PHASE I REPORT

WHITE RIVER NAVIGATION IMPROVEMENT PROJECT: RECREATION BENEFITS STUDY

Prepared for
Department of the Army
Corps of Engineers
Memphis District
167 North Main Street, Room B-202
Memphis, Tennessee 38103-1894

September 2004

URS Group, Inc.
200 Orchard Ridge Drive, Suite 101
Gaithersburg, Maryland 20878

3500 N. Causeway Blvd., Suite 900
Metairie, Louisiana 70002-3527

Contract No. DACW66-01-D-0005

The White River Navigation Improvement Project: Recreation Benefits Study represents the first of three phases of an overall effort by the United States Army Corps of Engineers to identify, evaluate, and calculate current and potential recreational benefits associated with the project. Objectives met in this first phase include a delineation of the study area, inventory of outdoor recreation resources, development of a methodology for monetizing recreation benefits, development of draft survey instruments, and presentation of a study plan for future phases.

Two principal outcomes of this study involve the recreation resource inventory and methodology for estimating recreation benefits. A comprehensive inventory of outdoor recreation resources, including fishing access points and outdoor recreation features, was conducted within a one-hour travel time of the White River. This inventory showed deficiencies in recreational opportunities, primarily nonconsumptive opportunities, by proximity to the White River. Nonconsumptive opportunities included hiking trails with overlooks of the river, picnicking and camping areas, and wildlife observation points.

The second principal outcome is the selection of two environmental valuation methods: travel cost and contingent valuation. General and technical reviews were provided to show how these methods can be used to monetize recreation benefits associated with the project.

Future study phases will build upon this report and identify specific alternatives for recreation improvements, including their benefits and costs.

TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Figures

Appendices

The White River Navigation Improvement Project (WRNIP) was first proposed by the United States Army Corps of Engineers (USACE) in 1979 (USACE 1979). The original WRNIP was authorized by the Water Resources Development Act (WRDA) in 1986, deauthorized by the 1988 WRDA, and then reauthorized by the 1996 WRDA. The current WRNIP pertains only to that portion of the White River from the City of Newport downstream to River Mile 10 (USACE 2003, p. 8). This report was conducted by URS Group, Inc. (URS) under Contract Number DACW66-01-D-0005 and Task Order Number 0010. The Scope of Work (SOW) for this report is included in Appendix A, and Appendix B contains the SOW for the final two phases.

The recent 2003 Preliminary Draft White River Navigation General Reevaluation Report (GRR) (USACE 2003) identified assessment of current and potential recreational opportunities as a part of the National Economic Development (NED) Plan for the WRNIP. The NED Plan is one that reasonably maximizes net national economic development benefits (ER 1105-2-100, Chapter II). The project schedule and resources for the 2003 GRR were such that the recreation assessment component of the NED Plan was not addressed. Thus, a purpose of the recreation assessment in this report was to identify recreational opportunities that would lead to a net increase in NED benefits.

Generally, this report represents USACE efforts to improve recreational opportunities along the Lower White River. This report represents Phase I of three phases of an overall effort by the USACE to identify, evaluate, and calculate current and potential recreational benefits associated with the Lower White River and the WRNIP. The purpose of the Phase I report is to:

- identify the study area;
- inventory recreational opportunities;
- develop the economic valuation methods and surveys; and
- develop a Study Plan for the two future phases (II and III).

Recreation topics addressed in this Phase I report are potentially closely associated with the innovative set of Environmental Operating Principles the USACE has set forth for all present and future natural resource restoration projects. Moreover, the focus on recreation addresses elements of the plan that maximize National Ecosystem Restoration (NER) benefits. The NER Federal objective is "… to contribute to national ecosystem restoration [with] increases in the net quantity and/or quality of desired ecosystem resources" (USACE 2000, p. 2-1). A plan that addresses both NED and NER objectives is formally referred to as the Combined NED/NER Plan (USACE 2000, pp. 2-1 through 2-7). The purpose of this combined Plan is to contribute to NED and NER outputs, attempt to maximize the sum of net NED and NER benefits, and offer the best balance between these two Federal objectives (USACE 2000, pp. 2-1 through 2-7). Preference toward the combined NED-NER Plan is a desirable objective in planning.

Development of the recreation plan, which consisted of identifying the study area and inventorying recreational opportunities, relied on advanced spatial analysis methods and personal interviews conducted with representatives from towns located along the Lower White River. The geographic information system (GIS) ArcGIS facilitated delineation and identification of recreational, natural, and cultural resources in the study area. Identified resources included official recreation areas (i.e., administered by state or federal agencies) as well as fishing and

recreational boating access points. The review of valuation methods included travel cost and contingent valuation. These methods were selected because their theoretical and data generating methods permit measurement of recreational benefits associated with alternative recreational improvements purposed for the White River study area. Potential improvements include both consumptive and nonconsumptive recreational features such as overlooks, hiking trails, and boat launches.

This report also provides drafts of two questionnaires that will be used in Phase II and Phase III to measure the economic value of recreation along the White River. One questionnaire will be administered to recreators at boat launches, picnic areas, and camping sites, and the other will be administered by telephone to a sample of randomly selected residents in the study area. The first questionnaire is termed the "on-site survey" and is designed to capture the number of trips and expenditures of current recreators. The second questionnaire is designed to capture the number of trips and expenditures of current users in addition to the trips and expenditures nonusers may take if certain recreational improvements are made along the White River. This questionnaire is termed the "telephone survey."

The second phase of this study will finalize the survey questionnaires, determine a schedule for survey administration, perform a pretest of questionnaires, design an electronic database, and provide a conceptual recreation plan. The third and final phase will develop a specific plan of recreation improvements and associated costs, statistically and econometrically analyze completed survey questionnaires, determine NED benefits (specifically, estimation of changes in consumer surplus), and conduct a risk and uncertainty analysis.

The remainder of the report is outlined as follows. Section 2 provides the boundaries for the Study Area and justification for these boundaries. Section 3 outlines the existing conditions in the Study Area, in terms of outdoor recreation demand and supply. Section 4 presents nonconsumptive and consumptive recreational opportunities available in the Study Area. Section 5 provides an overview of the environmental valuation methods and surveys that will be applied in Phases II and III. Section 6 presents a review of the econometric models that will be used in Phase III to analyze data collected from Phase II surveys. Finally, Section 7 summarizes this Phase I report and provides an overview of actions that will be taken in Phases II and III.

2.0 STUDY AREA IDENTIFICATION

The 2003 Preliminary Draft White River Navigation GRR (USACE 2003) identified currently perceived problems and/or opportunities including those identified in the original 1979 WRNIP feasibility report (USACE 1979). Table 1 provides selected statements of problems and opportunities about recreation included in the 2003 Draft GRR Report. Based on the Statement of Problems and Opportunities, project-specific study objectives were developed and identified in the Draft 2003 GRR. Study objective No. 5 was "to provide recreational features such as overlooks and park complexes, or otherwise improve the recreational development of the Lower White River." Pursuant to these identified objectives, the initial steps in formulating a recreation plan are being undertaken as part of this Phase I analysis. Steps include identifying the study area for the recreational component of the plan and completing an outdoor recreational resource inventory within the defined study area.

Table 1. Problems and Opportunities for Recreation in Relation to the WRNIP.

Problems/Opportunities Identified in 1979	Problem in 1979?	Currently a Problem?	Current Opportunities	Comments
Various recreational facilities in WRNIP area are critically deficient.	Yes.	Yes.	Construct recreational features in WRNIP area.	Example(s): nature trails; boat ramps; scenic overlooks; etc.
Possible habitat problems for song birds and other birds (nonconsumptive resources); lack of facilities for recreational birding.	No.	Yes.	Ecosystem restoration.	Not identified as a major opportunity in 1979; NER perspective encourages approach unlike what might have been employed in 1970s. Example(s): target creating specific types of bird habitat as part of other ecosystem restoration work conducted; construction of features to facilitate recreational birding related to song birds, and other birds.

Source: USACE. 2003 Preliminary Draft White River Navigation GRR.

2.1 REFINED STUDY AREA

The first area studied by the USACE Memphis District in association with the WRNIP is described in the Feasibility Report for the White River Navigation Study to Batesville, Arkansas (USACE 1979). The Feasibility Report for the White River Navigation Study provides discussion and illustrative description of the Study Area for the navigation component of the project, including part or all of the following counties:

- Fulton
- Randolph
- Izard
- Sharp
- Lawrence
- Greene
- Stone
- Jefferson
- Independence
- Van Buren
- Jackson
- Craighead
- Cleburne
- Poinsett
- White
- Woodruff
- Cross
- Lonoke
- Prairie
- Monroe
- St. Francis
- Lee
- Arkansas
- Phillips

Based on the navigational service area (i.e., the outermost limit from which goods and commodities might originate for waterway transport via the White River), this initial region of study comprises a reasonable study area for the purpose of evaluating the navigational benefits of the project. However, it is unrelated to recreation use and benefits and, therefore, not appropriate for use in the evaluation of this project.

In accordance with the ER 1105-2-100 (USACE 2000), the study area for the recreational evaluation must consider the recreation service area for the improved recreational features of the project, which will be formulated in Phases II and III of this study. For the purpose of this project, two service areas will be considered for the project Study Area: a 1-hour and a 30-minute travel time radius around the improvements.

Because the White River is a unique resource in the region that offers relatively deep draft for riverine boating activities, the service area for White River recreational boaters is considered to be at least a 1-hour service area, roughly equivalent to 50 road miles. This service area also likely applies to consumptive recreational uses such as fishing and hunting. However, if the final proposed recreational plan components do not include boat launches or other access improvements to the White River, the service area for the likely remaining recreation plan components (i.e., picnic areas, nature walks, and other features) is better reflected by a 30-minute buffer around the study reach of the White River, which roughly equates to 25 road miles.

Information obtained from the Cache National Wildlife Refuge representatives and other interviews (see Appendix C) supports the assumption that the service area is a 1-hour radius for the White River National Wildlife Refuge (WRNWR), the Cache River National Wildlife Refuge, other major regional attractions that provide unique outdoor recreational opportunities (e.g., boating on the White River), and excellent fishing and hunting opportunities.[1] Therefore,

[1] For the purpose of this study, National Wildlife Refuges are assumed to be similar to major regional and national parks with regard to passive recreation use, such as nature viewing. Both strive to preserve nature and the wildlife for citizens, but access to and within national parks is generally better than with National Wildlife Refuges. Furthermore, the mission of the National Park Service is to preserve nature in an unimpaired state. Therefore, "takes" of wildlife through hunting and trapping are prohibited on national park land but are allowed on National Wildlife Refuges.

proposed improvements that will provide improved access to consumptive use areas in the WRNWR, provide overnight stay areas (e.g., campgrounds), or provide new/enhanced access to unique recreational opportunities (e.g., boating on the White River) will be assigned a 1-hour service area. This area approximates a 50-mile buffer around the White River study reach.

Less nationally or regionally unique recreational features, such as nature walks, isolated picnic areas, and smaller Natural Areas, are considered to have a 30-minute service area for the purpose of this study. This consideration for the service area is supported by findings from an Arkansas Department of Recreation and Tourism Public Opinion Telephone Survey conducted during the development of the 1995 Statewide Comprehensive Outdoor Recreational Plan (SCORP). This survey asked the distance respondents were located from a public park and the frequency of respondent visits. Results of the survey indicate that attendance to parks dropped substantially for residents living farther than 30 minutes from a public park. This 30-minute or approximate 25-mile travel distance also corresponds with guidelines of the [American] National Recreation and Parks Association (NRPA) for parkland average "City Park" service areas as well as guidelines for outdoor recreation planning in Ontario, Canada (Ministry of Culture and Recreation, Sports and Fitness Division 1975; NRPA 1996).

Both the 30-minute and 1-hour travel time radii around the reach of the White River under study are displayed in Figure 1.[2] For this report, these two distances collectively define the proposed Study Area. The final Study Area determination will be made once the preliminary recreational plan components have been established.

The proposed Study Area is located in the Lower Mississippi Delta Region (LMDR). The LMDR is defined from a geographical and political perspective as a 219-county strip along the Mississippi River in Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee. Approximately 8.3 million people reside in this region. The LMDR is the poorest region in the United States (NLM 2004). The WRNIP-proposed recreational Study Area is largely associated with this region.

[2] It should be noted that the Study Area (i.e., service area) for this project is based on travel time and distance along the roadway system. The 50- and 25-mile radius buffers used as alternate Study Area boundaries are approximate only and do not reflect actual travel distance and time for the entire Study Area. In rural areas with few roadways, the distance from the White River associated with a 1-hour travel time may correspond to a less extensive area due to posted speed limits, circuitous roadways, and other circumstances. Survey sampling and other project tasks dependent upon the Study Area boundary will reflect actual travel distance and time to the proposed recreational improvement.

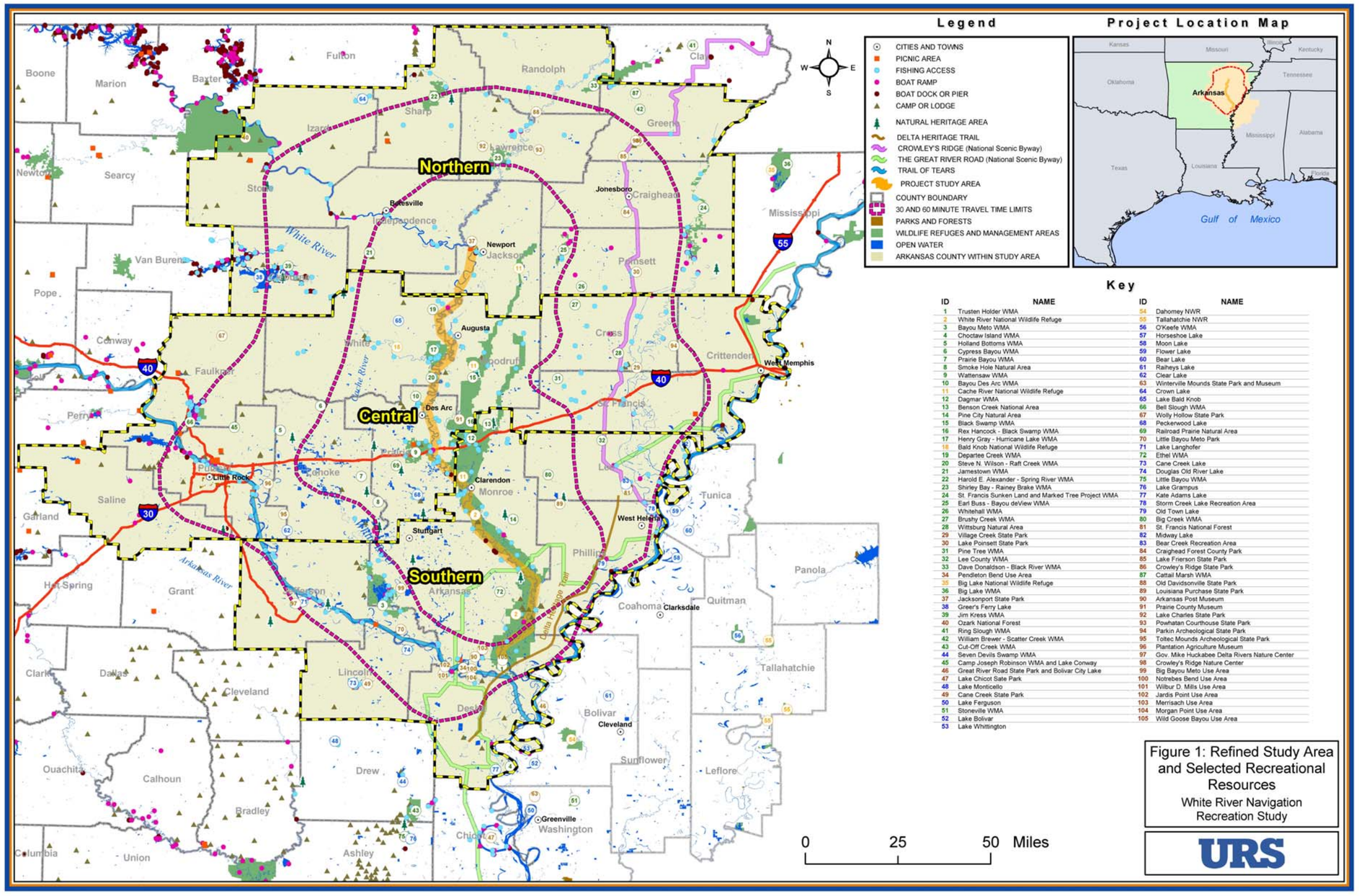


Figure 1: Refined Study Area and Selected Recreational Resources

White River Navigation Recreation Study

The proposed Study Area encompasses 28 counties but covers only a small portion of Greene, Saline, and Randolph counties. The following counties comprise the remainder of the Study Area: Arkansas, Cleburne, Craighead, Crittenden, Cross, Desha, Faulkner, Independence, Izard, Jackson, Jefferson, Lawrence, Lee, Lincoln, Lonoke, Monroe, Phillips, Poinsett, Prairie, Pulaski, St. Francis, Sharp, Stone, White, and Woodruff. The 28-county Study Area is larger than the study areas applied in the original Feasibility Report for the White River Navigation Study to Batesville, Arkansas (USACE 1979), and in the 2003 GRR. Principal findings from Table 2 include the observation that more than 20 percent of each county's population is less than 18 years of age, the average percent of population living below the poverty level is 19 percent (across all counties), approximately one third of the primary (or major) counties have noticed positive employment growth, and 9 of the 25 primary counties are projected to decrease in population.

Table 2. Census Statistics for Counties Included in the Study Area of the WRNIP, Recreational Analysis.

Census Statistic Categories							
County	**Population (2000)**	**Population (2002)[a]**	**Persons/ square mile**	**Employment Change (%) (2000-2001)**	**Percent Below Poverty**	**Median Household Income($)[b]**	**Persons Under 18 (%)**
Minor Counties[c]							
Greene	37,331	38,038	64.6	–3.7	13.3	30,828	25.2
Randolph	18,195	18,102	27.9	2.6	15.3	27,583	24.6
Saline	83,529	86,290	115.5	7.2	7.2	42,569	25.5
Major Counties[d]							
Arkansas	20,749	20,355	21.0	0.3	17.8	30,316	24.8
Cleburne	24,046	24,570	43.5	–4.2	13.1	31,531	21.3
Craighead	82,148	80,074	115.6	<0.1	15.4	32,425	24.1
Crittenden	50,866	51,155	83.4	–2.4	25.3	30,109	31.1
Cross	19,526	19,343	31.7	–3.1	19.9	29,362	27.8
Desha	15,341	14,805	20.1	–5.9	28.9	24,121	28.9
Faulkner	86,014	89,590	132.9	5.4	12.5	38,204	25.6
Independence	34,233	34,431	44.8	3.5	13.0	31,920	24.5
Izard	13,249	13,192	22.8	–18.5	17.2	25,670	20.9
Jackson	18,418	17,802	29.1	–4.7	17.4	25,081	22.2
Jefferson	84,278	83,374	95.2	–7.1	20.5	31,327	26.3
Lawrence	17,774	17,587	30.3	–1.8	18.4	27,139	24.0
Lee	12,580	12,217	20.9	–21.0	29.9	20,510	26.0
Lincoln	14,492	14,247	25.8	1.9	19.5	12,479	22.2
Lonoke	52,828	55,302	69.0	2.9	10.5	40,314	28.7

Census Statistic Categories							
County	**Population (2000)**	**Population (2002)[a]**	**Persons/ square mile**	**Employment Change (%) (2000-2001)**	**Percent Below Poverty**	**Median Household Income($)[b]**	**Persons Under 18 (%)**
Monroe	10,254	9,689	16.9	–0.9	27.5	22,632	27.9
Phillips	26,445	25,001	38.2	–5.9	32.7	22,231	32.2
Poinsett	25,614	25,401	33.8	–1.2	21.2	26,558	26.1
Prairie	9,539	9,440	14.8	–6.7	15.5	29,990	23.9
Pulaski	361,474	364,381	468.9	0.8	13.3	38,120	25.2
St. Francis	29,329	28,773	46.3	7.7	27.5	26,146	27.9
Sharp	17,119	17,270	28.3	–2.8	18.2	25,152	21.9
Stone	11,499	11,518	19.0	–10.5	18.9	22,209	22.2
White	67,165	69,354	65.0	–0.4	14.0	32,203	24.4
Woodruff	8,741	8,466	14.9	–3.2	27.0	22,099	26.0
Other							
State of Arkansas	2,673,400	2,710,079	51.3	0.5	15.8	32,182	25.4
United States of America	281,421,906	288,368,698	79.6	0.9	12.4	41,994	25.7

Note: Unless otherwise noted, based on the 2000 Census (Source: http://census.gov).
[a] 2002 estimate.
[b] Based on 1999 data.
[c] Minor counties have only a small portion of their land area within the Study Area boundaries.
[d] Major counties have the majority of their land area within the Study Area boundaries.

3.0 INVENTORY OF EXISTING CONDITIONS

The following subsections provide a preliminary review of the current state of demand and supply with respect to consumptive and nonconsumptive outdoor recreation in the project Study Area. Consumptive recreation is defined by outdoor activities that involve the taking of fish and wildlife. Examples include hunting and fishing. Nonconsumptive recreation is defined by outdoor activities that do not require taking fish and wildlife through fishing and hunting. Examples include bird watching, picnicking, and hiking.

