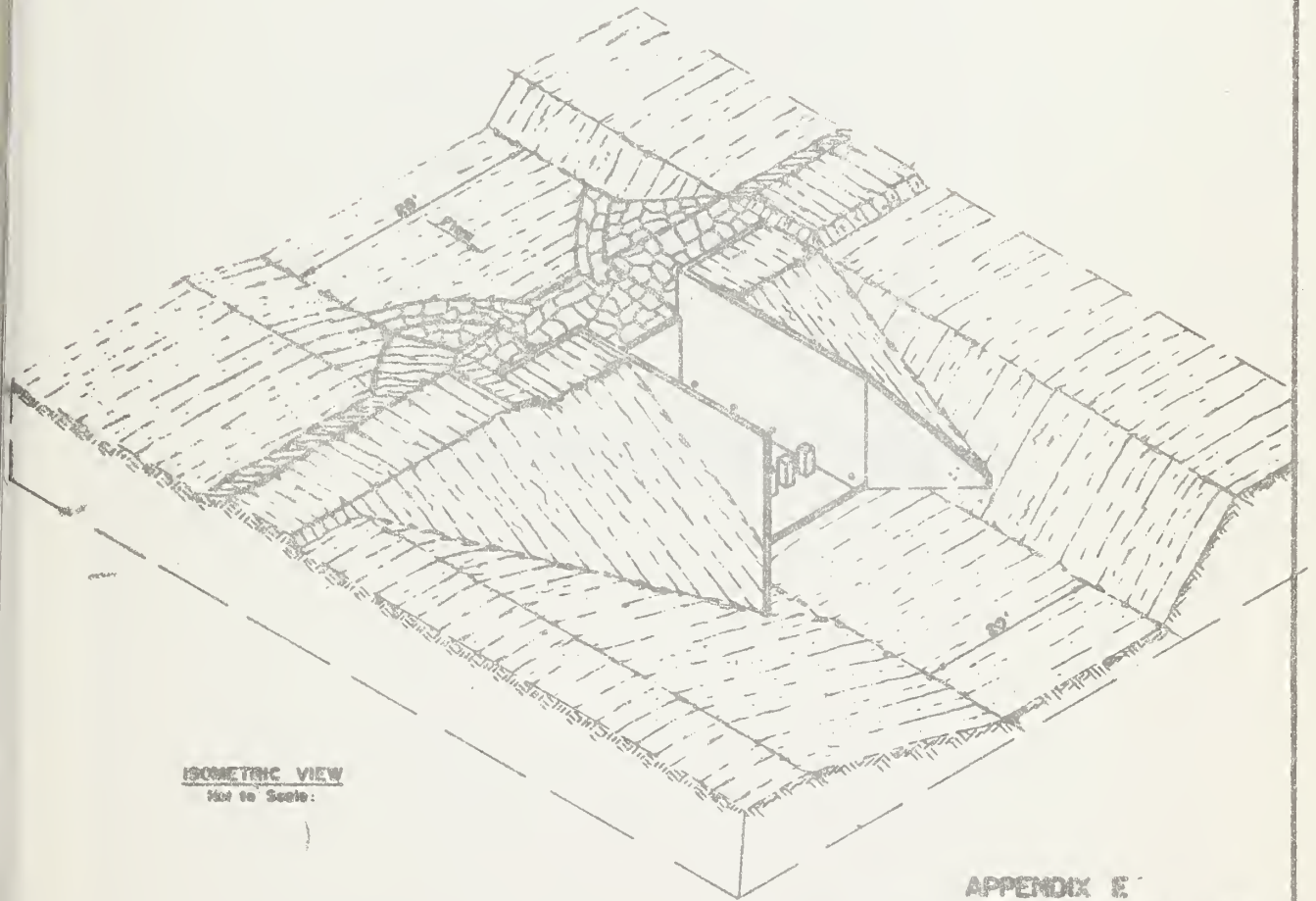
TYPICAL "TYPE C" GRADE CONTROL STRUCTURE







TYPICAL SECTION - BONE



ISOMETRIC VIEW  
Not to Scale.