The review of recreation demand is based on interviews (see Appendix C) and the 1995 SCORP. The supply analysis is based on a comprehensive inventory of recreational opportunities, including boat access facilities, camping sites, picnic areas, and wildlife management areas. The recreation supply and demand analyses provide the basis for the analysis of recreational opportunities provided in the next section.

3.1 OUTDOOR RECREATION DEMAND: PRELIMINARY FINDINGS

In order to facilitate the recreation analysis, a series of interviews was conducted in early March 2004 with key agencies and stakeholder entities (see Appendix C for minutes from these interviews). At the completion of each interview, a preliminary questionnaire was distributed to interviewees. Meeting minutes from the interviews and completed questionnaires that were returned are included in Appendix C. The following is a brief synopsis of the interviews and questionnaires.

3.1.1 Arkansas Game and Fish Commission (AGFC)

From a demand standpoint, AGFC noted that consumptive use demand data were available via hunting and fishing license sales records by county. However, they noted that they had very limited demand data on nonconsumptive uses. The AGFC mentioned that the Division of Parks and Tourism conducted an outdoor recreation use survey in 1995. Generally, the AFGC noted that there is strong demand for consumptive recreational activities, such as duck hunting and fishing, in the White River region, but had little information regarding nonconsumptive recreation uses.

3.1.2 The Arkansas Department of Parks and Tourism (ADPT)

In an interview with a representative of the ADPT, it was noted that a substantial data gap existed in recreation demand information. The representative also noted that the 1995 SCORP was recently updated, but a new recreation use survey was not performed. Thus, the 1995 data are the latest available information.

The 1995 SCORP notes that predominant recreational activities within the State of Arkansas include driving for pleasure, walking for pleasure, wildlife observation and photography, picnicking, fishing, pleasure boating, swimming, short hikes, and bicycling. While an important activity in the Study Area, hunting is an activity in which only 22 percent of the survey respondents (on average) participated in the past year (i.e., 1994). Participation rates of survey

respondents, by age cohort in various outdoor recreational activities for the entire state of Arkansas, are summarized in Table 3. Listed activities are sorted in order of overall popularity.

The Delta Heritage Trail and the possibility of a "rails to trails" project were mentioned as potential recreation opportunities for the White River Recreation Study. The Delta Heritage Trail crosses the White River at the town of St. Charles.

Table 3. Participation Rates in Outdoor Recreational Activities, by Age Cohort Within the State of Arkansas.

	Participation Rates as Percent of Responders in Age Cohort							
Activity	**18-20**	**21-24**	**25-44**	**45-54**	**55-59**	**60-64**	**65-74**	**75+**
Driving for Pleasure	79	87	86	82	65	68	83	57
Walking for Pleasure	72	87	74	79	52	84	68	52
Picnicking	43	78	81	77	59	54	57	48
Fishing	64	65	73	54	52	40	47	24
Swimming	71	78	75	51	34	38	21	14
Visiting Historical Sites	43	48	62	51	48	51	49	43
Wildlife Observation	43	65	51	58	48	62	53	52
Short Hikes	36	30	54	52	34	54	36	29
Pleasure Boating	50	43	51	35	24	30	28	24
Bicycling	57	39	56	29	28	30	21	9
Camping/Developed Sites	29	43	49	31	48	27	28	14
Basketball	50	52	49	26	17	19	11	0
Jogging/Running	43	43	45	26	28	16	13	10
Baseball/Softball	36	56	50	22	14	11	7	5
Photography	36	30	33	39	17	30	21	29
Hunting	14	30	44	25	17	16	26	5
Other Outdoor Games	29	48	37	23	28	5	13	9
Off-Road Driving	29	35	33	23	14	11	19	9
Canoeing/Floating	14	26	34	18	17	16	6	9
Camping/Undeveloped	7	39	29	19	14	8	10	9
Golf	29	26	22	16	10	11	9	9
Water Skiing	21	35	30	16	7	8	4	5
Lengthy Hikes	14	17	22	21	7	11	13	0
Horseback Riding	29	17	24	8	3	8	7	5
Tennis	29	22	22	5	10	8	2	5
Soccer	7	9	13	3	0	5	0	0

Activity	Participation Rates as Percent of Responders in Age Cohort							
	18-20	**21-24**	**25-44**	**45-54**	**55-59**	**60-64**	**65-74**	**75+**
Sailing	0	13	9	4	7	5	0	5
Overnight Hikes	7	9	7	1	3	5	2	0

Note: Italicized activities are those that are potentially reasonable and appropriate for improvement in association with the WRNIP.
Source: Arkansas Department of Parks and Tourism. Arkansas 1995 Statewide Comprehensive Outdoor Recreation Plan. Little Rock

3.1.3 City of Newport, Chamber of Commerce

An interview was conducted with several members of the City of Newport Chamber of Commerce. While they could not provide quantitative data on recreation use, they did express a desire for recreational improvements. Improvements discussed at the meeting were related to hiking trails, camping sites, and boat launches. Additionally, they expressed interest in enhancing existing recreational facilities in nearby Jacksonport State Park. They were also open to other ideas and requested information regarding previous recreational improvement projects.

3.1.4 City of Augusta, Chamber of Commerce

The Augusta Chamber of Commerce stated that recreation was a primary business in Augusta and recreational activities have led to an increased demand for bed and breakfasts and support businesses related to recreation (such as gun shops and machine repair shops). Additionally, recreational activities are a source of supplementary income for farmers (primarily through hunting leases). They mentioned an increase in duck hunting has led to farmers aggressively pursuing pit construction and habitat improvement projects to attract more hunters.

Recreational boating, fishing, skiing, and recreation on sand bars, were cited as important recreational activities associated with the White River. Chamber of Commerce representatives noted that the USACE constructed a boat launch that led to an increase in recreation along the White River. The Chamber of Commerce is interested in pursuing cruise tours on the White River and would like to see bird watching promoted in their area.

Potential recreational opportunities include:

- The City of Augusta has purchased land (~10 acres) near the river for a city park and would be interested in cost-sharing for its construction.
- The City owns an historic log cabin, which is on the National Register of Historic Places (NRHP), located along the river and would like to enhance this cultural resource with a riverfront park.
- The City would like to have a viewing pier.

Private lands are the primary impediment to accessing the White River. The interviewees mentioned that landowners may be resistant to easements, but they may be in favor of leasing their land.

3.1.5 Cache River National Wildlife Refuge

An interview was held with the refuge manager for the Cache River National Wildlife Refuge. He stated that the majority of recreational use is consumptive with primary activities including fishing, turtling, and duck and deer hunting. Duck hunting is the biggest attraction and has increased 30- to 40-fold over the last 10 years.

It was estimated that 120,000 hunters and 30,000 anglers visit the Cache River Refuge annually. From a recreation standpoint, refuge personnel have provided access to some oxbow lakes through road and boat launch construction. Additionally, they are actively pursuing the purchase of bottomland hardwood areas as well as adjacent fields to increase and improve waterfowl habitat.

It was also noted that canoeing activity is on the rise along the Cache River, which may lead to increased interest in other nonconsumptive uses, such as bird watching.

3.1.6 Des Arc Chamber of Commerce

Two interviews were held in the community of Des Arc with the Chamber of Commerce and local stakeholders. From a demand perspective, duck hunting and fishing were identified as the two primary recreational activities associated with the White River Basin. It was stated that approximately 60 percent of recreation users are from out-of-town and the rest are local. Primary draws for out-of-town users include duck and deer hunting, followed by recreational boating activities and sand bar parties along the White River. They emphasized that the natural resources are underutilized. The demand is there, but the ability to meet the demand is not.

Existing recreational facilities within Des Arc include a city park along the White River with a boat launch that was constructed by the USACE. Additionally, the City just constructed a lighted, paved walkway that extends approximately three blocks and runs adjacent to the river.

Potential recreational opportunities include:

- Creating overlooks, hiking trails, and picnic areas on two City-owned tracts of land, one of which is 22 acres and the other 40 acres, both located along the river.
- Developing a boardwalk along the river.
- Enhancing access to the primary sand bar, located adjacent to the 22-acre tract.
- Improving the riverfront park and constructing an amphitheater.
- Developing an RV park.
- Developing picnic areas around the boat launch.

3.1.7 City of Clarendon

City of Clarendon representatives stated that attracting new industry appears unlikely at this time. Therefore, development of recreational opportunities is important to their community from an economic development standpoint. Their current focus is on recreation and ecotourism.

They stated that deer and duck hunting are primary activities, followed by fishing. Canoeing and recreational boating, however, are not primary activities, perhaps because only one reliable boat launch gives local access to the White River. Accordingly, they would like to put in a high-water boat launch near the RV park being constructed by the City. They also mentioned that during the 1960s, Clarendon had a beach in close proximity to the town; however, the land was transferred to the U.S. Fish and Wildlife Service (USFWS) and the beach is no longer open. The beach was a popular site for residents, attracting a significant number of recreational boaters.

The City of Clarendon just completed a Tourist Welcome Center with 11 exhibits. The City also has received a grant to construct a butterfly garden. The City holds the Big Woods Birding Festival every May and indicated that birding was the focus of their recreation improvement plan.

The City of Clarendon has several unique natural, cultural, and historical features. The diverse and extensive expanse of natural habitat around Clarendon has prompted the City to pursue the Mississippi Flyway Commission to have their town listed on the Commission's Tour. From a cultural perspective, the City presently has 17 buildings on the NHRP and extensive efforts have been directed toward restoring many downtown buildings. Last, from an historical standpoint, the City of Clarendon played a role in the Civil War and is located just 15 minutes from the Louisiana Purchase State Park (a National Historic Landmark).

3.2 OUTDOOR RECREATION DEMAND: RESOURCE INVENTORY

Outdoor recreational opportunities in Arkansas are ample and widely distributed throughout the state. Recreational activities in the study area are centered around its principal natural resource assets that include public bottomland hardwood forests, rivers, lakes, and streams. Consumptive-use recreationists are predominantly fisherman and hunters while nonconsumptive-use recreationists include recreational boaters, skiers, hikers, campers, and birders. Hunting is primarily concentrated in the fall and winter. Birding, camping, fishing, and hiking occur most often during the early spring. Of those who hunt within the Study Area, anecdotal accounts from Phase I interviews portray 60 to 70 percent come from outside the Study Area, and 30 percent of those may be from out of state. Based on anecdotal accounts, Shelby County, Tennessee, and adjacent DeSoto County, Mississippi—both approximately 15 miles beyond the Study Area's boundary—account for a significant number of out-of-state hunters. Additionally, a large number of Little Rock, Arkansas, residents pursue a variety of hunting activities in the public lands of the Study Area. Specific information is limited on the number and location of fishermen, recreational boaters, skiers, hikers, campers, and birders.

An inventory of recreational resources was conducted in the Study Area. In order to facilitate the inventory, the Study Area was arbitrarily subdivided into three separate regions, Northern, Central, and Southern, with four different buffers in each region: 5, 15, 30, and 50 miles.[3] Figure 1 displays the location of selected recreational opportunities by region for the portion of the White River proposed for improvements. Figures 2 through 4 provide expanded

[3] The use of the three regions and four buffers is solely intended to provide a more detailed inventory of the Study Area and was not utilized in the determination of Study Area boundaries. Selection of these regions and buffers did not follow any form of standard recreation analysis approach.

graphic illustrations of the Northern, Central, and Southern regions. In the interest of clarity, only those resources deemed to be similar in nature to anticipated recreational improvement opportunities along the White River are provided on Figure 1. Recreational resources, such as local playgrounds, ball fields, amusements, and golf courses, are not provided.

Major lakes are also displayed on Figure 1. The nearest rivers on the National Wild and Scenic River list are the Buffalo and Little Missouri Rivers, located northwest and southwest of the White River, respectively. There are several streams and rivers in the Study Area that are listed on the Arkansas Natural and Scenic River System, including the East Fork in White County, the Strawberry River in Lawrence and Independence Counties, the Second Creek in St. Francis County, and the Arkansas River south of Arkansas County. These rivers provide canoeing and wildlife viewing opportunities. The Study Area also includes the Mississippi Flyway and corresponding wetlands supporting waterfowl wintering habitat.

There are numerous wildlife management areas and national wildlife refuges in the Study Area that support hunting, fishing, and wildlife observation. They also provide limited primitive camping, hiking trails, and recreational facilities. Facilities directly adjacent to and in close proximity to the White River are concentrated primarily in the lower reaches of the Study Area in the WRNWR. Mr. Larry Mallard (USFWS, Refugee Manager of the WRNWR) has indicated that currently the WRNWR has less emphasis on general recreational operations, such as development and upkeep of picnic areas, compared to that of past years (personal communication to Erwin Roemer, 2003).

State parks are primarily concentrated in the southern- and northern-most reaches of the Study Area. Similar to wildlife management areas and national wildlife refuges, state parks offer limited recreational features such as camping and picnicking facilities.

The Study Area also has several scenic byways traversing the region and the White River Study Area. These include the Great River Road, Crowley's Ridge Parkway, and the water route of the historic Trail of Tears.

The Great River Road in Arkansas follows delta land through the eastern side of the state and traverses more than 250 miles across 17 towns. The Crowley's Ridge Parkway is a series of federal, state, and county highways linked to traverse Crowley's Ridge. This ridge is a unique geologic formation located in the northeastern portion of Arkansas. One land route of the Trail of Tears crosses through the southern portion of the Study Area, following the Mississippi and Arkansas Rivers. The Trail of Tears is a National Historic Route marking the route taken by several eastern Native American tribes as they made their way in their removal to designated Indian lands in Oklahoma.

Appendix D provides listings of major parks, camping and picnic areas, wildlife management areas and refuges, natural and other scenic viewing areas, and similar sites in and around the Study Area. Appendix E lists fishing and recreational boating access points in the region. Collectively, these appendices show that there are a multitude of recreational opportunities available in the Study Area, although many of these opportunities are not located along the White River. An analysis of recreational sites and access points by proximity to the White River generally shows limited boat ramp access and recreational facilities (e.g., picnic areas and camping sites) along the river, especially in the Northern Region of the Study Area. Hiking trails also appear to be limited directly adjacent to the White River. Specific findings of

the analysis are provided in the following paragraphs. Overall, the analysis identifies areas along the White River that have minimal recreational opportunities and high potential for improving or introducing new recreational features.

Qualitatively, Tables 4a through 4c show an unbalanced number of recreational features across the Study Area regions. The Southern Region has the greatest number of features, with the exception of state parks and boat launches, within a given buffer of the White River. This result is partly due to the location of the Cache NWR and the WRNWR in the Central Region. In fact, the largest expanse of bottomland hardwood forests lies within the WRNWR. This forest type serves as preferred habitat for a multitude of migratory birds and, as a result, an attraction for both consumptive and nonconsumptive recreationists. The Northern Region has the greatest number of boat launches and state parks, second greatest number of camping sites and picnic areas, least number of fishing access points and wildlife refuges[4], and no hiking trails. The Central Region has no hiking trails or national parks, second greatest number of fishing access points, wildlife refuges, and state parks, and the least number of all other recreational features. Within a 5-mile buffer of the White River, the Northern Region has just one camp site, one picnic area, three boat launches, four fishing access points, and two state parks. In comparison, the Southern and Central Regions have on average 4 and 5 times more recreational features, respectively, than the Northern Region. This qualitative analysis indicates a need, from an inventory (as opposed to demand) standpoint, for improved or additional recreational features within 5 miles of the White River in the Northern Region.

The 5-mile buffer is the most pertinent of the four buffers listed in Tables 4a through 4c since it is within this area that recreators and potential recreators have the greatest direct access to the White River. Accordingly, if the goal of the recreation component of the WRNIP is to increase recreation-related benefits in the White River Study Area by improving or adding recreational features, then the greatest benefit would be generated by making these improvements within 5 miles of the White River. Improvements in the other buffers (15-, 25-, and 55-mile buffers) would certainly benefit outdoor recreation in the Study Area but may not have as great an impact.

Considering all three regions, the most important recreational opportunities to enhance are related to nonconsumptive recreation, including picnic areas, hiking trails, and camping sites. Boat launches could also be included in this list since there is a considerable amount of recreational boat activity on the White River. Based on the findings provided above, significant opportunities exist for enhancing nonconsumptive recreation-related benefits throughout the Study Area and in particular, in the Northern Region.

[4] For the purposes of this report, the term wildlife refuges encompasses state and federal wildlife refuges in addition to game preserves and fish hatcheries.

Table 4a. Number of Recreational Features and Areas Within the Northern Region of the Study Area.

	NORTHERN REGION[a]			
Recreational Feature	***≤ 5 miles***	***≤ 15 miles***	***≤ 25 miles***	***≤ 55 miles***
Boat Launches	3	4	10	69
Camping Sites	1	1	2	38
Fishing Access	4	10	20	76
Hiking Trails	0	0	0	0
Picnic Areas	1	1	1	3
Recreational Area[b]				
National Parks	0	0	0	0
State Parks	2	2	2	8
Wildlife Refuges[c]	0	0	3	12

[a] Northern Region includes Cleburne, Craighead, Greene, Independence, Izard, Jackson, Lawrence, Poinsett, Randolph, Sharp, and Stone counties.

[b] Recreational areas may contain recreational features listed above as well as other recreational features not included in this table.

[c] Includes national and state wildlife refuges, in addition to game preserves and fish hatcheries.

Table 4b. Number of Recreational Features and Areas Within the Central Region of the Study Area.

	CENTRAL REGION[a]			
Recreational Feature	***≤ 5 miles***	***≤ 15 miles***	***≤ 25 miles***	***≤ 55 miles***
Boat Launches	8	9	9	22
Camping Sites	3	9	13	28
Fishing Access	37	51	59	90
Hiking Trails	0	0	0	0
Picnic Areas	0	1	1	2
Recreational Area[b]				
National Parks	0	0	0	0
State Parks	0	0	0	4
Wildlife Refuges[c]	11	16	16	17

[a] Central Region includes Crittenden, Cross, Faulkner, Lonoke, Prairie, Pulaski, Saline, St. Francis, White, and Woodruff counties.

[b] Recreational areas may contain recreational features listed above as well as other recreational features not included in this table.

[c] Includes national and state wildlife refuges, in addition to game preserves and fish hatcheries.

Table 4c. Number of Recreational Features and Areas Within the Southern Region of the Study Area.

	SOUTHERN REGION[a]			
Recreational Feature	***≤ 5 miles***	***≤ 15 miles***	***≤ 25 miles***	***≤ 55 miles***
Boat Launches	9	25	32	61
Camping Sites	14	23	29	41
Fishing Access	21	42	51	97
Hiking Trails	1	1	1	1
Picnic Areas	1	3	3	7
Recreational Area[b]				
National Parks	0	1	1	1
State Parks	0	0	0	0
Wildlife Refuges[c]	1	29	29	40

[a] Southern Region includes Arkansas, Desha, Jefferson, Lee, Lincoln, Monroe, and Phillips counties.

[b] Recreational areas may contain recreational features listed above as well as other recreational features not included in this table.

[c] Includes national and state wildlife refuges, in addition to game preserves and fish hatcheries.

4.0 POTENTIAL RECREATIONAL OPPORTUNITIES

The emphasis of this section is on the nonconsumptive recreational opportunities in the Study Area because collectively they represent the greatest area in which the USACE can provide recreational benefits to Study Area communities. Several potential opportunities for recreational improvements were identified from agency and stakeholder interviews, preliminary survey responses, the latest Statewide Outdoor Recreation Use Survey, the inventory of existing recreational facilities in the region, and reviews of natural and cultural resources in the Study Area. These opportunities will form the basis for formulation of the specific recreation plan components and future phases of analysis.

Representatives of these communities clearly stated during the interview process that recreation is a significant component of the local economy. Additionally, many communities indicated that the primary focus of their economic development plans was to enhance recreational opportunities. There is a strong initiative to take advantage of the natural and cultural resources in the region with a focus on recreation and ecotourism.

4.1 NONCONSUMPTIVE AND CONSUMPTIVE RECREATIONAL OPPORTUNITIES

Given earlier findings of a minimal number of recreational facilities, wildlife observation points, hiking trails, and boat access points directly adjacent to the White River, there is significant interest in and potential opportunities for improving nonconsumptive recreation along the White River. These opportunities include the following:

- Riverfront parks and/or improved access to major sandbars;
- Hiking trails with overlooks of the river;
- Facilities to improve wildlife observation opportunities, specifically birding;
- Picnicking and camping facilities adjacent to the river;
- Interpretative facilities adjacent to the river; and
- Potentially a visitor's center near the river and I-40.

Fishing is also a primary recreational activity in the Study Area that could be improved. The demand for fishing in conjunction with the apparent demand for recreational boating and other water-related activities such as skiing, canoeing, and swimming, provide opportunities for improved access, such as boat ramps, docks, and related facility improvements. Examples of such improvements include parking lot resurfacing, boat ramp expansion, and high-water ramp access. These improvements would enhance the recreational experience for all recreators, whether fishermen or recreational boaters, by increasing boat launch efficiency and reducing crowding.

Potential consumptive recreational opportunities that could be improved along the White River include expanding existing wildlife management areas and/or converting existing agricultural lands to waterfowl/wildlife habitat. Significant efforts appear to be underway by national and state wildlife management and refuge managers, as well as private landowners, to expand existing facilities to take advantage of this opportunity. Providing support to these

entities represents a viable opportunity for recreational improvement. Table 5 summarizes both nonconsumptive and consumptive recreation opportunities identified in this study phase.

Table 5. Recreation Opportunities Identified in Preliminary Interviews.

Current Opportunities	Comment
Develop an interpretive recreation facility near junction of Delta Heritage Trail and White River.	Proposed by Arkansas Division of Parks and Tourism.
Improve access to White River for recreational boating and other water-related activities through development of boat ramps, dock facilities, and related improvements.	City of Clarendon needs a high-water boat ramp. This is applicable to numerous locations along the river.
Develop a city park near the White River in the City of Augusta.	The City of Augusta has purchased land (~10 acres) near the river for a city park and would be interested in cost-sharing for its construction
Develop a riverfront park in the City of Augusta.	The City of Augusta owns an historic log cabin, which is on the NRHP, located along the river and directly adjacent to downtown Augusta. The City would like to enhance this cultural resource with a riverfront park.
Develop an overlook or observation tower/pier on the White River.	This is applicable to several communities and locations along the river.
Develop 2 riverfront parks in the City of Des Arc.	The City of Des Arc owns 2 tracts of land—one is 22 acres and the other is 40 acres—both located along the White River.
Enhance access to the primary sand bar located adjacent to the 22-acre tract owned by the City of Des Arc.	Numerous comments regarding use of sandbars along the river for recreational use.
Improve the riverfront park in Des Arc and construct an amphitheater.	--
Develop a lodge or RV park near Des Arc.	Not applicable for Federal participation.
Develop picnic areas around the boat launch in Des Arc.	--

Current Opportunities	Comment
Improved facilities for birding in Clarendon near the Big Woods Birding Festival, consistent with Visions for Clarendon Economic Development Plan.	The Birding Festival is an annual event taking place in the Big Woods of Arkansas. Improvements should be consistent with the conservation strategies for the Big Woods.[5]
Provide access to a sandbar along the White River near population centers such as Clarendon, and Augusta.	There were several comments regarding historic use of the sandbar along the river in Clarendon for recreational use, but ownership by USFWS has eliminated access. There are likely other areas with potential "attractive" sandbars within the Study Area, which could also be considered as potential opportunities for recreation development.
Develop hiking or nature trails adjacent to the White River, incorporating overlooks and potential interpretive facilities.	Could be implemented in numerous locations.
Develop picnicking and/or camping facilities adjacent to the White River.	Could be implemented in numerous locations.
Develop a visitors' center with interpretive displays directly on the White River near I-40.	Need to evaluate relative to new visitors' center at the WRNWR along the southern portion of the Study Area.

Evident from Table 5 are the many current recreational opportunities in the Study Area. Given budgetary and time constraints, however, only a subset of these opportunities can be explored. Thus, a means for evaluating each opportunity must be developed and applied to this list. The following section presents the methods that will be used in the evaluation process and Section 6 describes in detail specific econometric techniques that will be used to generate information to make final decisions.

[5] The Big Woods of Arkansas includes a 550,000-acre corridor of floodplain forest following the bayous and rivers that flow into the Mississippi River, among them Bayou DeView, the Cache River, the lower White River, and the lower Arkansas River. The Nature Conservancy is working with a variety of partners (public agencies, timber companies, farmers, hunters, and others) to conserve, restore, expand, and connect crucial forest patches in the Big Woods. Strategies include protecting lands through purchase, gift, or conservation easements; reforesting marginal farmlands; and promoting land uses that are compatible with the natural functioning of the ecosystem (TNC 2004). In the city of Clarendon, whose economy was dependent almost exclusively on agriculture, the Nature Conservancy helped citizens create a compatible economic development plan that includes ecotourism and other activities that preserve the region's natural resources. Visions for Clarendon, an independent organization that arose from the process, established the annual Big Woods Birding Festival in 2002 to draw nature lovers into the heart of the Big Woods.

5.0 ECONOMIC VALUATION METHODS AND SURVEYS

Two principal methods for valuing nonmarket outdoor recreational features (e.g., picnic areas or boat launches) include travel cost and contingent valuation. The travel cost method (TCM) models an individual's decision about the number of visits to take to a particular location as a function of the total cost of visiting and an individual's personal characteristics. Data applied in estimating recreational demand curves within the TCM are obtained by directly questioning individuals about their recreational pursuits. These questions are typically asked in a survey format, which is administered either at the recreational site or by telephone or mail. The contingent valuation method (CVM) utilizes a survey to directly ascertain an individual's willingness to pay (WTP) for a change in recreational site features. For example, an individual may be asked to choose the maximum amount they are willing to pay (given budget constraints) for a new recreational feature such as a picnic area. Similar to TCM, data for the CVM are collected from surveys administered by phone or mail, or in person.

5.1 TRAVEL COST METHOD

The theoretical basis for the travel cost method can be established with a behavioral model or a preference function based on random utility theory. A behavioral model relates the actual number of visits an individual makes within a specified time period (season or year) to features of the sites visited, cost of visiting, and demographics. From this behavioral model, demand for a particular site can be estimated and a demand curve generated. The demand curve permits evaluation of changes in demand (number of trips per year) when site features change (e.g., a new boat launch is constructed). Additionally, an estimate of the individual's WTP to secure these changes can be calculated and compared to the costs of provision. Random utility theory (McFadden 1981) holds that the decision to visit a site or pay for a new recreational feature represents a discrete action that can be explained by observable characteristics of the decision maker, measurable characteristics of the new feature, and unobservable elements. Similar to the behavioral model, demand for a particular site, demand curve, and WTP can be determined within the random utility framework.

5.2 CONTINGENT VALUATION METHOD

In contrast to the TCM, demand curves generated with the CVM are based on intended behavior. That is, instead of observing the actual number of trips made by an individual, a survey is used to assess how many trips an individual might take under varying site conditions. For example, an individual may be asked to state the number of additional trips he would take if the primary boat launch he used was expanded to include a larger parking area and launch ramp. The hypothetical nature of the survey allows the researcher to explore a greater variety of possible site changes (e.g., improved boat launch with a new picnic area) than the TCM, yet suffers the disadvantage of relying on intended rather than actual behavior. Similar to TCM, the CVM yields demand, demand curves, and WTP for new recreational features.

5.3 VALUATION SURVEYS

Two principal sources of data underlying estimation of the travel cost and contingent valuation methods are respondent answers to telephone and on-site surveys.[6] On-site surveys are administered by interviewing recreators either before or after undertaking the recreational activity. These surveys are short in duration (approximately 5 minutes) and are intended to capture the basic elements (such as residence, number of trips taken to the site, and trip costs) necessary to estimate the valuation methods. Telephone surveys are administered to a randomly selected sample of residents in the study area, with both recreators and non-recreators included in the sample. These surveys are administered by interviewers who have been trained in the appropriate protocol for soliciting responses over the telephone. Telephone surveys are typically conducted in the evening.

For both the on-site and telephone surveys administered in this study, a broad array of recreational features will be evaluated, including riverside parks, hike and bike trails, boardwalks, observation decks, picnic areas, and boat ramps. Survey questions will be designed to link each recreational feature to individual WTP to secure that feature. Additionally, the questions will be designed to ensure that through econometric analysis a statistically valid estimate of mean WTP can be derived for each feature. In order to include all of these features in the econometric analysis without overloading survey participants with separate WTP questions for each feature, the recreational features will be randomized over survey participants. This procedure involves allocating two to three WTP questions to each participant, with a recreational feature randomly assigned to each question. Including all of the recreational features in a single survey would result in too many questions proposed to the participant and, consequently, would increase the probability that a participant would not complete the survey.

For the on-site survey, a single survey will be designed to collect the necessary information for estimating the recreation demand curves and WTP. A question identifying the survey participant as a birdwatcher, nature trail hiker, angler, canoeist, water skier, camper, picnicker, etc., will be one of the first questions asked and will serve as a means of limiting questions to those pertinent to the respondent. The on-site surveys will be administered twice within a calendar year, once during the fall months (early October to early November) and the second during the spring and summer months (March through September). These two periods should adequately capture current recreational demand associated with the White River. The surveys will be administered across a variety of sites including boat launches, picnic areas, and camp sites. Sites and timing for administering the on-site surveys will be determined by randomly selecting an equal number of weekday and weekend days and then randomly assigning boat launches, picnic areas, and camping sites to these selected days.

The on-site surveys will be administered with the aid of a handheld computer, as opposed to a written survey. The handheld computer will be used for two primary reasons. First, it will allow the surveyor to use one consistent survey for all survey participants. Thus, participants will be asked similar questions—in particular, the question regarding use of new or improved recreational facilities. Second, since all the possible forms of recreation will be included in a

[6] Mail surveys represent a third source of data but are not discussed in this section since the surveys will be administered on site and by telephone.

single survey, the survey will be lengthy. A handheld computer will belie the overall length of the survey (since only a portion of it is pertinent to the participant) and avoid intimidating or scaring off potential participants, as a multiple page survey might do. Refer to Appendix F for an example on-site survey.

In contrast to on-site surveys, a list of potential respondents for the telephone survey will be developed from all residents in the study area. This will ensure that both current (users) and potential new entrants (nonusers) are surveyed. To achieve a representative sample, a specified number of residents will be randomly selected from telephone records. A professional sampling firm (e.g., Survey Sampling, Inc.) will be contracted to generate this list of residents, and a separate firm or university will be contracted to administer the telephone survey. Analysis of the survey results will focus on assessing changes in user and nonuser behavior as site features and costs are changed. For example, it is reasonable to believe that the construction of a new boat launch or a boardwalk would result in an increased number of trips by current users and by nonusers becoming users. The telephone surveys will be augmented with on-site surveys to provide a complete picture of current and potential recreational behavior associated with the White River. Appendix G provides a sample telephone survey.

The number of residents to be randomly selected for the telephone survey will be based on the following sample size formula:

$$n = \{ (s*Z) / e \} \wedge 2 \qquad [1]$$

where n is the sample size or number of surveys to be administered, s is the standard deviation around the mean number of annual trips taken by survey participants, Z is the value from a standard normal distribution that is dependent on the level of confidence selected by the survey designer (e.g., 95 percent level of confidence implies a Z value of 1.96), and e is the level of error around the mean number of annual trips taken by participants that is acceptable to the designer (Yamane 1973, p. 204-205). An acceptable level of error is ±2.5 trips (URS/Dames & Moore, and Greeley-Polhemus Group 2001). Equation [1] will also be applied to the determination of the appropriate sample size for the on-site survey. For both the telephone and on-site surveys, estimates of the standard deviation (i.e., s) will be calculated from the results of pretest surveys.

A small number of pretest surveys will be administered by telephone and in person several months prior to administration of the final surveys. The purpose of these surveys is to obtain information on question clarity, length of time to complete the survey, and range of payment amounts (i.e., Z in Question 13, page E-4). This information will then be incorporated into the final design of the on-site and telephone surveys.

6.0 ECONOMETRIC MODEL FRAMEWORK AND SPECIFICATION

The purpose of exploring the underlying utility theory and data collection methods for the TCM and CVM is to show the link between site features that influence an individual's decision to recreate (or pay for a new recreational feature) and corresponding econometric models that yield demand curves. Under the random utility framework, the dependent variable in econometric estimation is discrete and can be modeled by a number of limited dependent variable models including mixed logit, multinomial logit, and probit. The behavioral model of the TCM is econometrically estimated with either a Poisson or negative binomial model. These models share the limited dependent variable structure of the discrete choice models but differ based on a finite dependent variable. The next two sections describe in greater detail the specifics of the econometric models applied in estimating each valuation method (refer to Appendix H for a more technical analysis of these methods and models). The third section provides a review of specific steps that will be taken to ensure that uncertainty is addressed in the estimation of WTP.

6.1 TRAVEL COST METHOD

The fundamental component of an econometric model for travel cost is a linear relationship between the total number of trips made by an individual (indexed by *i*) and characteristics of the individual, characteristics of the site, and costs associated with each visit. This relationship can be expressed mathematically in the following manner (assuming a single site):

$$TRIPS_i = b_0 + DEMOG_i b^D + ATTRS_i b^A + COSTS_i b^C + e_i \quad [2]$$

where *TRIPS* is the total number of trips made, b_0 is an intercept term, *DEMOG* denotes individual demographics, *ATTRS* denotes site-specific attributes, *COSTS* denotes trip costs, *b* denotes estimated coefficients for each variable, and *e* is an econometric error term. Typical characteristics of an individual that might be included in *DEMOG* include age, household size, wage, and residential location. Site-specific attributes *ATTRS* may include number of access points (such as boat launches), quality of picnic areas, and number of persons seen during visit (surrogate measure for extent of overcrowding). Finally, *COSTS* captures all costs associated with visiting the site, which include an admission fee (e.g., boat launch fee, if applicable), monetary cost of travel (such as gas, wear and tear on the vehicle, food, lodging, etc.), round-trip travel time, and time spent on site.

Once information has been collected for all the terms in equation [2], a count data model, such as the negative binomial (NB), can be applied to the estimation of a recreation demand curve. Estimation of the NB model will yield the estimated demand for trips (i.e., recreation) in terms of trips made per year. A demand curve can then be constructed by varying site attributes (*ATTRS*) or trip costs (*COSTS*) and by observing corresponding changes in number of trips (*TRIPS*) taken.

Finally, WTP for additional trips (*TRIPS**) following an improvement to the recreational site (e.g., a new boat launch) can be calculated from the negative binomial model:

$$WTP(TRIPS^*) = -\exp\boldsymbol{b}'X^* / b^C \quad [3]$$

where $\boldsymbol{b}$ captures the estimated parameters b_0, b^D, and b^A, X^* captures all of the variables (except *COSTS*) including the improved level of *ATTRS* in equation [2]; b^C is the parameter estimate for *COSTS;* and exp is the exponential operator.

6.2 CONTINGENT VALUATION METHOD

The basic premise for the CVM is that an economic value can be derived for an inherently unpriced, or nonmarket, good (e.g., recreational access) by econometrically analyzing individual responses to hypothetical changes in this good. These changes are presented in a survey that asks respondents to choose between the status quo (i.e., the respondent prefers the good in its current state) and an improved (or possibly, degraded) condition. If the improved condition is chosen, then the respondent is asked to choose the maximum amount of money he is willing to pay to secure the change.

Based on the above description of a standard contingent valuation survey, the respondent makes a discrete decision between paying for an improvement in the recreational feature and the status quo. An individual will choose the improved condition rather than the status quo as long as the utility (i.e., satisfaction) derived from the former exceeds that from the latter. For example, suppose the survey presented the individual with two options, one of which contains an improved boat launch with an associated fee of $5 per launch and the other the status quo of no improvements with no fee.[7] The individual will choose the improved boat launch as long as the increase in satisfaction the individual derives from the recreational improvement (including the fee) exceeds the satisfaction he derives from simply utilizing the launch in its present state.

The basic econometric structure for analyzing this choice is a probability model wherein variables from equation [2] are combined in a nonlinear manner to develop predictions of respondent behavior. A probability model is necessary since the analysis relies on intended, as opposed to actual, behavior. Thus, we can only estimate the probability an individual will choose a specific option. The probability model links random utility theory to recreation demand estimation and states that the probability an individual will choose the improved state rather than the status quo is conditional upon the costs associated with the improved condition, specific recreational features, and personal characteristics, such as income and residential location. Given certain assumptions regarding the distribution of the error term, the probability an individual will make this choice can be econometrically modeled by the multinomial logit, mixed logit, or probit models. Parameter estimates derived from estimating one of these limited dependent variable models can then be used to derive WTP measures, i.e., economic values, for a change in recreational attributes *ATTRS* from the status quo level to an improved level:

[7] The launch fee of $5 would represent one possible payment from a list of several fees (e.g., $3, $7, $11, and $25) that would be randomly assigned across surveys.

$$WTP = b^{ATTRS} / b^{COST} \quad [4]$$

where b^{ATTRS} is the parameter estimate for the variable capturing the improved recreational feature and b^{COST} is the parameter estimate for the variable measuring costs incurred by individuals for the improved state.

Contingent valuation can also be linked with the TCM to capture both actual and intended behavior. The methods are combined by simply augmenting standard travel cost questions of respondent origin, monetary costs of travel, and number of trips to the site with a separate question asking the individual to state how many more trips he would be willing to take if the site was improved. Continuing the earlier example, instead of asking the individual if he would be willing to pay a $5 launch fee, the question would be posed in the following way: "If improvements were made to this boat launch such that more than one boat could launch at the same time and parking was expanded, and all other aspects of your trip remained the same (i.e., travel costs and crowding do not change), how many more trips would you be willing to take?" If the average cost per trip is $20 and the average individual states he is willing to take at least one additional trip, then an economic value of $20 per person can be placed on the improvements. Aggregating this value over all current and potential recreators yields the total economic value for the new recreational feature.

Two econometric models can be applied to the analysis of data collected from a linked contingent valuation-travel cost survey. The first is a Heckman or two-stage model. These models are based on a limited dependent variable (i.e., the left hand side of equation [2] can now assume only finite or discrete values) and consist of two stages. In the first stage, the probability an individual will not make additional trips is modeled with a logistic or probit model. In the second stage, ordinary least squares or a negative binomial model is used to empirically estimate the number of trips an individual will take as a function of elements included on the right hand side of equation [2]. Similar to econometric analysis of travel cost data, the Heckman or two-stage model will generate demand, demand curves, and WTP for new recreational features. The second econometric model for analyzing data from a CVM-TCM survey would be an ordered logistic or probit model. However, in order to apply these models, the survey question would have to be phrased in a manner similar to the standard contingent valuation question. That is, the individual would be asked if she would be willing to take *X* more trips (instead of paying $5 in a boat launch fee) if the improvements were made to this boat launch.[8] Analysis of responses to this question would follow the procedures outlined above.

6.3 UNCERTAINTY

Uncertainty will be incorporated into the economic analysis in two primary ways. First, uncertainty will be addressed in the determination of sample size for the telephone and on-site surveys. This will be accomplished by multiplying the original estimated sample size, provided

[8] The additional number of trips is denoted by *X* to indicate that the survey designer has provided the survey respondent with a list of possible choices (see Appendices E and F). The respondent then chooses only one of the available options that best matches the additional number of trips he would take if the boat launch improvements were made.

by calculation of equation [1], by a contingency factor. This factor will serve as a measure of the uncertainty associated with mailing addresses (it is common to have 1 to 5 percent of the surveys returned due to incorrect addresses), incomplete interviews (it is also common to have a small percentage of respondents not complete the survey), and invalid responses. This last category includes protest and yea-saying respondents. Protest respondents refer to individuals who would not pay any amount for the proposed recreational feature because they are opposed to the sponsoring agency or the payment vehicle. Yea-saying respondents refer to individuals who would be willing to pay for the recreational feature regardless of the cost of the feature. Failing to account for these respondents in the economic analysis can result in biased estimates of WTP. A proposed range for the contingency factor applied in this study is 5 to 10 percent of the original sample size.

Uncertainty will also be incorporated into the economic analysis by developing confidence intervals around WTP point estimates. Reporting confidence intervals allows the researcher to present a statistically based range of possible WTP values for each evaluated recreational feature. Thus, the researcher is not restricted to stating that WTP is exactly a certain dollar amount. Either Krinsky-Rob procedures or the Delta method, depending on whether the assumption of normality holds, will be used to develop the confidence intervals.

Beyond efforts to incorporate uncertainty into the economic analysis, residual uncertainty may still exist. Primary sources for this uncertainty include the probability that respondents' expressed intentions differ from actual intentions (a common problem with stated preference methods), flaws in the survey, or flaws in survey administration. Efforts will be taken to design the survey to minimize residual uncertainty.

7.0 SUMMARY AND STUDY PLAN FOR PHASES II AND III

This first phase report identified the Study Area for the recreation analysis of the White River Navigation Improvement Project, provided an inventory of recreation opportunities in the Study Area, reviewed environmental valuation methods and surveys that will be used in Phases II and III, and developed a Study Plan (or Scope of Work) for these two phases. The Study Area was defined by a 50-mile buffer around the section of the White River under study. This distance corresponds to a one-hour travel time and addressed the potential service areas surrounding proposed recreational improvements. The 50-mile buffer was based on findings that the White River is a unique resource in the region that offers relatively deep draft for riverine boating activities. The proposed Study Area is located within the Lower Mississippi Delta Region and includes twenty-eight Arkansas counties.

An alternate delineation of the Study Area was also provided in this report. A radius of 25-miles, or 30 minutes, was considered. This consideration was based on the possibility that the final proposed recreation plan components will not include boat launches or other access improvements to the White River. If this is the case and recreational features such as picnic areas, boardwalks, and hiking trails are presented as alternative improvements, then the Study Area is better reflected by a 30-minute buffer around the study reach of the White River. The final components of the recreation plan will dictate whether the final study area will be a 50-mile or 25-mile buffer.

The inventory of recreational opportunities was facilitated by geographic information systems and interviews with town representatives, refugee managers, and local stakeholders. Recreational features inventoried included picnic areas, camping sites, boat launch ramps, state parks, and wildlife management areas. Analysis of this inventory showed deficiencies in recreational opportunities, primarily nonconsumptive opportunities, by proximity to the White River. Based on the proposed Study Area and recreational opportunity inventory, a list of potential recreational opportunities was generated. These opportunities were primarily concentrated on nonconsumptive recreation and include hiking trails with overlooks of the River, picnicking and camping areas, and wildlife observation points.