APPENDIX E

TYPICAL  
GRADE CONTROL STRUCTURE

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

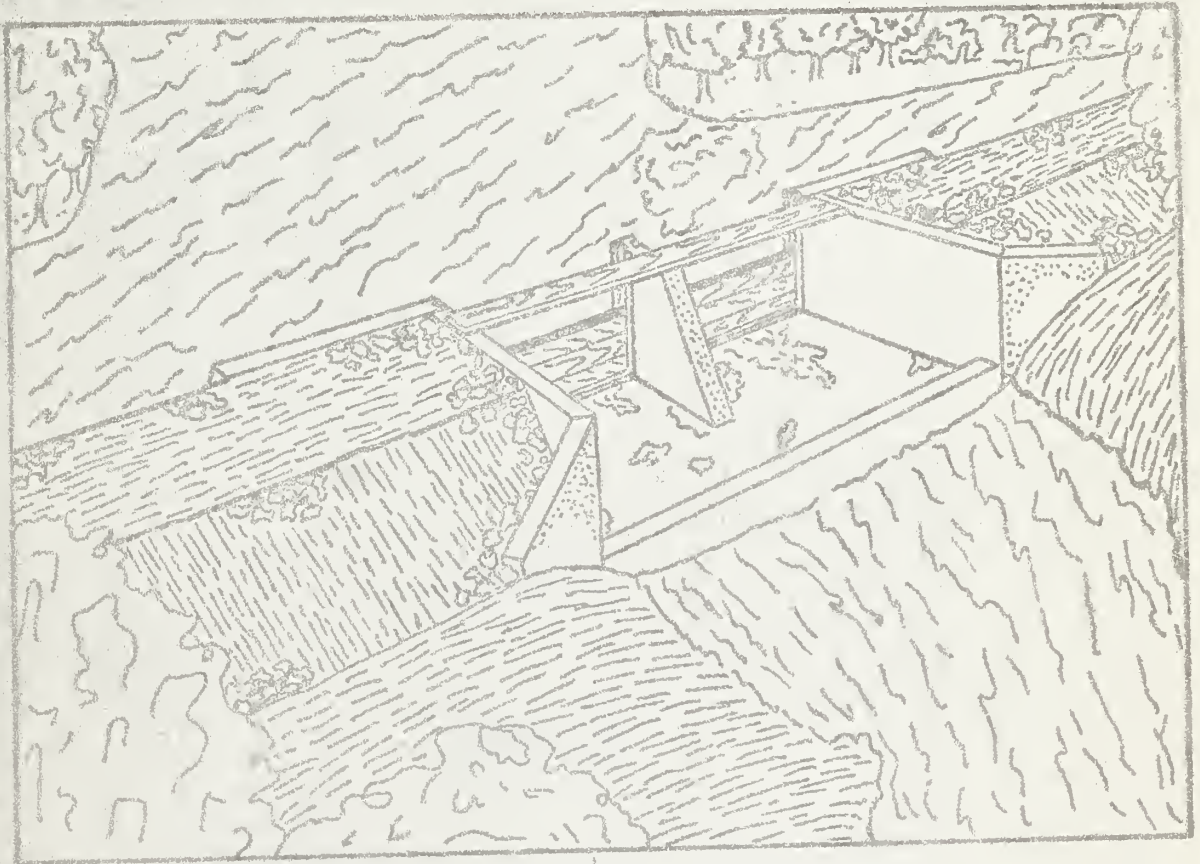
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APPENDIX F