Two valuation methods, TCM and CVM, and several limited dependent variable econometric models were presented as means for determining the economic benefits associated with alternative recreational opportunity enhancement plans. Both TCM and CVM are well-known techniques for deriving economic values for unpriced recreation benefits. The theoretical and data-generating structure of these methods will enable calculation of the economic benefits associated with recreation on and along the White River. Moreover, application of these valuation methods will permit an economic comparison of alternative enhancement plans. The principal form of data collection for the TCM and CVM will be on-site and telephone surveys. This report provided drafts of each of these surveys. Finally, several econometric models were presented for analysis of data collected from these surveys, representing the multiple ways in which this data can be analyzed.

There are two additional phases of the recreation analysis of the WRNIP. The second phase will finalize the survey questionnaires, determine a schedule for survey administration, perform a pretest of questionnaires, and design an electronic database. The final phase will include:

- development of a specific plan of recreation improvements and associated costs;
- statistical and econometric analysis of completed questionnaires;
- estimation of user days for each resource;
- determination of economic benefits (specifically, estimation of changes in consumer surplus);
- completion of a risk and uncertainty analysis; and
- final report preparation.

Refer to Appendix B for the complete study plan and SOW for Phases II and III.

Collectively, these three study phases will provide a complete assessment of the opportunities and economic benefits associated with outdoor recreation in the White River Study Area. A separate report will not be produced for Phase II. Instead, a written final report will be produced in conjunction with the Phase III analysis. This report will provide a comprehensive summary of Phases I, II, and III. Additional products provided at the conclusion of Phase III will include all the GIS data that were used to complete the contract, web site useable information, photo-documentation, and returned surveys (from both Phase I and II interviews).

8.0 REFERENCES

Arkansas Department of Parks and Tourism. Arkansas 1995 Statewide Comprehensive Outdoor Recreation Plan. Little Rock, AR.

James City County, Virginia. 2003. Comprehensive Plan. Obtained from http://www.jccegov.com/about/2003CompPlanUpdate/CompPlan2003PDFFiles/parkrec.pdf.

Long, J.S. 1997. Regression Models for Categorical and Limited Dependent Variables. Sage Publications, London.

McFadden D (1981) Econometric models of probabilistic choice, in Manski C & McFadden D Structural Analysis of Discrete Data with Econometric Applications, MIT Press, Cambridge, MA, pp. 198–272.

Ministry of Culture and Recreation, Sports and Fitness Division. 1975 + [date unknown]. Guidelines for Developing Public Recreation Facility Standards. Ontario, Canada. Obtained from http://www.lin.ca/lin/resource/html/jk52.htm.

National Library of Medicine, Specialized Information Services. 2004. TIOP Demonstration: Mississippi Delta Project. Obtained from http://www.sis.nlm.nih.gov/tiop/miss01.htm.

National Parks and Recreational Association. 1993 (revised 1996). Parks, Recreation, Open Space, and Greenway Guidelines.

Platte County Missouri. 2001+ [date unknown]. Park Master Plan. Obtained from http://www.co.platte.mo.us/parks/geninformation.htm.

The Nature Conservancy. 2004. Big Woods of Arkansas. Obtained from http://nature.org/exclude/print.php of the Nature Conservancy.

U.S. Army Corps of Engineers. 1979. Feasibility Report for the White River Navigation Study to Batesville, Arkansas. Memphis District.

U.S. Census Bureau. 2000 Census of Population and Housing. Accessible online at http://www.census.gov/prod/cen2000/index.html.

U.S. Army Corps of Engineers. 2003. 2003 Preliminary Draft White River Navigation General Reevaluation Report. Memphis District.

URS/Dames & Moore and Greeley-Polhemus Group. 2001. Lower Atchafalaya Reevaluation Study: Recreational Study. URS/Dames & Moore, Bethesda, MD, and Greeley-Polhemus Group, West Chester, PA.

Yamane T. 1973. Statistics: An Introductory Analysis. Harper, New York.

Appendix A

Scope of Work for Phase I

Preliminary Draft
WHITE RIVER NAVIGATION GRR
RECREATION STUDY
SCOPE OF WORK for PHASE I
Contract No. DACW66-01-D-0005
Delivery Order No. 0010

9 December 2003

1. PURPOSE:

The USACE, Memphis District (MVM) requires reconnaissance-level, preliminary study directed at recreational analysis along the lower White River, Arkansas. This scope-of-work is to identify the Contractor's activities to be performed for this phase of a recreation study and the report that is due upon completion of this phase of work. All work conducted under this task order shall be in compliance with pertinent USACE Civil Works planning and recreational regulations.

2. ACTIVITIES:

The contractor will perform the following activities for this phase of the White River Navigation General Reevaluation Report (GRR) recreation study:

a. Refine recreation study area.

b. Inventory existing recreational opportunities. Literature search and mail surveys supplemented with document telephone interviews (See Enclosure 1) to identify existing recreation within the study area in particular the four river towns of Newport, Augusta, Des Arc, and Clarendon.

c. Conceptualize the econometric models needed to generate the demand curves

d. Develop a Plan of Study including costs.

e. Develop draft survey questionnaire(s) and draft mailing list. Survey questionnaire needs to collect information for both contingent value method and travel cost method. Plus, the questionnaire needs a question to identify protest responses.

The results of this effort may be used by MVM to support and guide additional recreational survey and analysis for a more complete study of recreational needs for this project.

3. REPORTS:

A preliminary summary letter report shall be produced following the *basic* completion of activities, but preceding submittal of a full draft report. Draft and final reports are due upon completion of all work activities and they will include the following as a minimum:

a. A write-up of activities and contacts.

b. A write-up identifying the study area and existing recreation that was developed from the literature search and interviews.

c. A Plan of Study for recreation survey and plan development, including estimated cost.

d. A write-up of the econometric models needed to generate the demand curves.

e. Copy of draft survey questionnaire(s) and draft mailing list.

All above is to be generated in an electronic media compatible with Microsoft Word and the Corps' communication format. Initial draft of report shall include five hard copies and the electronic version. Final draft of report shall be of same quantity (5) regarding hard copies.

4. MATERIALS AND SUPPORT PROVIDED BY MVM:

- USGS topographic maps and White River navigation charts.
- Use, if requested, of GIS data existing at MVM.
- Informal briefings from MVM staff regarding current MVM activities planned or existing in the recreational study area (e.g. MVM's existing navigation maintenance program, White R. Comprehensive Basin Study, etc.). Such briefings, if necessary, are to be coordinated with POC listed at end of this document.

5. SCHEDULE:

- Start work – Not Later Than (NLT) 10 days following Notice to Proceed (NTP). (estimate NTP will be 15 January 2004).
- Submit preliminary summary letter report (precedes full draft report) on or about 1 April 2004.
- Initial Draft Report, 5 copies and electronic on or about 15 May 2004.
- (MVM review of initial draft and return comments to Contractor; ITR presentation by Contractor takes place during this time).
- Final Report, 5 copies and electronic on or about 1 July 2004.

6. INDEPENDENT TECHNICAL REVIEW:

Contractor will provide a representative for an in-progress review conference with MVD to support MVM's Quality Assurance Program.

7. OTHER:

The project study area is anticipated to include portions of US Fish and Wildlife Service (USFW) National Wildlife Refuges. These USFW lands are tangent to a substantial length of the lower White River channel or its tributaries. The Contractor shall contact the POC listed below

prior to conducting information-gathering associated with USFW lands, or planning physical visitation.

8. POC:

If you have any questions about the White River GRR, please contact Jim Lloyd at 901-544-3343; james.w.Lloyd@mvm02.usace.army.mil

ENCLOSURE 1

The following are individuals that can provide recreation information within the study area:

A. Bryan Kellar, Director
Outdoor Recreation Grants Program
Arkansas Department of Parks & Tourism
Office 501-682-1301;
Fax 501-682-0081
bryan.kellar@mail.state.ar.us

B. Harvey Joe Sanner, State President
American Agriculture Movement, Inc. of Arkansas
Box 950, Des Arc, Arkansas 72040
501-516-7000
Hjsanner@aol.com

(Mr. Sanner is a good source of info and contacts for the four river towns on the White River.)

C. Craig Uyeda, Chief of the River Basins and Governmental Relations
Division for the Arkansas Game and Fish Commission
501-978-7303
ckuyeda@agfc.state.ar.us

D. Ian McDevitt
U.S. Army Corps of Engineers MVM Economist
for the White River GRR
901-544-0741
ian.mcdevitt@mvm02.usace.army.mil

E. Erwin Roemer
USACE MVM archeologist and NEPA coordinator
for the White River GRR
901-544-0704
erwin.j.roemer@mvm02.usace.army.mil

Appendix B

Scope of Work for Phases II & III

WHITE RIVER NAVIGATION GRR
RECREATION BENEFITS STUDY
SCOPE OF WORK/PLAN OF STUDY
PHASES II AND III

1. INTRODUCTION:

The USACE, Memphis District (MVM) requires a reconnaissance-level, preliminary study directed at economic analysis of recreation along the lower White River, Arkansas. The Scope of Work for these Phase II and III activities follows upon work performed under Phase I activities between February and May 2004. The Phase I activities consisted of the flowing tasks:

- Refine the recreation study area
- Inventory existing recreational opportunities. (Literature search and mail surveys supplemented with documented telephone interviews to identify existing recreation within the study area, in particular the four river towns of Newport, Augusta, Des Arc, and Clarendon.)
- Conceptualize the econometric models needed to generate the demand curves
- Develop a Plan of Study including costs
- Develop draft survey questionnaire(s) and draft mailing list. (Survey questionnaire needs to collect information for both contingent value method and travel cost method. Plus, the questionnaire needs a question to identify protest responses.)

Phase II will consist of two primary components, an economic component and a recreation plan development component:

Economics

- Finalizing the resources to be tested
- Performing a pretest of survey instruments
- Finalizing the survey instruments
- Finalizing the survey pool
- Developing a survey schedule
- Designing the database

Recreation Plan

- Augmenting the GIS database
- Developing alternative conceptual level recreation plan components
- Developing cost estimates for each component
- Re-interviewing local representatives and stakeholders (from Phase I interviews)

Phase III will consist of:

Economics

- Estimating user days for each resource
- Conducting surveys
- Analyzing results
- Applying results to the demand model
- Calculating benefits
- Developing confidence intervals
- Preparing draft and final report

Recreation Plan

- Conducting public meetings with local stakeholders

2. SCOPE OF WORK – PHASE II:

The projected timeline for completion of Phase II work is between 2 and 3 months.

Finalize the Resources to be Tested

URS shall work closely with MVM to determine which resources should be tested. It is anticipated that URS will evaluate two categories of use: water-based and land-based. Water-based recreation includes motor boating, canoeing, kayaking, water skiing, and fishing. Land-based recreation includes picnicking, bird watching, sight-seeing, and hiking.

Perform Pretest of Survey Instruments

URS will conduct a pretest of two survey instruments: one for current users and one for new entrants. The purpose of the pretest is to ensure that respondents understand the questions and are able to give valid, accurate, unambiguous answers. The first survey will focus on estimating the change in the number of trips for current users as well as their expenses. The change in trips will be a function of new recreational features such as boat launches, picnic areas, lookouts, trails, and visitor centers. The specific features will be randomly varied among the respondents. The second survey will focus on respondents who do not currently use the White River for recreation. The pretest of the two surveys instruments will be performed through both in-person and telephone interviews.

Finalize the Survey Instruments

Following the pretest, URS will finalize the survey instruments. URS will send all survey forms to OMB for approval.

Finalize the Survey Pool

URS will finalize development of the list of current users and potential new entrants. This step primarily involves dividing current users and new entrants into two groups (see below), calculating the sample size for each group, and finalizing the list of potential survey participants:

- Current Users
  - Water-Based Users
  - Land-Based Users
- New Entrants
  - Water-Based Users
  - Land-Based Users

Develop a Survey Schedule

URS will develop a survey schedule that maximizes the number of surveys conducted per day but also captures variations in seasonal use. Most of the surveys would be performed between April and November. A random number generator will be used to assign actual survey dates. Each survey date would have associated with it an alternate "rain" date.

Design Database

URS will design a relational database using Microsoft Access. This database will serve as the repository of the data collected during Phases II and III.

Conceptual Recreational Plan Development

URS will develop the components of the conceptual recreation plan through close coordination with local communities / potential sponsors. Specific elements addressed in this part of Phase II include:

- Augmentation of GIS Database: URS will augment the geographic information system established for the project with property ownership of project lands and available Color Infrared Aerial Photography, USGS GAP data, and other information to help identify potentially suitable land parcels for the type of recreational improvements under consideration. Non-project lands potentially available for recreation development noted in the previous phases will also be identified in the GIS database.
- URS will develop alternative conceptual level recreation plan components based on GIS data and spatial data analysis of population, existing recreation facilities and resources, prior community and agency meetings, project and off-project land availability, and previously identified recreation opportunities. This process will consist of identifying specific locations and sites along with conceptual level type improvements and features to be implemented at each location. Proposed improvements and features include hiking trails, observation decks, boardwalks, boat launches, camping sites, and picnic areas. Additionally, improvements in access, parking, restrooms, and utilities will be considered.

- URS will develop preliminary cost estimates for each proposed recreational feature and improvement. Cost estimates will be developed using average unit cost pricing.
- URS will discuss the alternative conceptual level recreation plan features under consideration. These meetings will be used as a forum to work with local stakeholders to refine and improve the alternatives under consideration, consider any new alternatives, prioritize alternatives from local perspectives, and discuss potential sponsorship of possible recreation improvements.

3. SCOPE OF WORK – PHASE III:

The projected timeline for completion of Phase III work is between 5 and 7 months.

Estimate User Days

URS will estimate annual user days for each resource. The estimations will be based on available information such as fishing licenses, hunting licenses, boating licenses, other surveys, etc.

Conduct Surveys

URS will conduct the full surveys in accordance with the protocol developed during Phase II.

Analyze Results

URS will enter all of the survey information into an Access database. Several initial queries will be run to search for outliers that would indicate that a respondent misunderstood a survey question. Responses that are unreasonable will be removed from further analysis. Protest responses will be analyzed separately.

Apply Results to Demand Model

The data collected will be statistically analyzed using the models developed in Phase I.

Calculate Benefits

URS will use the annual user day, willingness to pay, and time saved (for users that switch boat access points) estimations to calculate average annual benefits. It is important to ensure that the benefits are National Economic Development benefits as described in Principles and Guidelines; regional benefits can not be counted as NED benefits.

Evaluate Alternatives

URS will perform a benefit-cost analysis for each proposed recreational feature. These analyses will address uncertainty in reported recreation benefits, costs, and associated benefit-cost ratios through the development of confidence intervals. URS will estimate confidence intervals around calculated estimates of WTP using either the Krinsky-Rob method or the delta method (depending on whether the assumption of normality holds). Additionally, URS will estimate confidence intervals around cost estimates of proposed recreation plan components. Reasonable probability distribution assumptions, such as normal and triangular, will be applied in the analysis. Results of the benefit-cost analysis for each plan component will be reported as a range, as opposed to a specific point estimate.

Conduct Public Meetings

URS will conduct public meetings to present potentially viable alternatives and estimated costs in order to further discuss potential sponsorship of the proposed alternatives. Projected recreational use and improvement costs determined in earlier steps of this concept plan development will be presented to potential sponsors. Final recreation plan components to be included in the economic analysis will be determined based on these meetings.

Prepare Draft and Final Report

In the project report, URS will describe in detail the methodology, results and conclusions. The report will be consistent with and apply methods recommended in ER 1105-2-100. The main section headings will be:

- Introduction
- Study Approach/Methodology
- Results and Discussion
- Conclusions

MVM will review the draft report within four weeks. URS will respond to the comments and make the changes within an additional four weeks.

4. MEETINGS:

URS will attend two meetings at the Memphis District. The first meeting will be held close to the conclusion of Phase II. The second meeting will be held following the submittal of the draft report during Phase III.

Appendix C

Minutes of Meetings Held Between March 8 and 10, 2004 in the White River Study Area, Arkansas

Appendix C
Minutes for Meetings Held Between March 8th and 10th, 2004 in the White River Study Area, Arkansas

March 8th

USACE, MVM Representatives

Erwin Roemer, Archeologist

Ian McDevitt, Economist

- Indicated that the recreational survey should have questions regarding recreational user response to increases in not only fish stocks, or catch rates, but also new camping sites, boardwalks – i.e., activities associated with nonconsumptive recreation
- Additionally, mentioned that the recreation use survey should have both travel cost and contingent valuation components
- Discussed the lack of specific information on recreation in the GRR and how this trip should be used to gather information to develop a plan of study for the recreation component
- Noted the need to assess the potential for recreational opportunities and define areas where recreational opportunities would have the greatest impact
- Overall, the USACE wants objective information in order to counter future potential criticisms
- Ian mentioned that he had notes from earlier meetings with local areas in regards to recreational opportunities/costs
- Mentioned Red River Waterways Project as a possible template for the recreational opportunities component (as opposed to demand/valuation component) of this study – contact Vicksburg office for report
- Highlighted desire to have interpretive centers in towns of Newport and Des Arc (especially Des Arc because of proximity to I-40) – mentioned the new interpretative center in St. Charles as a possible example to follow
- Discussed the possibility that wing dikes may lead to reductions in fish stocks because the dikes (may) simply redistribute existing stocks while focusing fishing effort of anglers; thus, benefits of wing dikes will be site specific and this specificity will need to be incorporated in the Travel Cost/Contingent Valuation survey – Dr. Jack Kilgore is the fisheries expert for this matter

Arkansas Game and Fish Commission

Alice Browning, Division of Licensing

- Provided information on hunting and fishing license sales for the White River area, by county for the last 5 years
- Indicated that improved access, such as boat launches, would help to increase decreasing sales

Craig Uyeda, Chief of the River Basins and Governmental Relations Division for AGFC

- Highlighted the fact that he did not have a great deal of recreation information and referred us to Jim Sullivan and Jeff Hartwick, district managers in the Brinkley, AR office**

- Also referred us to Alan Mueller of the USFWS for nonconsumptive recreation information*
- Mentioned recreation use survey conducted in 1995 that found enhanced nonconsumptive recreation to be the second most desired improvement in Arkansas Game and Fish programs – referred us to Nancy Ledbetter of AGFC for more information on this survey*
- Directed us to county level maps that had locations of all boat launches and access points
- Introduced us to Tracy Moy, GIS specialist with AGFC, who then directed us to their website GEOSTORE for wildlife related GIS information (in particular, Wildlife Management Areas)
- Indicated that the location of new boat launches was driven by demand (i.e., if enough people express interest in a new launch), but ultimately determined by district biologists – overall, though, it was an informal selection process
- Indicated that improving or establishing new launches along the White River would cost no less than $100,000

Arkansas Department of Parks and Tourism

Bryan Kellar, Director of Outdoor Recreation Grants, Arkansas Dept. of Parks and Tourism

- Noted substantial to total data gap in recreation information
- Provided us with the 1995 SCORP (Statewide Comprehensive Outdoor Recreation Plan) – indicated that a more recent SCORP had been completed but that it was not very worthwhile
- Indicated that the White River area is more oriented toward hunting and fishing, as opposed to nonconsumptive uses
- Discussed the Delta Heritage Trail and possibility of a "Rails to Trails" plan
- Indicated that he would be willing to provide financial assistance for the recreation assessment, as this information would be beneficial to the development of their next SCORP
- Indicated that a telephone survey might be more useful than an onsite survey because there are few recreational facilities in the White River area
- Indicated that he would provide information on local recreational facilities once we identified our study area

Newport Chamber of Commerce

Julie Allen, Director of NCC

Russell Harris, Director of Economic Development Commission

Ralph McDonald, Member of White River Coalition

Gay Lacy, Representative for Arkansas Waterways Commission

- Indicated desire for hiking trails, camping sites and boat launches
- Discussed State Park in Jacksonport, AR and the recreational facilities/opportunities that could be enhanced at the Park

- Indicated that they would like to see a previous study completed by URS or the USACE on a similar stream project in order to give them a good idea of the types of recreational opportunities that might be constructed/enhanced along the White River
- Highlighted need for AR Dept. of Parks and Tourism and AGFC to be on-board in order to help garner public support for the White River project and for cost-sharing any proposed recreational facility

March 10th

Augusta Chamber of Commerce (ACC)

Virginia Boyles, President of ACC

Gayne Schmidt, White River Conservancy

Nathan Gregory, Local farmer and outdoorsman

- Stated that recreation was the primary business in Augusta (greater than farming)– recreation has led to bed and breakfast demand, supports business related to recreation, such as gun shops and machine repair shops, and provides additional income to farmers
- Noted an increase in duck hunting (farmers are aggressively pursuing pit construction and habitat improvement projects to attract more hunters)
- Stated that they start receiving phone calls in August for leasing hunting property and that by September all hotels are booked
- Mentioned recreational boating, such as houseboats and skiing, and sand bars as river associated recreation
- Mentioned that they hold an annual bass tournament on Memorial Day Weekend as well as frequent senior citizen fishing trips
- Interested in pursuing to a greater extent cruise tours on the White River
- Stated that recreators come from all over
- Would like to see bird watching promoted in their area
- Highlighted importance of flooding along the White River for hunting and fishing and expressed concern that the wing dikes would reduce overflow
- Also, that wing dikes would lead to diminished numbers and quality of spawning grounds for fish because of reduced overbank flooding – noted increase in fishing opportunities around dikes, but wondered for how long this would last
- Expressed concerns that the entire ecological system would be disrupted if the project was implemented
- Expressed concerns over the project disrupting the water table – i.e., reduced overbank flooding would lead to reduced recharging of underground aquifers
- Expressed concerns that the project would lead to dredging and construction, which would increase noise and congestion in the White River area that would drive off wildlife
- Mentioned a waterfowl study conducted by Arkansas Wildlife Federation

- Mentioned that the City of Augusta has purchased land (~ 10 acs) near the river for a city park and would be interested in cost-sharing for its construction
- Noted that the USACE constructed a boat launch which led to an increase in river associated recreational demand
- Noted that there is a demand for additional recreational opportunities in the community
- Mentioned that the city owns an historic log cabin, which is on the National Register, located along the river – would like to enhance this cultural resource with a riverfront park
- Noted that they would like to have a viewing pier
- Mentioned private land as the primary impediment to accessing the White River – stated that landowners are resistant to easements but may be in favor of leasing their land
- Mentioned Taylor Bay as a primary location for recreation – has a few boat slips and about 20 homes

Cache National Wildlife Refuge

Dennis Widener, Refuge Manager

- Stated that the majority of recreational use is consumptive with primary activities including commercial fishing, turteling, duck and deer hunting
    - Waterfowl is the biggest attraction - duck hunting has increased 30 to 40 fold over last 10 years
- Mentioned that all Arkansas State Wildlife Management Areas in the White River area have been designated national wetlands
- Highlighted the importance of preserving the natural hydrology of the White River and the importance of overbank flooding for dietary purposes and wintering activities of waterfowl – provides for fish nurseries and spawning
- Mentioned that the Cache and Lower White River Basin provide for all life stages of birds
- Mentioned that land is valued/appraised for its recreational value, not farming potential
- Stated that he maintains informal use numbers through the number of permits issued – he assumes that for each permit issued, 3 trips are taken (number of visits per permit is unbounded) and they issue around 40,000 permits annually – accordingly, 120,000 hunter visits to the Cache
    - Use numbers for anglers computed in similar manner – assumes around 30,000 angler visits annually
- In regards to the travel cost survey, mentioned that anglers would be more receptive to a question that was phrased in terms of increase in catch rates, as opposed to increase in fish stock levels
- Mentioned that he has provided access to some oxbow lakes through road and boat launch construction

- Noted that he has not provided the USACE with recreation information, or ideas for future recreational projects, because they do not want this information to be seen as a tradeoff for the Navigation project
- Mentioned that he is actively pursuing the purchase of bottomland hardwood areas and adjacent fields to increase and improve waterfowl habitat
- Noted that canoeing activity is on the rise in the Cache, which may lead to increased interest in other nonconsumptive uses, such as bird watching
- Mentioned short-lived benefits of wing dikes since eventually they fill with sediment – noted book authored by Jack Kilgore on this very issue
    - Also noted that wing dikes disrupt food chain in the river
- Mentioned that a survey by the USFWS of the benefits refuges provide to local communities will more than likely be conducted this winter – only 4 or 5 refugees across the nation will be selected for the survey

American Agricultural Movement, Inc.

Pat Mullen, land manager and friend of Harvey J. Sanner

- Mentioned they would like to see excursion boats for wildlife viewing, especially eagle watching
- Would like to double boat ramp access if the Navigation project is approved
- Mentioned that the project would reduce the amount of dredging by half
- He would like to see a boat launch/fueling dock
- Noted recreational boat use and sand bar parties along the White River
- Noted that duck hunting and fishing were two primary recreational activities associated with White River
- Mentioned that the city owns two tracts of land, one is 22 ac and the other 40 ac, both located along the river
- Expressed interest in a boardwalk
- Noted that the city has a park along the river and a boat launch constructed by the USACE; additionally, the city just constructed a lighted, paved walkway that extends for about 3 blocks and runs adjacent to the river
- Expressed interest in the possibility of enhancing access to the primary sand bar, which is located at the 22 ac tract
- Expressed interest in improving the riverfront park and the possibility of constructing an amphitheater

Des Arc Chamber of Commerce

Dwight Hill, President

Terri Gross, District Bookkeeper and head of the Recreation and Tourism Committee for Des Arc

- Des Arc is in the infancy stages of improving tourism
- Education, through advertising and marketing, is one of their primary tools for trying to improve recreation in the Des Arc area
- Mentioned the idea of an RV park

- Stated that approximately 60% of users are from out-of-town and the residual local – primary draws for out-of-town users include duck and deer hunting
- Noted that there are no motels in the area and that they would like to see a lodge constructed
- Mentioned Garth Hardware Store, adjacent restaurant, and White River Motors as possible alternative survey locations (in addition to boat launch)
- Highlighted underutilized resources – the natural resources are there, the demand is there, but the ability to meet the demand is not
- Would like to see picnic areas developed around the boat launch
- Mentioned that a grant had been awarded to the city to construct a four-wheel drive trail

March 11th

City of Clarendon

Don Boshers, Mayor

Rachelle Moore, Director of Visions for Clarendon

- Emphasized hunting, fishing and recreation and that industry is not interested in their city
- Stated that deer and duck hunting are primary activities, followed by fishing – canoeing and recreational boating are not primary activities
- Noted that there is only one reliable access point (i.e., boat launch) to the White River – they would like to put in a high water launch at the RV park
- Mentioned that Clarendon used to have a beach (during 1960's) in close proximity to the town, but the land was transferred to USFWS and the beach is no longer open
- Mentioned that they have developed a Strategic Plan outlining goals and future for Clarendon
    - Their mission statement is that if they can improve the environment they can improve the economy, which will in turn improve the community
    - Their focus is on ecotourism
- City of Clarendon just completed a Tourist Welcome Center with 11 exhibits, which they have agreed to send us copies of
- Received a grant to construct a butterfly garden
- Nearing completion of an RV park
- Just completed construction of a fishing pond near downtown Clarendon
- Hold the Big Woods Birding Festival on May 22nd – have held the festival for two consecutive years and won best new Arkansas festival last year
    - Festival attracted 600 people in the first year and 800 in the second year
    - Festival consists of butterfly walks, boat rides on the White River, birding tours, etc.

  - Indicated that the best time to capture nonconsumptive recreational use associated with the White River in Clarendon would be during this festival
  - Festival funded mostly with T21 (transportation) grants
- Highlighted history of Clarendon as a Civil War town
- City of Clarendon has 17 buildings on the National Register
- Mentioned that Clarendon is located just 15 minutes from the Louisiana Purchase Park
- Mentioned that Clarendon is located in the flyway for migratory birds
- Noted that they are actively pursuing the Mississippi Flyway Commission to have their town listed on the Commission's Tour
- Noted that Visions for Clarendon started the Delta Rivers Regional Tourism Council (DRRTC), which consists of the counties Monroe, Lee, Phillips, and Arkansas
  - DRRTC has a tourism coordinator (Rachele will provide the coordinator's information) that helps local businesses get started, conducts tours, and has created a tourism video
- Stated that they could provide assistance during the interview process

KEY:

* indicates that a follow-up meeting occurred with the individual(s) listed in the statement

** indicates that a follow-up meeting did not occur

Appendix D

Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Appendix D
Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Recreational Areas Within the Study Area[1]

Name	Agency	Available Uses
Trusten Holder WMA	AGFC	Hunting, fishing, and 5 areas for primitive camping.
White River NWR	USFWS	Fishing, hunting, wildlife observation and photography, primitive camping, and environmental education.
Bayou Meto WMA	AGFC	Hunting, fishing, 52 primitive campsites, 13 boat ramps, and an observation tower.
Choctaw Island WMA	AGFC	Not yet open to the public.
Holland Bottoms WMA	AGFC	Wildlife and habitat observation.
Cypress Bayou WMA	AGFC	Wildlife and habitat observation.
Prairie Bayou WMA	AGFC	Wildlife and habitat observation.
Smoke Hole Natural Area	ANHC	Wildlife and habitat observation.
Wattensaw WMA	AGFC	Hunting, fishing, 38 primitive campsites, boat ramp, a 28 target archery range, and 3 retriever trial areas.
Bayou Des Arc WMA	AGFC	Hunting, birding, improved and primitive camping.
Cache River NWR	USFWS	Fishing, hunting, photography, canoeing, hiking, and wildlife observation.
Dagmar WMA	AGFC	Hunting, fishing, birding, 14 primitive campsites, and 5 concrete boat launches.
Benson Creek Natural Area	Nature Conservancy and ANHC hold undivided interest	Wildlife and habitat observation and boat access.
Pine City Natural Area	ANHC	Wildlife and habitat observation.
Rex Hancock – Black Swamp WMA	AGFC	Hunting, fishing, and 4 primitive camping areas.
Henry Gray – Hurricane Lake WMA	AGFC	Hunting, fishing, birding, 35 primitive campsites, pavilion, and a 28 target archery range.
Bald Knob NWR	USFWS	Fishing, hunting, photography, and wildlife observation.
Departee Creek WMA	AGFC	Hunting, fishing, and birding.
Steve N. Wilson – Raft Creek WMA	AGFC	Wildlife and habitat observation.
Jamestown WMA	AGFC	Hunting and wildlife observation.
Harold E. Alexander – Spring River WMA	AGFC	Hunting, fishing, canoeing, hiking, birding, boat ramp, and 5 primitive campsites.
Shirey Bay – Rainey Brake WMA	AGFC	Hunting, fishing, primitive campsites, birding, wildlife observation, boat ramps, and handicapped marked trails.
St. Francis Sunken Land and Marked Tree Project WMA	AGFC	Hunting, handicapped marked trails, fishing, birding, and wildlife observation.
Earl Buss – Bayou de View WMA	AGFC	Hunting, fishing, primitive camping, boat launch, and handicapped marked trails.
Whitehall WMA	AGFC	Wildlife and habitat observation.

Appendix D
Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Recreational Areas Within the Study Area[1]

Name	Agency	Available Uses
Brushy Creek WMA	AGFC	Wildlife and habitat observation.
Wittsburg Natural Area	ANHC	No public access.
Village Creek State Park	ADPT	Hiking trails, fishing, marina and boat ramps, 104 campsites, 10 cabins, visitor center, 4 pavilions, playground, multi-use fields, and a driving range.
Lake Poinsett State Park	ADPT	Fishing, 29 campsites, picnic areas, pavilion, playground, trails, boat launch, and rentals.
Pine Tree WMA	AGFC cooperative with U of A	Hunting, fishing, birding, and hiking.
Lee County WMA	AGFC	Wildlife and habitat observation.
Dave Donaldson - Black River WMA	AGFC	Hunting, fishing, birding, and primitive camping.
Pendleton Bend Use Area	USACE	13 campsites, 1 picnic shelter, flush toilets, showers, trailer dump stations, visitor assistance, trash containers and water; day use fee.
Big Lake NWR	USFWS	Boating, fishing, hunting, and wildlife observation.
Big Lake WMA	AGFC	Hunting, fishing, and primitive camping.
Jacksonport State Park	ADPT	Historic courthouse and riverboat, 20 standard A campsites, swim beach, pavilion, picnic areas, playground, Tunstall Riverwalk Trail, entrance fees.
Greer's Ferry Lake	USACE	Toilet facilities, showers, boat ramps, tent and trailer spaces, grills, picnic tables, fishing, and hiking
Jim Kress WMA	AGFC	Hunting, wildlife and habitat observation.
Ozark National Forest	USFS	Fishing, hunting, cabins, camping, picnicking, hiking, wildlife and habitat observation.
Ring Slough WMA	AGFC	Wildlife and habitat observation.
William Brewer - Scatter Creek WMA	AGFC	Hunting, hiking, photography, wildlife observation, birding, pavilion, and primitive camping.
Cut-off Creek WMA	AGFC	Hunting and 4 primitive campsites.
Seven Devils Swamp WMA	AGFC	Hunting, fishing, 2 boat ramps, and birding.
Camp Joseph Robinson WMA and Lake Conway	AGFC	Wildlife and habitat observation.
Great River Road State Park and Bolivar City Lake	MDWFP	61 campsites, visitor center, shelter, picnic area, trails, playground, fishing, and boating.
Lake Chicot State Park	ADPT	Fishing, birding, guided tours, 127 campsites, 14 cabins, pool, pavilions, laundry, playground, store/marina, visitors center, boat and bike rentals.
Lake Monticello	N/A	Water related activities.
Cane Creek State Park	ADPT	Guided tours, hiking, kayaking, biking, birding, 30 campsites, bathhouse, rent RV's, 2 pavilions, visitor center, boat launch, fishing pier, playground, and picnic area.

Appendix D
Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Recreational Areas Within the Study Area[1]

Name	Agency	Available Uses
Lake Ferguson	N/A	Water related activities.
Stoneville WMA	MDWFP	Hunting, wildlife and habitat observation.
Lake Bolivar	N/A	Water related activities.
Lake Whittington	N/A	Water related activities.
Dahomey NWR	MDWFP	Fishing, hunting, and wildlife observation.
Tallahatchie NWR	USFWS	Boating, fishing, hunting, and wildlife observation.
O'Keefe WMA	MDWFP	Hunting, wildlife and habitat observation.
Horseshoe Lake	N/A	Water related activities.
Moon Lake	N/A	Water related activities.
Flower Lake	N/A	Water related activities.
Bear Lake	N/A	Water related activities.
Raiheys Lake	N/A	Water related activities.
Clear Lake	N/A	Water related activities.
Winterville Mounds State Park and Museum	MDWFP	Touring the historic mounds and picnicking.
Crown Lake	N/A	Water related activities.
Lake Bald Knob	N/A	Water related activities.
Bell Slough WMA	AGFC	Hunting, wildlife observation, and a nature trail.
Wolly Hollow State Park	ADPT	Fishing, swimming, canoe and boat rentals, bathhouse, 30 campsites, pavilion, picnic area, and hiking.
Peckerwood Lake	N/A	Water related activities.
Railroad Prairie Natural Area	ANHC	Wildlife and habitat observation.
Little Bayou Meto Park	USACE	General public use.
Lake Langhofer	N/A	Water related activities.
Ethel WMA	AGFC	Wildlife and habitat observation.
Cane Creek Lake	N/A	Water related activities.
Douglas Old River Lake	N/A	Water related activities.
Little Bayou WMA	AGFC	Wildlife and habitat observation.
Lake Grampus	N/A	Water related activities.
Kate Adams Lake	N/A	Water related activities.
Storm Creek Lake Recreation Area	USFS	14 campsites, picnic areas, toilets, boating, boat ramp, bathhouse, swim beach, fishing, pier, and a pavilion.
Old Town Lake	N/A	Water related activities.
Big Creek WMA	AGFC	Fishing and birding.
St. Francis National Forest	USFS cooperative agreement with AGFC	Hunting, fishing, hiking, birding, photography, campsites with restrooms, water source, and picnic areas.
Midway Lake	N/A	Water related activities.

Appendix D
Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Recreational Areas Within the Study Area[1]

Name	Agency	Available Uses
Bear Creek Recreation Area	USFS	31 campsites, toilets, boating, boat ramp, fishing, and fishing pier.
Craighead Forest County Park	Craighead County	General public use.
Lake Frierson State Park	ADPT	Fishing, 4 campsites, restrooms, picnic sites, pavilion, playground, trail, boat ramp, fishing pier, and visitor center.
Crowley's Ridge State Park	ADPT	Four cabins, bathhouse, 26 campsites, picnic area, trails, pavilions, baseball field, fishing, and swimming.
Cattail Marsh WMA	AGFC	Wildlife and habitat observation.
Old Davidsonville State Park	ADPT	Fishing, boat ramp, fishing pier, 49 campsites, picnic areas, 2 pavilions, playground, and 4 trails.
Louisiana Purchase Historical Monument/State Park	ANHC cooperative with ADPT	Interpretive boardwalk, wildlife and habitat observation.
Arkansas Post National Monument/Museum	NPS	Five exhibit buildings showing the history of the Prairie and Delta region; entrance fee.
Prairie County Museum	ADPT	Interpretive museum with entrance fee.
Lake Charles State Park	ADPT	Fishing, 61 campsites, picnic areas, hiking trails, pavilion, boat launch, beach, playground, and visitor center.
Powhatan Courthouse State Park	ADPT	Guided tours of the historic buildings and exhibits.
Parkin Archeological State Park	ADPT	Visitor center, exhibit area, auditorium, gift shop, picnic area, playground, and pavilion.
Toltec Mounds Archeological State Park	ADPT	Visitor center with exhibits, theater, research lab, and trails.
Plantation Agriculture Museum	ADPT	Exhibits and interpretive programs.
Governor Mike Huckabee Delta Rivers Nature Center	AGFC	Trail, exhibit hall, land and multipurpose room, on and off site programs, live animals, wetland area, and a gift store.
Crowley's Ridge Nature Center	AGFC	Exhibit area, observation tower, meeting room, discovery room, auditorium, gift shop, and offices; 5.5 acre prairie, 2.5 acre pond, and 100 acres of woodlands.
Moore Bayou Use Area	USACE	General public use.
Big Bayou Meto Use Area	USACE	General public use.
Notrebes Bend Use Area	USACE	34 campsites, trailer dump stations, visitor assistance, trash containers and water; day use fee.
Wilbur D. Mills Use Area	USACE	21 campsites, 4 picnic shelters, flush toilets, showers, trailer dump stations, visitor assistance, trash containers and water; day use fee.
Jardis Point Use Area	USACE	General public use.
Merrisach Use Area	USACE	64 campsites, flush toilets, showers, trailer dump stations, visitor assistance, trash containers and water; day use fee.

Appendix D
Activities Available at Selected Outdoor Recreational Areas Within 50 Miles of the White River Navigation Improvement Project

Recreational Areas Within the Study Area[1]

Name	Agency	Available Uses
Morgan Point Use Area	USACE	General public use.
Wild Goose Bayou Use Area	USACE	General public use.

[1] The listing of recreational areas within the Study Area follows the key in Figure 1.

Sources: Miscellaneous brochures and interviewers with facility personnel.

Acronyms: ADPT – Arkansas Department of Parks and Tourism; AGFC – Arkansas Game and Fish Commission; ANHC – Arkansas Natural Heritage Commission; MDWFP – Mississippi Department of Wildlife, Fisheries, and Parks; NPS – National Park Service; U of A – University of Arkansas; USACE – United States Army Corps of Engineers; USFS – United States Forest Service; USFWS – United States Fish and Wildlife Service.

Appendix E

Boat/Fishing Access Points by Waterbody, Owner, and County

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
ADHT Lake	ADHT Lake	ADHT	Jackson
Apple Lake	Apple Lake	AGFC	Monroe
Arkansas River			
Tar Camp	Arkansas River	USACE	Jefferson
Regional Park	Arkansas River	USACE	Jefferson
Ste. Marie	Arkansas River	USACE	Jefferson
Sheppard Island	Arkansas River	USACE	Jefferson
Trulock	Arkansas River	USACE	Jefferson
Rising Star	Arkansas River	USACE	Jefferson
Little Bayou Meto	Arkansas River	USACE	Jefferson
Big Bayou Meto	Arkansas River	USACE	Jefferson
Brodie Bend	Arkansas River	Private (fee)	Jefferson
Island Harbor	Arkansas River	USACE	Jefferson
Pendleton Bridge	Arkansas River	USACE	Desha
Pendleton PUA	Arkansas River	USACE	Desha
Morgan Point	Arkansas River	USACE	Desha
Dam 2 West	Arkansas River	USACE	Desha
Notrebes Bend Use Area	Arkansas River	USACE	Arkansas
Moore Bayou Use Area	Arkansas River	USACE	Arkansas
Bayou Meto	Arkansas River	USACE	Arkansas
Cooks Landing	Arkansas River	USACE	Pulaski
North Little Rock	Arkansas River	USACE	Pulaski
Willow Beach	Arkansas River	AGFC	Pulaski
Dam Site East	Arkansas River	USACE	Pulaski
Dam Site West	Arkansas River	USACE	Pulaski
Wrightsville	Arkansas River	USACE	Pulaski
I-430 Bridge Landing	Arkansas River	AHTD	Pulaski
Murray Park	Arkansas River	USACE	Pulaski
Alltel Arena	Arkansas River	NLR	Pulaski
Atkins Lake	Atkins Lake	AGFC	Jefferson
Bald Knob Lake	Bald Knob Lake	Bald Knob	White
Baltz Lake	Baltz Lake	Pocahontas	Randolph
Barnett Lake			
Barnett Lake	Barnett Lake	AGFC	White
Reed	Barnett Lake	AGFC	White
Bayou Bartholomew	Bayou Bartholomew	ADPT	Lincoln

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Bayou de View			
Benson Creek WMA	Bayou de View	ANHC	Monroe
Rock Island RR	Bayou de View	AGFC	Monroe
Hwy. 70	Bayou de View	AGFC	Monroe
Hwy. 38	Bayou de View	Private	Woodruff
Hwy. 306	Bayou de View	Private	Woodruff
Hwy. 145	Bayou de View	Private	Woodruff
Hwy. 64	Bayou de View	Private	Woodruff
Hwy. 269	Bayou de View	Private	Woodruff
Bayou DesArc			
Hwy. 11	Bayou DesArc	Private	Prairie
Beauchamp	Bayou DesArc	Private	Prairie
Bayou Meto			
Wrape	Bayou Meto	AGFC	Jefferson
Cannon Brake	Bayou Meto	AGFC	Jefferson
Bayou Meto	Bayou Meto	AGFC	Arkansas
Highway 79	Bayou Meto	AHTD	Arkansas
Bear Creek Lake			
Bear Creek Lake	Bear Creek Lake	USFS	Lee
Fishing Pier	Bear Creek Lake	USFS	Lee
Hwy. 262	Bear Slough	Private	Woodruff
Belcoe Lake	Belcoe Lake	Private	Desha
Woolly Hollow State Park	Bennett Lake	ADPT	Faulkner
Big Belle Lake	Big Belle Lake	AGFC	White
Hurricane Lake WMA	Big Hurricane Lake	AGFC	White
Black River			
Elgin Ferry	Black River	AGFC	Jackson
Elgin Ferry	Black River	Private	Independence
Black Rock Walk In	Black River	AGFC	Lawrence
Black Rock	Black River	Black Rock	Lawrence
Powhatan Landing	Black River	Private	Lawrence
Coffey	Black River	AGFC	Lawrence
Pocahontas	Black River	Pocahontas	Randolph
Schaffer's Eddy	Black River	AGFC	Randolph
Old Davidsonville State Park	Black River	ADPT	Randolph