TYPICAL WATER-LEVEL CONTROL STRUCTURE





APPENDIX F

TYPICAL STOPLOG TYPE WATER CONTROL STRUCTURE



APPENDIX G

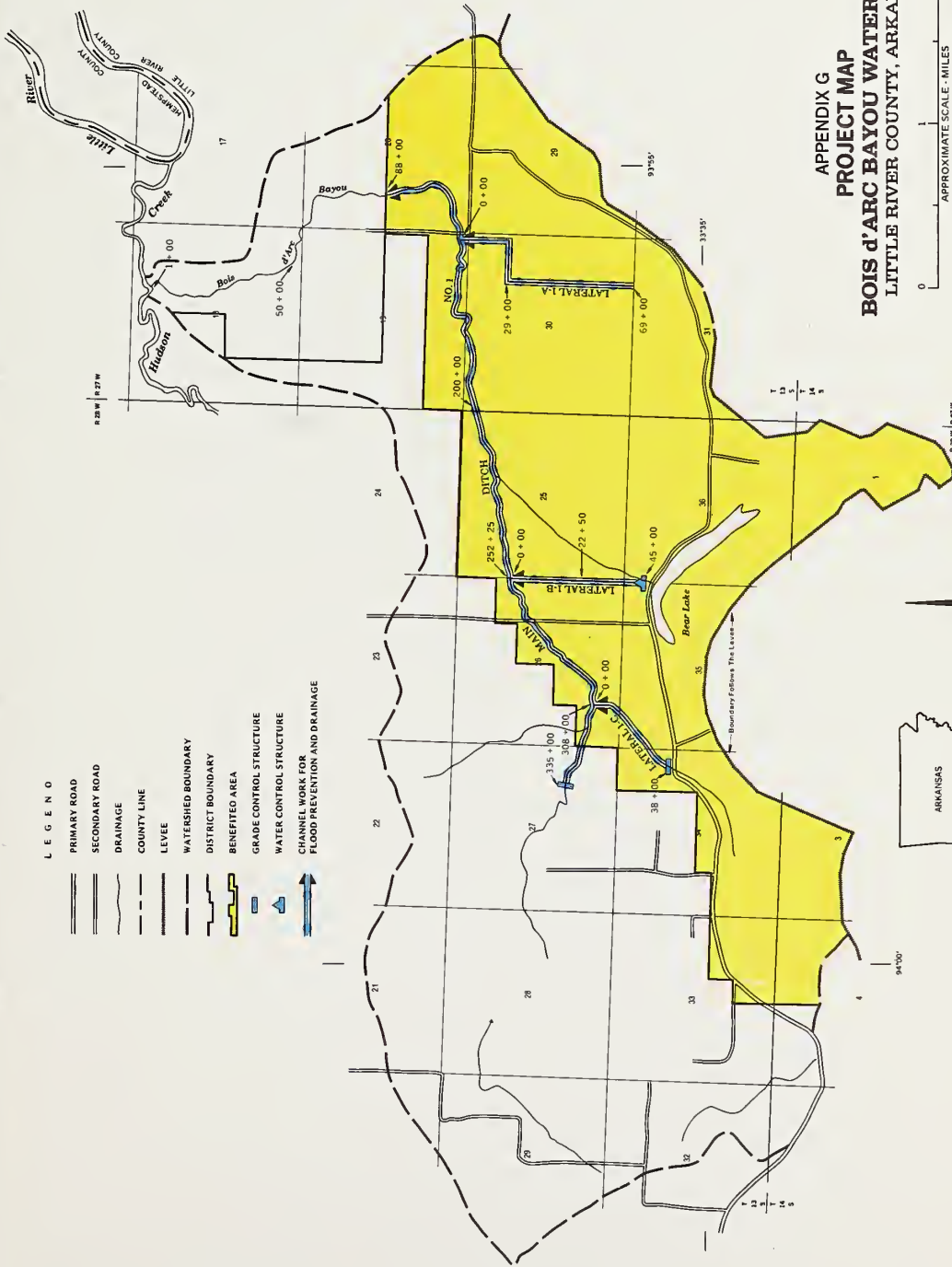
PROJECT MAP





LEGEND

- PRIMARY ROAD
- SECONDARY ROAD
- DRAINAGE
- COUNTY LINE
- LEVEE
- WATERSHED BOUNDARY
- DISTRICT BOUNDARY
- BENEFITED AREA
- GRADE CONTROL STRUCTURE
- WATER CONTROL STRUCTURE
- CHANNEL WORK FOR FLOOD PREVENTION AND DRAINAGE



APPENDIX G  
 PROJECT MAP  
 BOIS D'ARC BAYOU WATERSHED  
 LITTLE RIVER COUNTY, ARKANSAS

APPROXIMATE SCALE - MILES  
 0 1 2

BASE COMPILED FROM LATEST USES QUADS AND 1975 ARKANSAS GENERAL HIGHWAY MAP. 10,000 FOOT GRID BASED ON ARKANSAS COORDINATE SYSTEM, SOUTH ZONE.