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Borrow Pit			
Borrow Pit	Borrow Pit	USFWS	Monroe
Borrow Pit	Borrow Pit	USFWS	Monroe
Bradford Lake	Bradford Lake	Private	White
Brown Pool	Brown Pool	U of A	St. Francis
Burnt Cane	Burnt Cane Lake	AGFC	St. Francis
Cache River			
Dobbs Landing	Cache River	Private	Monroe
Hwy. 70	Cache River	AGFC	Monroe
Sandy Banks	Cache River	Private	Prairie
Broadwater	Cache River	USFWS	Prairie
Black Swamp WMA	Cache River	AGFC	Woodruff
Hwy. 260	Cache River	USFWS	Woodruff
Black Swamp	Cache River	AGFC	Woodruff
Hwy. 64	Cache River	Private	Woodruff
Hwy. 17	Cache River Little	Private	Woodruff
Cane Creek Lake			
Cane Creek	Cane Creek Lake	Private	Lincoln
Earthen Fishing Jetty	Cane Creek Lake	AGFC	Lincoln
State Park Access Area	Cane Creek Lake	ADPT	Lincoln
City Park Lake	City Park Lake	Walnut Ridge	Lawrence
Clear Lake Landing	Clear Lake	Private	Lonoke
Coal Pile	Coal Pile Hole	Private	Desha
Cow Bayou	Cow Bayou	AGFC	Lee
Cox Cypress	Cox Cypress Lake	AGFC	Arkansas
Craighead Forest Park	Craighead F. P. Lake	Jonesboro	Craighead
Hwy. 42	Cross County Ditch	Private	Cross
Crowley's Ridge State Park	Crowley's Ridge State Park	ADPT	Greene
Crown Lake			
Crown Lake	Crown Lake	Horseshoe Bend/Fee	Izard
Fisherman's Park	Crown Lake	AGFC	Izard
Current River Beach	Current River	Private	Randolph
Dagmar Pond	Dagmar Pond	AGFC	Monroe
Deep Bank Slough	Deep Bank Slough	AGFC	White
Devil's Fork			
Prim Bridge	Devil's Fork	AGFC	Cleburne
Tomahawk	Devil's Fork	Private	Cleburne

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Diamond Lake	Diamond Lake	Horseshoe Bend/Fee	Izard
Payneway	Ditch 60	AGFC	Poinsett
Douglas Lake	Douglas Lake	Private	Lincoln
East Lake	East Lake	Private	Monroe
Eleven Point	Eleven Point River	AGFC	Randolph
Flowers Lake	Flowers Lake	U of A	St. Francis
Remmel Park	Fourche Creek	AGFC	Pulaski
Marked Tree	Francis River	AGFC	Poinsett
Siphons	Francis River St.	AGFC	Poinsett
Glaise Creek			
Glaise Creek	Glaise Creek	AGFC	White
Glaise Creek	Glaise Creek	AGFC	White
Glenwood Lake	Glenwood Lake	Private	Arkansas
Green Lake	Green Lake	Private	Monroe
Greers Ferry Lake			
River	Greers Ferry Lake	Private	Cleburne
Tannenbaum	Greers Ferry Lake	Private	Cleburne
Fronteer Canyon	Greers Ferry Lake	Private	Cleburne
Dam Site	Greers Ferry Lake	USACE	Cleburne
Old Hwy. 25	Greers Ferry Lake	USACE	Cleburne
Heber Springs	Greers Ferry Lake	USACE	Cleburne
Eden Isle	Greers Ferry Lake	Private	Cleburne
Cove Creek	Greers Ferry Lake	USACE	Cleburne
Mill Creek	Greers Ferry Lake	USACE	Cleburne
Narrows	Greers Ferry Lake	USACE	Cleburne
Devils Fork	Greers Ferry Lake	USACE	Cleburne
Hill Creek	Greers Ferry Lake	USACE	Cleburne
Cherokee	Greers Ferry Lake	USACE	Cleburne
Shiloh	Greers Ferry Lake	USACE	Cleburne
Little Peter Creek	Greers Ferry Lake	Private	Cleburne
Halowell	Halowell Reservoir	AGFC	Arkansas
Hammans	Hammans Reservoir	Private	Arkansas
Hickson Lake	Hickson Lake	AGFC	Monroe
Hill Slough	Hill Slough	AGFC	Lawrence
Honey Lake	Honey Lake	AGFC	White
Horn Lake	Horn Lake	Private	Prairie

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Horseshoe Lake			
Horseshoe Lake	Horseshoe Lake	USFWS	Prairie
Horseshoe Lake	Horseshoe Lake	Private	Woodruff
Horseshoe Lake	Horseshoe Lake	AGFC	Lawrence
Indian Bay	Indian Bay	Private	Monroe
Jerden Brake	Jerden Brake	Private	Lonoke
Kansas Lake	Kansas Lake	Private	Monroe
Moore's Farm Access	Kate Adams Lake	AGFC	Desha
L'Anguille River			
Whitehall	L'Anguille River	AGFC	Poinsett
Marianna	L'Anguille River	Marianna	Lee
Hwy. 306	L'Anguille River	Private	St. Francis
Hwy. 261	L'Anguille River	Private	St. Francis
Hwy. 70	L'Anguille River	Private	St. Francis
Hwy. 64	L'Anguille River	Private	Cross
Hwy. 364	L'Anguille River	Private	Cross
Hwy. 42	L'Anguille River	Private	Cross
Hwy. 284	L'Anguille River	Private	Cross
Weber	Lagrue Bayou	USFWS	Arkansas
Lake Austelle	Lake Austelle	ADPT	Cross
Lake Charles			
Lake Charles State Park	Lake Charles	AGFC	Lawrence
Lake Charles	Lake Charles	AGFC	Lawrence
Flippo's Landing	Lake Charles	Private	Lawrence
Lake Conway			
Palarm Creek	Lake Conway	AGFC	Faulkner
Pierce Creek	Lake Conway	AGFC	Faulkner
Lake Conway Dam	Lake Conway	AGFC	Faulkner
Brannans	Lake Conway	Private (fee)	Faulkner
Lake Conway Landing	Lake Conway	Private (fee)	Faulkner
Paradise	Lake Conway	Private (fee)	Faulkner
Hwy. Landing	Lake Conway	Private (fee)	Faulkner
Adams Lake Landing	Lake Conway	AGFC	Faulkner
Gerald Ward Fishing Pier	Lake Conway	AGFC	Faulkner
Camp Robinson WDA	Lake Conway	AGFC	Faulkner
Lawrence Landing	Lake Conway	AGFC	Faulkner

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Lake DesArc	Lake DesArc	AGFC	Prairie
Lake Dunn	Lake Dunn	ADPT	Cross
Lake Frierson			
Lake Frierson	Lake Frierson	ADPT	Greene
Primitive Campground	Lake Frierson	AGFC	Greene
Lake Greenlee			
Greenlee	Lake Greenlee	AGFC	Monroe
Greenlee South	Lake Greenlee	AGFC	Monroe
Hogue	Lake Hogue	AGFC	Poinsett
Lake Pine Bluff	Lake Pine Bluff	AGFC	Jefferson
Lake Whitstine	Lake Whitstine	Private	Independence
Little Bayou Meto			
Little Bayou Meto	Little Bayou Meto	AGFC	Arkansas
Upper Vallier	Little Bayou Meto	AGFC	Arkansas
Lower Vallier	Little Bayou Meto	AGFC	Arkansas
Long Pond	Little Bayou Meto	AGFC	Arkansas
Harold Ives Impoundment	Little Bayou Meto	AGFC	Arkansas
Tipton	Little Bayou Meto	AGFC	Arkansas
Little Red River			
Ramsey	Little Red River	AGFC	White
Riding	Little Red River	AGFC	White
West Point	Little Red River	AGFC	White
Nimo	Little Red River	AGFC	White
Hurricane Lake WMA	Little Red River	AGFC	White
Pangburn Bridge	Little Red River	AGFC	White
Searcy Landing	Little Red River	Searcy	White
Barnett	Little Red River	AGFC	Cleburne
Lobo	Little Red River	AGFC	Cleburne
Dripping Springs	Little Red River	AGFC	Cleburne
Pangburn Bridge	Little Red River	AGFC	Cleburne
Cow Shoals	Little Red River	AGFC	Cleburne
Libby Shoals	Little Red River	AGFC	Cleburne
JFK Park	Little Red River	USACE	Cleburne
Maddox Bay	Maddox Bay	Private	Monroe
Mallard Pond	Mallard Pond	AGFC	White
Mammoth Pond Pier	Mammoth Pond	AGFC	Prairie

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Merrisach	Merrisach Lake	USACE	Arkansas
Stewart	Middle Fork Little Red	AGFC	Cleburne
Midway Lake	Midway Lake	Private	Lee
Mississippi River			
McCallie	Mississippi River	AGFC	Desha
Mellwood Old River	Mississippi River	Private	Phillips
Helena	Mississippi River	Helena	Phillips
Helena Harbor	Mississippi River	AGFC	Phillips
Peters Island	Mississippi River	USACE	Lee
Battleaxe Landing	Mississippi River	AGFC	Lee
Dewitt City Park	Mitchell Lake	Dewitt	Arkansas
Buzzard Beach	Morgan Point Lake	USACE	Desha
New Lake	New Lake	U of A	St. Francis
Newark City Lake	Newark City Lake	Newark	Independence
Newport City Lake	Newport City Lake	Newport	Jackson
White River NWR	Numerous Lakes	USFWS	Monroe
White River Oxbow Lakes	Numerous lakes and sloughs	USFWS	Arkansas
Old D. S. P. Lake	Old D. S. P. Lake	ADPT	Randolph
Old River	Old River	Private (fee)	Jefferson
Old River Lake			
Old River	Old River Lake	USFWS	Monroe
Old River Lake	Old River Lake	Private	Prairie
Old Town Lake	Old Town Lake	AGFC	Phillips
Peckerwood Lake			
Herman's Landing	Peckerwood Lake	Private	Prairie
Red Barn	Peckerwood Lake	Private	Prairie
Pickthorne	Pickthorne Lake	AGFC	Lonoke
Poinsett Lake			
Poinsett	Poinsett Lake	AGFC	Poinsett
State Park	Poinsett Lake	ADPT	Poinsett
Deckleman Landing	Poinsett Lake	AGFC	Poinsett
Raft Creek WMA	Raft Creek WMA	AGFC	White
Ramsey Slough	Ramsey Slough	AGFC	Independence
Reynolds Park	Reynolds Park Lake	Paragould	Greene
Robe Bayou			
Robe Bayou	Robe Bayou	AGFC	Monroe
Robe Bayou	Robe Bayou	AGFC	Monroe

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Robe Bayou	Robe Bayou	AGFC	Monroe
Hart Lake	Roc Roe Bayou	USFWS	Monroe
Rowe Lake	Rowe Lake	Batesville	Independence
Mulberry	Salt Bayou Ditch	AGFC	Arkansas
Searcy City Lake	Searcy City Lake	Searcy	White
Shirey Bay	Shirey Bay	AGFC	Lawrence
Conway George	Slough	USFWS	Prairie
Spring Lake	Spring Lake	Private	Prairie
Spring River			
Imboden	Spring River	AGFC	Lawrence
Ravenden	Spring River	AGFC	Lawrence
Hardy Beach	Spring River	AGFC	Sharp
L.B. Access	Spring River	AGFC	Sharp
St. Francis River			
St. Francis	St. Francis River	AGFC	Phillips
Storm Creek Lake	St. Francis River	AGFC	Phillips
Stephen's Landing	St. Francis River	AGFC	Poinsett
Huxtable	St. Francis River	AGFC	Lee
Jerry Stewart	St. Francis River	AGFC	St. Francis
Newcastle	St. Francis River	Private	St. Francis
Parkin	St. Francis River	Parkin	Cross
Flowers Access Area	St. Francis River	AGFC	Cross
Bay	St. Francis River	Private	Cross
Hwy. 42	St. Francis River	Private	Cross
Williams	St. Francis River	AGFC	Craighead
Cockleburr Slough	St. Francis River	AGFC	Craighead
Iron Bridge Access	St. Francis River	AGFC	Craighead
Lake City	St. Francis River	AGFC	Craighead
Lake City 2	St. Francis River	Lake City	Craighead
Oak Donnick	St. Francis River St.	AGFC	Poinsett
Stinger Lake	Stinger Lake	Mtn. View	Stone
Rush Landing	Stinking Bay	Private	Arkansas
Storm Creek Lake			
Storm Creek Pier	Storm Creek Lake	USFS	Phillips
Hornor Neck Lake	Storm Creek Lake	AGFC	Phillips
Strawberry River			
Riverview School	Strawberry River	AGFC	Lawrence

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
Strawberry River	Strawberry River	AGFC	Izard
Simstown Spring Walk-in	Strawberry River	AGFC	Sharp
Peebles Bluff	Strawberry River	AGFC	Sharp
Taylor Bay			
Taylor Bay	Taylor Bay	Private	Woodruff
Little Taylor Bay	Taylor Bay	Private	Woodruff
Tom's Lake	Tom's Lake	AGFC	White
Upper Lake Hogue	Upper Lake Hogue	AGFC	Poinsett
Upshaw Lake	Upshaw Lake	Private	Prairie
Wattensaw Bayou			
Wattensaw Bayou	Wattensaw Bayou	AGFC	Prairie
Wattensaw Bayou	Wattensaw Bayou	AGFC	Prairie
Hwy. 11	Wattensaw Bayou	Private	Prairie
Webb Lake	Webb Lake	AGFC	Prairie
White River[1]			
Wild Goose Bayou Use Area	White River (right bank – river mile 10)	USACE	Arkansas
Jacks Bay	White River (right bank – river mile 16.8)	USFWS	Arkansas
Hudson Landing	White River (left bank – river mile 35.7)	AGFC	Phillips
Botts	White River (right bank – river mile 57)	AGFC	Arkansas
	White River (right bank – river mile 68.7)	Private	Arkansas
	White River (right bank – river mile 76.1)	Private	Arkansas
Preston Ferry	White River (right bank – river mile 82.5)	AGFC	Arkansas
Aberdeen	White River (right bank – river mile 91)	Private	Monroe
Clarendon	White River (left bank – river mile 99.3)	AGFC	Monroe
Pepper's Eddy	White River (right bank – near river mile 115.5)	Private	Prairie
	White River (right bank – river mile 116.8)	Private	Prairie
Devalls Bluff	White River (right bank – near river mile 121.4)	AGFC	Prairie
Hwy. 70 East Access	White River (left bank – river mile 121.9)	AGFC	Prairie
Hwy. 70	White River (right bank – river mile 121.9)	AGFC	Prairie
Wattensaw Bayou	White River (right bank – river mile	AGFC	Prairie

Boat/Fishing Access Points			
Name	**Waterbody**	**Owner**	**County**
	126.5)		
	White River (left bank – river mile 136.1)	Private	Prairie
DesArc	White River (right bank – river mile 143.2)	DesArc	Prairie
Georgetown	White River (right bank – river mile 167)	AGFC	White
	White River (left bank – river mile 175.6)	Private	Woodruff
	White River (right bank – river mile 178.5)	Public	White
	White River (left bank – river mile 190)	Private	Woodruff
	White River (right bank – river mile 194.1)	Private	White
Augusta	White River (left bank – river mile 198)	AGFC	Woodruff
	Whiter River (right bank – river mile 201.9)	Non-Usable	Woodruff
	White River (right bank – river mile 222)	Private	White
Newport	White River (right bank – river mile 255)	AGFC	Jackson
Jacksonport State Park	White River (left bank – river mile 260)	ADPT	Jackson
Oil Trough	White River	AGFC	Independence
Newark Ferry	White River	AGFC	Independence
Batesville	White River	AGFC	Independence
Mark House	White River	AGFC	Independence
Guion	White River	AGFC	Izard
Sylamore	White River	AGFC	Izard
Mt. Olive	White River	AGFC	Izard
Bone Island	White River	AGFC	Izard
Calico Rock	White River	Calico Rock	Izard
Chesmond Ferry	White River	AGFC	Izard
Younger	White River	AGFC	Stone
Martin	White River	AGFC	Stone
Guion	White River	AGFC	Stone
White River NWR Lakes	White River NWR Lakes	USFWS	Desha
Wood Duck Pond	Wood Duck Pond	AGFC	Woodruff

[1] Those fishing access points along the White River without a river mile location are listed from south to north. River mile data are not readily available for these sites, but will be reconciled with field survey data at a later date.

Acronyms: ADHT – Arkansas State Department of Highways and Transportation; ADPT – Arkansas Department of Parks and Tourism; AGFC – Arkansas Game and Fish Commission; ANHC – Arkansas Natural Heritage Commission; MDWFP – Mississippi Department of Wildlife, Fisheries, and Parks; NLR – North Little Rock; U of A – University of Arkansas; USACE – United States Army Corps of Engineers; USFS – United States Forest Service; USFWS – United States Fish and Wildlife Service.

Appendix F

On-Site Survey for Recreational Benefits Assessment

United States Army
Corps of Engineers

URS

WHITE RIVER NAVIGATION IMPROVEMENT PROJECT
RECREATIONAL BENEFITS ASSESSMENT
ON-SITE (BOAT LAUNCH) SURVEY[9]

Project Description and Privacy Act Statement

Information is being collected by the U.S. Army Corps of Engineers to investigate the economic and social benefits of improving recreational opportunities associated with the White River as part of the White River Navigation Improvement Project. The Corps of Engineers will use this survey to obtain information to aid in formulating the most economically, socially, and environmentally acceptable plan in accordance with the Water Resources Council Principles and Guidelines. Individual responses will be collected and tabulated by type of response, but information specific to an individual will not be published or released. Individual responses will be retained in our files as backup data and retired to the Record Center after 10 years. Only the tabulated totals of the type of responses will be published in a project report which will be circulated to the public and other Federal and State water and land management agencies.

Answers to questions are voluntary. There are no consequences for failing to respond; however, your responses would be appreciated and will greatly aid in our planning effort.

Instructions

The Corps would appreciate it if you would be willing to complete the survey at this site. If you fill it out here, the interviewer will be present to answer any questions you may have. While your response is voluntary, the more persons who answer the survey, the greater its value to the community and recreation along the White River.

Public Report Burden

The public report burden for this information collection is estimated to average 10-15 minutes per response. Send comments regarding this burden estimate or any other aspect of this data collection, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, Virginia 22202-4302, and the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503, Attn.: Desk Officer for U.S. Army Corps of Engineers. Respondents should be aware that notwithstanding any other provision of law, an agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Please DO NOT RETURN your completed form to either of these addresses.

[9] A separate on-site survey has been developed for administration at picnic areas and campgrounds. Due to the similar types of questions in both on-site surveys, only the on-site boat launch survey is provided in this report.

Background Information

Date:	_____	Weather:	_____
Time:	_____	Interviewer:	_____
Location:	_____	Number in Group:	_____

Questions

Q1: On average, how many days per year do you spend participating in recreational activities on the White River?

# of Annual Recreation Days: _____

Q2: On average, how much time do you spend on the water, including the time it takes you to launch and load your boat, per recreational trip on the White River?

# of Hours per Trip: _____

Q3: What is the typical number of people in your group when you begin your trip from this launch?

Group Size: _____

Q4: Is the purpose of this trip fishing, boating (for pleasure or skiing), or other:

- ☐ Fishing
- ☐ Boating
- ☐ Other (please describe) _____

Q5 (Skip to Q7 if FISHING is not selected): What is the primary species of fish you catch on any given fishing trip that begins from this site?

Fish Species: _____

Q6: How many fish do you catch, excluding the catch of the rest of your group, during a typical trip that begins from this site?

# of Fish Caught: _____

Q7: How many trips (regardless of purpose) have you begun from this launch in the past 12 months?

# of Trips: _____

Q8: How much time did it take you to travel one-way from your home to this site?

# of Minutes: _____

Q9: How many miles did you travel one-way from your home to this site?

# of Miles: _____

Q10: Could you please list the amount of money you spend in each of the following categories during a typical trip to this site (whole numbers please):

Lodging: _____

Food and Beverages: _____

Transportation: _____

Activities/Entertainment: _____

Miscellaneous Expenses: _____

Q11: You said that you make **(repeat answer from Q7)** _____ recreational boating trips per year from this location. If a new boat launch was constructed, similar in all respects to this one, that reduced the amount of time you spent traveling between home and launching your boat by X%, how many additional boating trips per year would you take from either location (i.e., the new launch or this launch)?

- ☐ I would not take any additional trips **(Proceed to Q12)**
- ☐ I would take 1 additional trip **(Skip to Q13)**
- ☐ I would take 2 additional trips **(Skip to Q13)**
- ☐ I would take 3 additional trips **(Skip to Q13)**
- ☐ I would take 4 additional trips **(Skip to Q13)**
- ☐ I would take 5 or more additional trips **(Skip to Q13)**

***Q11 (alternate)**: You said that you make **(repeat answer from Q7)** _____ recreational boating trips per year from this location. If improvements such as parking lot resurfacing and boat ramp enlargement were made to this boat launch how many additional boating trips per year would you be willing to take from this site?*

- ☐ *I would not take any trips **(Skip to Q12)***
- ☐ I would take 1 additional trip (Skip to Q13)
- ☐ *I would take 2 additional trips **(Skip to Q13)***
- ☐ *I would take 3 additional trips **(Skip to Q13)***
- ☐ *I would take 4 additional trips **(Skip to Q13)***
- ☐ *I would take 5 or more additional trips **(Skip to Q13)***

Q12: Please choose one reason from the following list that best describes your decision not to take additional trips if a new boat launch *(or boat launch improvements)* was constructed near your residence:

- ☐ I am fine with the current number of boat launches *(I am fine with the boat launch in its present condition)*
- ☐ I am opposed to the idea of increasing the number of access points to the White River *(I am opposed to the idea of spending more government money on boat launch improvements)*
- ☐ I believe only improvements are necessary, not a new boat launch *(I believe improvements are not enough and that a new boat launch should be constructed)*
- ☐ Other (please describe) _____

Q13: Would you be willing to pay $Z per launch from this site in the form of a boat launch fee if this site was improved such that more than one boat could launch at the same time and parking was expanded?

- ☐ Yes
- ☐ No

Q14: (Skip this question if YES is marked in Q13): Please choose one reason from the following list that best describes your decision not to pay a boat launch fee if this site was improved and expanded:

- ☐ I am fine with the boat launch in its present condition
- ☐ The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative launch fees (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- ☐ I do not mind paying for a new boat launch, but do not like the idea of a boat launch fee
  - Given this response, could you provide an alternative form of payment you would support: _____

- ☐ I should not have to pay for a new boat launch
- ☐ Other (please describe) _____

Q15: How would you rate the quality of this boat launch?

- ☐ Poor
- ☐ Fair yet needs improvement (please specify below)
- ☐ Fair and no need to improve
- ☐ Excellent

Improvements: _____

_____

Q16: Please identify on FIGURE 1, by circling, the primary location where you launch your boat onto the White River.

Q17: What are the primary reasons you use this boat launch over other launches? Please select from the following:

- ☐ Close to my home
- ☐ Close to my destination on the river
- ☐ Few people use this launch
- ☐ Launch ramp is not very steep and easy to launch from
- ☐ Large parking area
- ☐ Cleanliness
- ☐ Other (please describe) _____

Q18: Are there other boat launches that you use for launching your boat onto the White River?

- ☐ Yes **(please identify by circling these launches on FIGURE 2 provided at the end of this survey)**
- ☐ No **(Skip to Q20)**

Q19: Please select from the following list the primary reasons why you use these other launches:

- ☐ Close to my home
- ☐ Close to my destination on the river
- ☐ Few people use this launch
- ☐ Launch ramp is not very steep and easy to launch from
- ☐ Large parking area
- ☐ Cleanliness
- ☐ Other (please describe) _____

For this last section, we would like to ask a couple of questions about you.

Q20: How would you rate, on a scale of 0 to 5, with 0 implying very little to no knowledge and 5 meaning full knowledge, your knowledge of the White River Navigation Improvement Project? (Please circle only one number.)

0 1 2 3 4 5

Q21: What is your zip code:

Zip Code: _____

Q22: What is your approximate age?

- ☐ 18-20
- ☐ 21-24
- ☐ 25-30
- ☐ 31-40
- ☐ 41-50
- ☐ 51-60
- ☐ 61-70
- ☐ > 70

Q23: How many people presently live in your household?

Household Size: _____

Q24: Are you presently employed or retired?

- ☐ Employed
- ☐ Retired

Q25: Are you currently a member of an outdoor sportsmen's organization or a local birding group?

- ☐ Yes
  - Name of organization/group _____
- ☐ No

Q26: Are you currently a member of a duck or deer hunting club?

- ☐ Duck club
- ☐ Deer club
- ☐ Both
- ☐ Neither

Q27: Are you currently a member of a natural resource conservation organization, such as the Nature Conservancy or Ducks Unlimited?

- ☐ Yes
  - Name of organization _____
- ☐ No

Q28: How many days per year do you spend participating in all types of outdoor recreation?

# of Total Recreation Days: _____

Q29: Please select the highest level of education you have completed:

- ☐ Grade school
- ☐ Some high school
- ☐ High school graduate
- ☐ Some college or technical school
- ☐ College graduate
- ☐ Graduate or advanced degree

Q30: Please approximate your annual income before taxes, in 2003: (Please note that this survey is anonymous. This information will ensure that all income groups are represented.)

- ☐ Under $10,000
- ☐ $10,000 to $19,999
- ☐ $20,000 to $29,999
- ☐ $30,000 to $39,999
- ☐ $40,000 to $49,999
- ☐ $50,000 to $59,999
- ☐ $60,000 to $69,999
- ☐ $70,000 to $79,999
- ☐ $80,000 to $89,999
- ☐ over $90,000

Q31: Do you wish to make any additional comments about recreation along the White River?

Note to interviewer: read the following:

> **"Thank you for participating in this survey. The information you have provided will be used by the Corps in evaluating the project."**

Information to be recorded by the interviewer: The Respondent was:

Q32: Female _____ Yes _____ No

Q33: Cooperative _____ Yes _____ No

Q34: Appeared to understand the questions _____ Yes _____ No

Q35: Appeared to be impaired in any way _____ Yes _____ No

Interview Number: _____

Appendix G

Telephone Survey for Recreational Benefits Assessment

United States Army
Corps of Engineers

URS

WHITE RIVER NAVIGATION IMPROVEMENT PROJECT
RECREATIONAL BENEFITS ASSESSMENT
TELEPHONE SURVEY

Hello, my name is _____ and I am calling on behalf of the United States Army Corps of Engineers. May I speak with

We are collecting information to investigate the economic and social benefits of improving recreational opportunities associated with the White River as part of the White River Navigation Improvement Project. The Corps of Engineers will use this survey to obtain information to aid in formulating the most economically, socially, and environmentally acceptable plan in accordance with the Water Resources Council Principles and Guidelines. Individual responses will be collected and tabulated by type of response, but information specific to an individual will not be published or released. Individual responses will be retained in our files as backup data and retired to the Record Center after 10 years. Only the tabulated totals of the type of responses will be published in a project report, which will be circulated to the public and other Federal and State water and land management agencies.

We have a few questions that will take less than 8 minutes. Your responses would be appreciated and will greatly aid in our planning effort. Is now a good time to ask you those questions?

1 CORRECT PERSON - NOW IS GOOD TIME

2 CORRECT PERSON - CALLBACK

3 NO - WON'T LET YOU TALK TO CORRECT PERSON

4 CORRECT PERSON NOT AVAILABLE - SCHEDULE CALLBACK

5 CORRECT PERSON REFUSES TO PARTICIPATE

I want to assure you that all the information you give me will be kept strictly confidential. This interview is voluntary. If you don't want to answer any particular question, just tell me. Also, my supervisor may listen to part of the interview for quality control.

Q1: How would you rate, on a scale of 0 to 5, with 0 implying very little to no knowledge and 5 meaning full knowledge, your knowledge of the recreational opportunities along the White River? (Please circle only one number)

0 1 2 3 4 5

Q2: How would you rate, on a scale of 0 to 5, with 0 again implying very little to no knowledge and 5 meaning full knowledge, your knowledge of the White River Navigation Improvement Project? (Please circle only one number)

0 1 2 3 4 5

Q3: Do you presently participate in recreational activities along the White River, such as hunting, fishing, recreational boating, or birding?

- ☐ Yes
- ☐ No **(Skip to Q28)**

Q4: On average, how much time, in hours, do you spend per recreational trip on or along the White River?

# of Hours per Trip: _____

Q5: What is the typical number of people in your group when you recreate on or along the White River?

Group Size: _____

Q6: Is the purpose of your trips primarily fishing, recreational boating (for pleasure or skiing), hunting, birding, camping, or other:

- ☐ Fishing
- ☐ Recreational Boating **(Skip to Q9)**
- ☐ Hunting **(Skip to Q12)**
- ☐ Birding **(Skip to Q12)**
- ☐ Camping **(Skip to Q12)**
- ☐ Other (please describe) _____
  (Skip to Q12)

Q7: What is the primary species of fish you catch during a typical fishing trip?

Fish Species: _____

Q8: How many fish do you catch, excluding the catch of the rest of your group, during a typical trip that begins from this site?

# of Fish Caught: _____

Q9: Is there a primary boat launch on the White River that you begin your trips from:

- ☐ Yes
- ☐ No **(Skip to Q12)**

Q10: Can you provide me with the name or approximate location of this boat launch:

Primary Boat Launch: _____

Q11: What are the primary reasons you use this boat launch over other launches? Please select from the following:

- ☐ Close to my home
- ☐ Close to my destination on the river
- ☐ Few people use this launch
- ☐ Launch ramp is not very steep and easy to launch from
- ☐ Large parking area
- ☐ Cleanliness
- ☐ Other (please describe) _____

Q12: How many total recreational trips, regardless of purpose, have you taken to the White River in the past 12 months?

# of Trips: _____

Q13: How much time does it take you to travel one-way from your home to a location along the White River where you begin a typical recreational trip?

# of Minutes: _____

Q14: How many miles do you travel one-way from your home to a location along the White River where you begin a typical recreational trip?

# of Miles: _____

Q15: Could you please list the amount of money you spend in each of the following categories during a typical trip to the White River (whole numbers please):

Lodging: _____

Food and Beverages: _____

Transportation: _____

Activities/Entertainment: _____

Miscellaneous Expenses: _____

Note to Interviewer: Please read the following:

I would now like to ask you a couple of hypothetical or if – then questions regarding potential improvements or additions to the recreational opportunities along the White River. Basically, these questions will present you with a proposed change and then ask you if you would take additional trips to the White River. Again, your participation is voluntary and there are no right or wrong answers.

Q16: You said that you make **(repeat answer from Q12)** _____ trips per year to the White River. Suppose a new boat launch was constructed near your residence that reduced the amount of time you spent traveling between home and launching your boat onto the White River by *X*%. If this occurred, how many additional trips per year to the White River would you take from this new boat launch? Please choose one of the following options.

- ☐ I would not take any additional trips **(Proceed to Q18)**
- ☐ I would take 1 additional trip **(Skip to Q19)**
- ☐ I would take 2 additional trips **(Skip to Q19)**
- ☐ I would take 3 additional trips **(Skip to Q19)**
- ☐ I would take 4 additional trips **(Skip to Q19)**
- ☐ I would take 5 or more additional trips **(Skip to Q19)**

Q17: Please choose one reason from the following list that best describes your decision not to take additional trips if a new boat launch *(or boat launch improvements)* was constructed near your residence:

- ☐ I am fine with the current number of boat launches *(I am fine with the boat launch in its present condition)*
- ☐ I am opposed to the idea of increasing the number of access points to the White River *(I am opposed to the idea of spending more government money on boat* launch improvements)
- ☐ I believe only improvements are necessary, not a new boat launch (I believe *improvements are not enough and that a new boat launch should be constructed)*
- ☐ Other (please describe) _____

Q18: Ok. Now, suppose construction of the new boat launch is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the boat launch constructed and pay a one-time, mandatory payment of Z$ or each resident can choose to not have the launch constructed and pay no additional bill. How would vote for this hypothetical proposal:

- Yes
- No

Q19 (Skip this question if the respondent chose YES in Q18): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a boat launch:

- I am fine with the boat launch in its present condition
- The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- I do not mind paying for a new boat launch, but do not like the idea of paying for it all at once
- I should not have to pay for a new boat launch
- Other (please describe) _____

Q20: For the second if – then question, suppose a new public boardwalk was constructed along a portion of the White River near your residence. If this occurred, how many more trips per year would you take to the White River? Please choose one of the following options.

- I would not take any additional trips **(Proceed to Q21)**
- I would take 1 additional trip **(Skip to Q22)**
- I would take 2 additional trips **(Skip to Q22)**
- I would take 3 additional trips **(Skip to Q22)**
- I would take 4 additional trips **(Skip to Q22)**
- I would take 5 or more additional trips **(Skip to Q22)**

Q21: Please choose one reason from the following list that best describes your decision not to take additional trips if a new boardwalk was constructed near your residence:

- My primary purpose in taking a trip to the White River is for fishing, recreational boating, and/or hunting, thus a new boardwalk does not interest me
- I am opposed to the idea of spending government funds on the construction of a boardwalk
- I am opposed to the idea of increasing recreational development along the White River
- Other (please describe) _____

Q22: Ok. Similar to the earlier hypothetical vote for the boat launch, suppose construction of the new boardwalk is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the boardwalk constructed and pay a one-time, mandatory payment of *Z*$ or each resident can choose to not have the boardwalk constructed and pay no additional bill. How would vote for this hypothetical proposal:

- ☐ Yes
- ☐ No

Q23 (Skip this question if the respondent chose YES in Q22): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a boardwalk:

- ☐ My primary purpose in taking a trip to the White River is for fishing, recreational boating, and/or hunting, thus a new boardwalk does not interest me
- ☐ The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- ☐ I do not mind paying for a new boardwalk, but do not like the idea of having to pay for it all at once
- ☐ I should not have to pay for a new boardwalk
- ☐ Other (please describe) _____

Q24: For the final if – then question, suppose a new public picnic area was constructed along a portion of the White River near your residence. If this occurred, how many more trips per year would you take to the White River? Please choose one of the following options.

- ☐ I would not take any additional trips **(Proceed to Q25)**
- ☐ I would take 1 additional trip **(Skip to Q26)**
- ☐ I would take 2 additional trips **(Skip to Q26)**
- ☐ I would take 3 additional trips **(Skip to Q26)**
- ☐ I would take 4 additional trips **(Skip to Q26)**
- ☐ I would take 5 or more additional trips **(Skip to Q26)**

Q25: Please choose one reason from the following list that best describes your decision not to take additional trips if a new picnic area was constructed near your residence:

- ☐ My primary purpose in taking a trip to the White River is for fishing, recreational boating, and/or hunting, thus a new picnic area does not interest me
- ☐ I am opposed to the idea of spending government funds on the construction of a picnic area
- ☐ I am opposed to the idea of increasing recreational development along the White River
- ☐ Other (please describe) _____

Q26: Ok. Similar to the earlier hypothetical vote for the boat launch and boardwalk, suppose construction of the new picnic area is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the picnic area constructed and pay a one-time, mandatory payment of *Z*$ or each resident can choose to not have the picnic area constructed and pay no additional bill. How would vote for this hypothetical proposal:

- Yes
- No

Q27 (Skip this question if the respondent chose YES in Q27): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a new picnic area:

- My primary purpose in taking a trip to the White River is for fishing, recreational boating, and/or hunting, thus a new picnic area does not interest me
- The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- I do not mind paying for a new picnic area, but do not like the idea of having to pay for it all at once
- I should not have to pay for a new picnic area
- Other (please describe) _____

----------NOTE TO INTERVIEWER: SKIP TO Q42----------

Non-User Survey

Q28: Do you participate in outdoor recreational activities in areas other than the White River?

- Yes
- No

Note to Interviewer: Please read the following:

I would now like to ask you a couple of hypothetical or if – then questions regarding potential improvements or additions to the recreational opportunities along the White River. Basically, these questions will present you with a proposed change and then ask you if you would take additional trips to the White River. Again, your participation is voluntary and there are no right or wrong answers.

Q29: For the first question, suppose a new boat launch that provides direct access to the White River was constructed within *X miles* of your residence. If this occurred, how many trips per year to the White River would you take from this new boat launch? Please choose one of the following options.

- ☐ I would not take any trips **(Proceed to Q30)**
- ☐ I would take 1 trip **(Skip to Q31)**
- ☐ I would take 2 trips **(Skip to Q31)**
- ☐ I would take 3 trips **(Skip to Q31)**
- ☐ I would take 4 trips **(Skip to Q31)**
- ☐ I would take 5 or more trips **(Skip to Q31)**

Q30: Could you choose one reason from the following list that best describes your decision not to take a trip to the White River if a boat launch was constructed:

- ☐ I have no interest in recreating in or along the White River **(Skip to Q42)**
- ☐ I do not currently nor plan on owning a boat
- ☐ I am opposed to the idea of spending government funds on the construction of a boat launch
- ☐ I am opposed to the idea of increasing recreational development along the White River
- ☐ Other (please describe) _____

Q31: Ok. Now, suppose construction of the new boat launch is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the boat launch constructed and pay a one-time, mandatory payment of *Z*$ or each resident can choose to not have the launch constructed and pay no additional bill. How would vote for this hypothetical proposal:

- ☐ Yes
- ☐ No

Q32 (Skip this question if the respondent chose YES in Q31): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a boat launch:

- ☐ I have no interest in recreating in or along the White River
- ☐ The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- ☐ I do not mind paying for a new boat launch, but do not like the idea of paying for it all at once
- ☐ I should not have to pay for a new boat launch
- ☐ Other (please describe) _____

Q33: For the second if – then question, suppose a new public boardwalk was constructed along a portion of the White River near your residence. If this occurred, how many trips per year would you take to the White River to walk along the boardwalk? Please choose one of the following options.

- I would not take any trips **(Proceed to Q34)**
- I would take 1 trip **(Skip to Q35)**
- I would take 2 trips **(Skip to Q35)**
- I would take 3 trips **(Skip to Q35)**
- I would take 4 trips **(Skip to Q35)**
- I would take 5 or more trips **(Skip to Q35)**

Q34: Could you choose one reason from the following list that best describes your decision not to take a trip to the White River if a boardwalk was constructed:

- I have no interest in recreating in or along the White River **(Skip to Q42)**
- I *have* an interest in recreating in or along the White River, just not walking along a boardwalk
- I am opposed to the idea of spending government funds on the construction of a boat launch
- I am opposed to the idea of increasing recreational development along the White River
- Other (please describe) _____

Q35: Ok. Similar to the earlier hypothetical vote for the boat launch, suppose construction of the new boardwalk is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the boardwalk constructed and pay a one-time, mandatory payment of *Z*$ or each resident can choose to not have the boardwalk constructed and pay no additional bill. How would vote for this hypothetical proposal:

- Yes
- No

Q36 (Skip this question if the respondent chose YES in Q35): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a boardwalk:

- ☐ I have no interest in recreating in or along the White River
- ☐ The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- ☐ I do not mind paying for a new boardwalk, but do not like the idea of paying for it all at once
- ☐ I should not have to pay for a new boardwalk
- ☐ Other (please describe) _____

Q37: For the final if – then question, suppose a new public picnic area was constructed along a portion of the White River near your residence. If this occurred, how many trips per year would you take to the White River? Please choose one of the following options.

- ☐ I would not take any trips **(Proceed to Q38)**
- ☐ I would take 1 trip **(Skip to Q39)**
- ☐ I would take 2 trips **(Skip to Q39)**
- ☐ I would take 3 trips **(Skip to Q39)**
- ☐ I would take 4 trips **(Skip to Q39)**
- ☐ I would take 5 or more trips **(Skip to Q39)**

Q38: Could you choose one reason from the following list that best describes your decision not to take a trip to the White River if a picnic area was constructed:

- ☐ I have no interest in recreating in or along the White River **(Skip to Q42)**
- ☐ I *have* an interest in recreating in or along the White River, just not picnics
- ☐ I am opposed to the idea of spending government funds on the construction of a picnic area
- ☐ I am opposed to the idea of increasing recreational development along the White River
- ☐ Other (please describe) _____

Q39: Ok. Similar to the earlier hypothetical vote for the boat launch and boardwalk, suppose construction of the new picnic area is up for a vote by county residents. The two choices are as follows: Each resident can choose to have the picnic area constructed and pay a one-time, mandatory payment of Z$ or each resident can choose to not have the picnic area constructed and pay no additional bill. How would vote for this hypothetical proposal:

- ☐ Yes
- ☐ No

Q40 (Skip this question if the respondent chose YES in Q39): Could you choose one reason from the following list that best describes your decision not to vote in favor of construction of a boardwalk:

- ☐ I have no interest in recreating in or along the White River
- ☐ The payment is too high
  - Given this response, would you be willing to pay one of the following proposed alternative payments (circle one):
    - $Z^1 < Z$
    - $Z^2 < Z$ …
- ☐ I do not mind paying for a new picnic area, but do not like the idea of paying for it all at once
- ☐ I should not have to pay for a new picnic area
- ☐ Other (please describe) _____

Q41: We have presented three possible recreational improvements and additions the United States Army Corps of Engineers are considering for the Lower White River. However, these improvements may not match the recreational improvements you would like to see along the White River. Thus, could you provide me a couple of your ideas for improving recreation opportunities along the White River?

Improvements: _____

Note to interviewer: Please read the following before asking the questions:

"*As a conclusion to this survey, I would like to ask a couple of questions about you*."

Q42: What is your zip code:

_____

Q43: What is your approximate age?

Q44: How many people presently live in your household?

Household Size: _____

Q45: Are you presently employed or retired?

- ☐ Employed
- ☐ Retired

Q46: Are you currently a member of an outdoor sportsmen's organization or a local birding group?

- ☐ Yes
  - Name of organization/group _____
- ☐ No

Q47: Are you currently a member of a duck or deer hunting club?

- ☐ Duck club
- ☐ Deer club
- ☐ Both
- ☐ Neither

Q48: Are you currently a member of a natural resource conservation organization, such as the Nature Conservancy and Ducks Unlimited?

- ☐ Yes
  - Name of organization _____
- ☐ No

Q49: Please select the highest level of education you have completed:

- ☐ Grade school
- ☐ Some high school
- ☐ High school graduate
- ☐ Some college or technical school
- ☐ College graduate
- ☐ Graduate or advanced degree

Q50: Please approximate your annual household income before taxes, in 2003: (Please note that this survey is anonymous. This information will ensure that all income groups are represented.)

- ☐ Under $10,000
- ☐ $10,000 to $19,999
- ☐ $20,000 to $29,999
- ☐ $30,000 to $39,999
- ☐ $40,000 to $49,999
- ☐ $50,000 to $59,999
- ☐ $60,000 to $69,999
- ☐ $70,000 to $79,999
- ☐ $80,000 to $89,999
- ☐ over $90,000

Q51: Do you wish to make any additional comments about recreation along the White River?

Note to interviewer: read the following:

"Thank you for participating in this survey. The information you have provided will be used by the Corps in evaluating the project."

Information to be recorded by the interviewer: The Respondent was:

Q52: Female _____ Yes _____ No

Q53: Cooperative _____ Yes _____ No

Q54: Appeared to understand the questions _____ Yes _____ No

Interview Number: _____

Appendix H

Technical Review of Econometric Models for Demand Curve Estimation

1. DEMAND CURVE ESTIMATION: THEORY

Two principal utility theoretic methods for deriving economic values for nonmarket outdoor recreational attributes (e.g., picnic areas or boat launches) include travel cost and contingent valuation. The travel cost method (TCM) is a revealed preference method that models an individual's decision about which site to visit and/or the number of visits to take as a function of the individual's time, income, other personal characteristics, and site-specific attributes as well as substitute sites. Given the revealed preference framework of TCM, data applied in estimating recreational demand curves are obtained from observing actual recreator behavior. Typical means of acquiring this information include telephone, mail, and on-site surveys. The contingent valuation method (CVM) is a stated preference method that utilizes a constructed market to directly ascertain an individual's WTP to pay for a change in recreational site attributes. For example, an individual may be asked to choose the maximum amount they are willing to pay (given budget constraints) for a new recreational feature such as a picnic area. Similar to TCM, data are collected from surveys administered by phone, mail, or in-person.

The theoretical basis for the TCM can be established with a behavioral model or a preference function, based on either random utility theory or the household production function, linked to a model of respondent behavior. CVM relies on similar random utility or household production function frameworks. Random utility theory holds that the decision to visit a site or pay for a new recreational feature represents a discrete action that can be explained by observable characteristics of the decision maker, measurable attributes of the new feature, and unobservable elements. The household production function provides a framework in which market and nonmarket goods (such as a boat launch) are technically combined with an individual's knowledge or experience of these goods in a type of production function that yields services flows. The individual derives direct utility from these final service flows and by maximizing utility subject to a budget constraint yields derived demands for the nonmarket goods. Finally, a simple behavioral model states the number of visits an individual makes within a specified time period (season or year) is a function of the attributes of the sites visited (q), cost of visiting (c), and demographics (x). From this behavioral model, demand for site j can be expressed as:

$$r_{ij} = r(c_{ij}, q_{ij}; x_i) \qquad [1]$$

where i indexes individual recreators and j indexes visited sites. The expected relationship between trips costs c and number of visits r is negative (i.e., increasing costs of visiting site j lead to reductions in visits to that site) whereas the relationship should be positive for improvements in site attributes q. The relationship between demographics x and visits is unknown and specific to each study area. Random utility theory and the household production function yield a similar demand equation for visits.

The purpose of exploring the underlying utility theory for each method is to show the link between attributes that influence an individual's decision to recreate or pay for a new recreational feature and corresponding econometric models that yield WTP measures. Under the

random utility framework, the dependent variable in econometric estimation is discrete and can be modeled by a number of limited dependent variable models that include mixed logit, multinomial logit, and probit. The behavioral model of the TCM is econometrically estimated with either a Poisson or negative binomial model. These models share the limited dependent variable structure of the discrete choice models but differ based on a finite dependent variable. Last, the household production function can be estimated by either count data or discrete choice models, depending on the specification of utility.

2. DEMAND CURVE ESTIMATION: ECONOMETRICS

Travel Cost Method

Behavioral Model

Count data models applied to the estimation of demand for recreation are based on the theoretical model of equation [1] plus an econometric error term *e*:

$$r_i = r(c_{ij}, q_{ij}; x_i) + e_i \qquad [2]$$

Since r_i is defined by a finite number of non-negative values ($r_i \geq 0$), e_i can be specified to follow either the Poisson or gamma distribution. The latter distribution gives rise to the negative binomial model, which may be preferred over Poisson because it is not subject to the unrealistic assumption of equal mean and variance, incorporates unobserved heterogeneity across individuals, and has a wider tail at the end of the distribution. A wider tail is important for capturing the behavior of a few individuals who take many trips—a likely characteristic of recreators in the White River area.

The formal econometric model of the negative binomial is given by:

$$\pi_i(y = r \mid \mathbf{X}) = \{[\Gamma(y + \alpha^{-1})/y!(\Gamma\alpha^{-1})]*[\alpha^{-1}/\alpha^{-1} + \mu]\text{^}\alpha^{-1}*[\mu/\alpha^{-1} + \mu]\text{^}y^{-1}\} \qquad [3]$$

where *y* is the observed number of trips, *r* is the predicted number of trips, $\boldsymbol{X}$ captures all of the regressors on the right hand side of equation [1], α is the overdispersion parameter (measuring extent to which variance exceeds the mean), and mean μ is given an exponential functional form $\mu = \exp(\beta'\boldsymbol{X})$, where β is a vector of estimated parameters b_0, b^x, b^q, and b^c (Long 1997). Equation [3] states the probability the predicted number of trips (*r*) will equal the observed, or actual, number of trips (*y*), conditional on individual, site, and cost attributes, is equal to a nonlinear function of these attributes, observed trips, and the extent of overdispersion. Estimation of equation [3] yields values for r_i, which represent the estimated demand for trips (i.e., recreation). Equation [3] is appropriate for modeling recreation demand when data collection is conducted by either telephone or mail, since survey respondents may or may not be recreators. If a sufficient number of respondents to the telephone survey are nonusers (i.e., $y = 0$) such that there are two distinct groups of respondents, users and nonusers, then equation [3] can

be expanded to model each group jointly. The specific form of this econometric model is given by the zero inflated negative binomial model. However, if on-site surveys (e.g., surveys conducted at a boat launch) are used for data collection, then equation [3] should be augmented to account for strictly non-negative visits ($y > 0$) by respondents. This adaptation of equation [3] yields the truncated negative binomial model.

The fundamental component of an econometric model for travel cost is given by the term for the mean of the distribution of trips taken by all surveyed recreators, i.e., μ. The expected value of μ is given a linear econometric structure when the distribution is assumed Poisson or negative binomial. That is, $E[\mu] = \beta' \boldsymbol{X}$. This linear relationship connects the total number of trips made by an individual to the attributes of the individual, characteristics of the site, and costs associated with each visit. This relationship can be expressed mathematically in the following manner (assuming a single site):

$$y_i = b_0 + x_i b^x + q_i b^q + c_i b^c + e_i \qquad [4]$$

where y is the total number of trips made by the individual, b_0 is an intercept term, x denotes individual attributes, q denotes site-specific characteristics, and c denotes trip costs. Typical attributes of an individual that might be included in x include age, household size, wage, and residential location. Site-specific attributes (q) may include catch rates for certain fish species, number of access points (such as boat launches), quality of picnic areas, and number of persons seen during visit (surrogate measure for extent of crowding). Finally, c captures all costs associated with visiting the site, which include an admission fee (e.g., boat launch fee), monetary cost of travel (such as gas, wear and tear on the vehicle, food, lodging, etc.), round-trip travel time, and time spent on site.

Once information has been collected for all the terms in equations [3] and [4], the negative binomial (NB) model can be applied to the estimation of recreation demand. A demand curve can then be constructed by varying site attributes (q) or trip costs (c) and observing corresponding changes in number of trips (r) taken. Finally, WTP to pay for additional trips (r^*), conditional recreational improvements denoted by $\boldsymbol{X}^*$, can be calculated from equation [3]:

$$WTP(r^* \mid \boldsymbol{X}^*) = -\exp \boldsymbol{b}' \boldsymbol{X}^* / b^c \qquad [5]$$

where $\boldsymbol{b}$ is a vector of estimated parameters (excluding b^c) and b^c is the parameter estimate for the variable measuring trip costs (i.e., c).

Random Utility Theory

As mentioned earlier, there are essentially two primary theoretical approaches for generating demand curves in the TCM. The behavioral model is outlined in equations [2] through [5]. The utility theory approach holds that an individual derives utility or satisfaction from outdoor

recreation trips and is willing to forgo consumption of other goods and services in order to take more trips. If we assume that satisfaction derived from taking these trips can be decomposed into observable and unobservable components, then a random utility model of recreation behavior can be formulated:

$$u_{ij} = v_{ij}(r, w, s \mid \boldsymbol{X}) + e_{ij} \quad [6]$$

where u denotes latent utility, i indexes recreators, j denotes a particular site visited by i, r denotes outdoor recreation trips, w indexes market goods consumed by each individual, s denotes all other nonmarket goods and services from which each individual derives utility, and $\boldsymbol{X}$ captures all of the regressors on the right hand side of equation [1]. The first component on the right hand side of equation [6] is termed the systematic or observable component since its elements are constant across all trips taken by each individual and the elements can be measured by the researcher. The second term on the right hand side of equation [6] is termed the stochastic or unobservable component since it captures all of the individual and trip-specific factors that are unknown to the researcher.

Random utility theory posits that an individual will choose site j over some other site k as long as the utility derived from j exceeds that from k. For example, an individual may choose to visit the Cache National Wildlife Refuge instead of the Bald Knob National Wildlife Refuge because there are better opportunities to view bald eagles, which is a source of enjoyment for the individual. We can write this choice of the individual (visit site j instead of k) mathematically:

$$u_{ij} > u_{ik} \rightarrow j = 1, k = 0 \; ; \; j, k \in Q \; , j \neq k \quad [7]$$

Equation [7] states that if the utility an individual derives from visiting site j is greater than that derived from visiting site k, then the individual will visit site j (j = 1) and not k (k = 0). The additional components in equation [7] place restrictions on j and k such that both sites have to be elements of the set of all recreation sites available to the individual (denoted by Q) and must also be mutually exclusive (that is, an individual cannot visit sites j and k simultaneously).

In order to econometrically analyze the choice of site j over k (i.e., equation [7]), we must make two significant assumptions. First, that the systematic component v(.) in equation [6] can be written in a linear form:

$$v_{ij}(r, w, s \mid \boldsymbol{X}) = \beta_i' \boldsymbol{X}_j \quad [8]$$

Given this assumption, substituting equation [8] into equation [6], and forming a probability over which site will be chosen yields the following:

$$\pi(u_{ij} > u_{ik} \mid \boldsymbol{X}) = \pi(j = 1 \mid \boldsymbol{X}) = F[\beta_i'(\boldsymbol{X}_{ij} - \boldsymbol{X}_{ik}) > e_{ik} - e_{ij}] = F(v^* > e^*) \quad [9]$$

where π is the probability operator, F is the cumulative distribution function of the utility difference between the two sites, and v^* and e^* are compact notation for the utility difference. The second assumption for econometrically analyzing site choice holds that the stochastic term e_{ij} must follow a Type I extreme value distribution. Given this assumption and applying equation [9] yields a specific econometric structure for site choice analysis:

$$\pi(u_{ij} > u_{ik} \mid \boldsymbol{X}) = F(v^* > e^*) = \exp\beta_i'\boldsymbol{X}_j / \ \Sigma_Q \exp\beta_i'\boldsymbol{X}_Q \quad [10]$$

Equation [10] represents the conditional logit model. Equation [10] can be modified to estimate the multinomial logit, mixed logit, or probit models.

Parameter estimates derived from estimating equation [10] are applied to the calculation of WTP, i.e., economic values, for a change in recreational attributes q from q^o (status quo level) to q^* (improved level):

$$WTP = 1/\ b^c\ \{\boldsymbol{b}'\boldsymbol{X}^o - \boldsymbol{b}'\boldsymbol{X}^*\} \quad [11]$$

where b^c is the parameter estimate for the variable measuring costs incurred by individuals for visiting sites j or k, $\boldsymbol{b}$ is a conformable vector of estimated parameters (excluding the cost parameter) for site- and individual-specific variables included in equation [10], and $\boldsymbol{X}^o$ and $\boldsymbol{X}^*$ are vectors of independent regressors representing the status quo and improved levels of q, respectively.

Contingent Valuation Method

The basic premise for the CVM is that an economic value can be derived for an inherently unpriced, or nonmarket, good by econometrically analyzing individual responses to hypothetical changes in this good. These changes are presented to the respondent in a survey, or constructed market, and the responses solicited are choices between the status quo (i.e., the respondent prefers the good in its current state) and an improved (or possibly, degraded) state. If the latter is chosen, then the respondent is asked to state or choose the maximum amount of money he is willing to pay to secure the change.

Based on the above description of a standard contingent valuation survey, the respondent makes a discrete decision between paying for an improvement in the nonmarket good and the status quo. An individual will choose the improved state over the status quo as long as the utility derived from the former exceeds that from the latter. For the purpose of this exposition, suppose the good is recreational access and the improvement is a new boardwalk. Similar to the random

utility theory specification of the TCM, the basic econometric structure for analyzing choice is given by:

$$\pi_i(IM = 1 \mid c_i, q_i; r_i) = \exp(b_0^{IM} + x^{IM}b^x + q^{IM}b^q + c^{IM}b_c) / \{\exp(b_0^{IM} + x^{IM}b^x + q^{IM}b^q + c^{IM}b^c) + \exp(b_0^{SQ} + x^{SQ}b^x + q^{SQ}b^q + c^{SQ}b^c)\} \quad [12]$$

where π is the probability operator, *IM* denotes the improved level of recreational access, *SQ* denotes the status quo level, and all other variables are defined as before. Equation [12] links random utility theory to recreation demand estimation and states that the probability an individual will choose to pay for the new boardwalk rather than forgo payment and continue to enjoy the status quo is conditional upon the costs associated with the boardwalk, specific features of the boardwalk, and personal attributes such as income and residential location. WTP for the new boardwalk is calculated from the parameter estimates in equation [12] in a manner similar to equation [11].

Collectively, the 12 equations in this appendix show the connection between economic theory, observed recreator behavior (whether observed at the recreational site or in a survey setting), and econometric derivation of an economic value in the form of WTP for changes in recreational attributes. The TCM and CVM are the environmental valuation techniques underlying these equations and providing the link between nonmarket recreational features and economic benefits assessment.

Ozark
Howell
Oregon
Ripley
Butler
New Madrid
Pemiscot
Dunklin
Fulton
Randolph
Clay
Baxter
Marion
Izard
Sharp
Lawrence
Greene
Searcy
Stone
Batesville
Craighead
Jonesboro
Mississippi
Lauderdale
Tipton
Shelby
Independence
Newport
Van Buren
Cleburne
Jackson
Poinsett
Conway
Cross
Augusta
White
Faulkner
Woodruff
St. Francis
Prairie
Lonoke
Lee
Pulaski
Monroe

Figure 2: Northern Region of Study Area for White River Navigation Recreation Study

30 Minute Travel Time Limit
60 Minute Travel Time Lmiit
City
Hiking Trail
Picnic Ground
Fishing Access
Boat Launch
Camping Sites
White River
National Park
State Park
Wildlife Refuge

N
W
E
S

10 0 10 Miles

URS

Searcy
Stone
Van Buren
Cleburne
Independence
Newport
Craighead
Poinsett
Mississippi
Jackson
Pope
Conway
Augusta
Cross
Crittenden
West Memphis
White
Woodruff
Faulkner
St. Francis
Shelby
Perry
Des Arc
De Soto
Pulaski
Lonoke
Clarendon
Lee
Prairie
Little Rock
Tate
Saline
Tunica
Monroe
Garland
Phillips
Coahoma
Quitman
Panola
Hot Spring
Grant
Jefferson
Arkansas
Clark
Dallas
Lincoln
Cleveland
Desha
Ouachita
Calhoun
Bradley
Drew
Bolivar

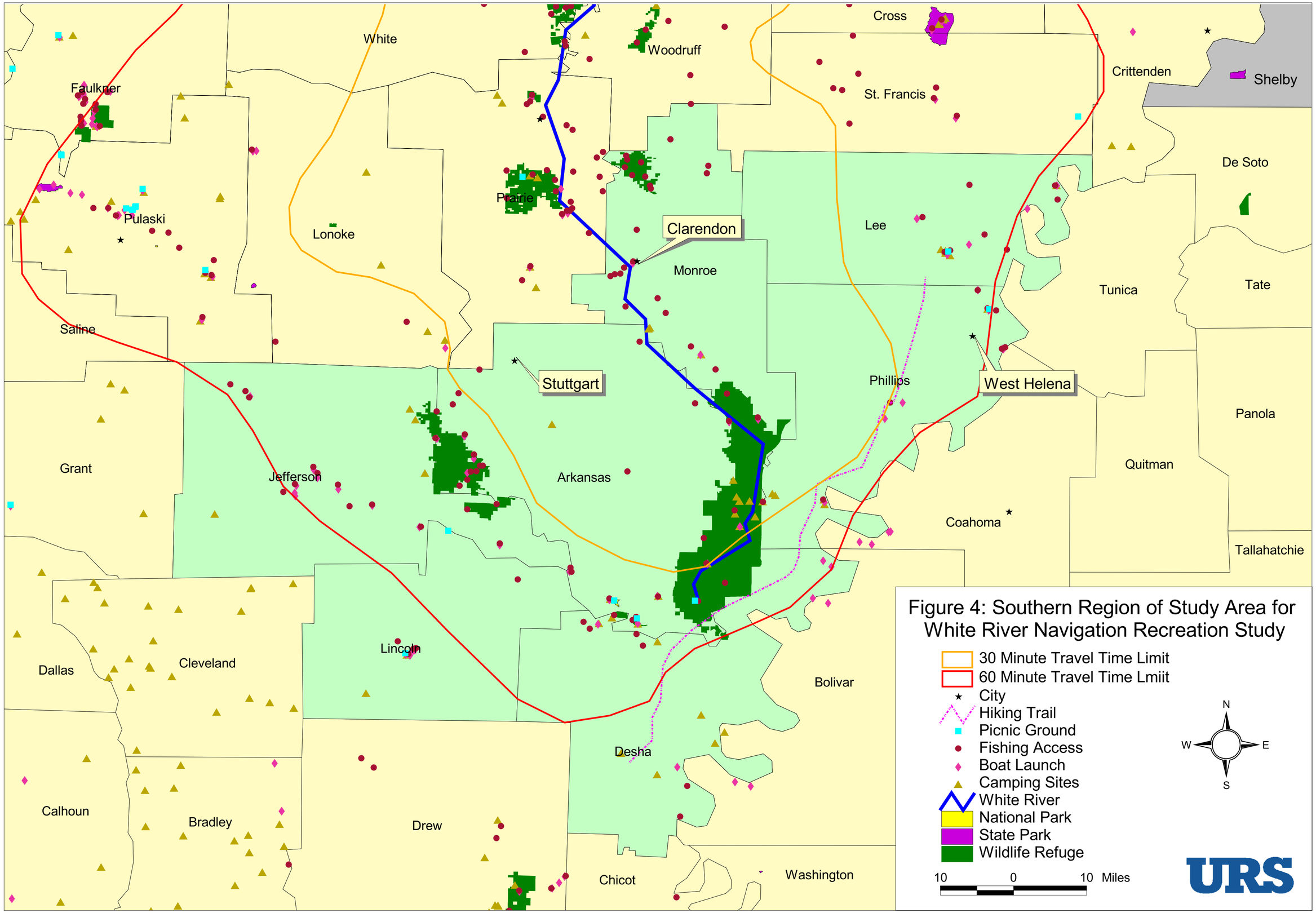
Figure 3: Central Region of Study Area for White River Navigation Recreation Study

- 30 Minute Travel Time Limit
- 60 Minute Travel Time Lmiit
- City
- Hiking Trail
- Picnic Ground
- Fishing Access
- Boat Launch
- Camping Sites
- White River
- National Park
- State Park
- Wildlife Refuge

N
W
E
S

10 0 10 Miles

URS


White
Woodruff
Cross
Crittenden
Shelby
Faulkner
St. Francis
De Soto
Prairie
Pulaski
Lonoke
Clarendon
Lee
Monroe
Tunica
Tate
Saline
Stuttgart
Phillips
West Helena
Panola
Grant
Jefferson
Arkansas
Quitman
Coahoma
Tallahatchie
Lincoln
Dallas
Cleveland
Bolivar
Desha
Calhoun
Bradley
Drew
Chicot
Washington
Figure 4: Southern Region of Study Area for White River Navigation Recreation Study
30 Minute Travel Time Limit
60 Minute Travel Time Lmiit
City
Hiking Trail
Picnic Ground
Fishing Access
Boat Launch
Camping Sites
White River
National Park
State Park
Wildlife Refuge
N
W
E
S
10 0 10 Miles
URS