Ancillary Benefits of the Ouachita River Navigation System

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Abstract

The Ouachita River, one of five designated commercially navigable waterways in the state, is economically and socially beneficial to the region's communities and industries. The river provides barge service via two public ports in addition to privately owned terminals and riverfront industrial sites. The Ouachita has been classified as a "low-use river" and is at high risk of losing its federal funding for maintenance and operation. This study investigates the ancillary benefits of the Ouachita River to the State of Arkansas including recreation, tourism, commercial shipping, water supply and electrical generation. The goal of this report is to provide information that may be useful in seeking ongoing funding of the river.

1.0 Project Description

The U.S. Army Corps of Engineers (USACE) and the Office of Management and Budget have classified the Ouachita River[1] as a "low-use river" because of what they regard as insufficient tonnage being shipped on the waterway. However, users of the river contend that when all of the uses of the waterway are considered, the federal interest is well-served in terms of economic, social and environmental benefits. The Ouachita River, one of five designated commercially navigable waterways in Arkansas, has public ports at Crossett and Camden in south Arkansas. Barge service is also available through privately owned terminals and riverfront industrial sites along the river. The Ouachita River contributes to the economic vitality of the region's industries including agriculture, oil and gas refineries and power generation plants. In addition, the region's communities, recreational users and wildlife directly benefit from this water resource.

The objective of this study is to investigate and report the ancillary benefits of the Ouachita River Waterway to the State of Arkansas including recreation, tourism, commercial shipping, water supply and electrical generation as appropriated by House Bill 1351. The need for this study is driven by the ongoing difficulty of securing adequate federal funding for the maintenance and operation of the Ouachita River's navigation system. In the President's original FY05 Budget proposal, funding for the Ouachita Black Navigation System was zeroed out for maintenance and operation. These funds provide essential money for bank stabilization and dredging for the Ouachita Black Navigation System. After many meetings and a joint, bipartisan effort, funding was successfully restored.

The federal government provides the funding necessary for sustainable waterborne transportation through the USACE regarding development and maintainability of the infrastructure of the nation's inland waterways. In the federal budget, the decision regarding allocation of operations and maintenance (O&M) funds considers the volume of commerce on waterways and funding is reduced for those that do not satisfy a determined minimum limit on the volume of commerce. David Grier from the USACE Institute for Water Resources states that this metric supports

1 Cover photo from www.orva.org/images/poto_15.gif

larger mainstream waterways with adequate funding but penalizes smaller tributary waterways with funding cuts.[2] In the U.S., tributaries are all rivers other than the Mississippi, Ohio, Tennessee and the Gulf Intercoastal.[3]

In the navigation program of USACE, waterways are classified as high-use or low-use waterways according to their volume of commerce.[4] There are two performance metrics for low-use waterway designation. These are: 1) a waterway has less than 1 billion ton-miles of commercial cargo annually and 2) a waterway has less than 1 million tons of cargo moving annually.[3,4,5] Although the objective of using this criterion is to allocate funds to those waterways that provide the greatest economic benefit, it reduces the funding for smaller tributary waterways since most of tributaries are classified as low-use waterways. For example, the funding for twelve tributary waterways was reduced by as much as 5% to 90% by using this measure of performance in the FY03 budget.[3]

Tributaries generally have lower traffic density since they are short, smaller channels. As a result, the ton-mile of a tributary is much lower than a mainstem waterway. Traffic on the tributaries is only a small part of the total commerce between consumer and producer, yet it has a significant role within overall movement of freight. Mainstem waterways are linked to each other with the presence of tributaries. Tributaries have a vital role in national navigation system, connecting more remote regions and communities with mainstem waterways.[3] Between 1999 and 2003, 69% of the total tons on the waterways originated from tributary waterways.[6] Furthermore, as declared in Tributary Tonnage data sheet published by USACE for years between 2000 and 2004, tributaries attributed 62% of all tons in inland traffic on the nation's waterway system.

Tributaries also have ancillary benefits such as flood protection, water supply, recreation and hydropower. The overall efficiency of the waterway system is dependent on the existence of tributaries. Nevertheless, the contribution of tributaries to the nation is underestimated by the ton-mile performance measure. As David Grier points out, waterways should be considered as a system since a shipment may travel on multiple waterways to reach the final destination.[2] The ton-mile metric only shows the traffic on a particular waterway and only the distance traveled on that waterway. It does not include the total movement of freight and does not consider the need for that tributary to complete the shipment.

Using tributaries reduces transfers in movement of products and therefore reduces the cost and time for shippers. For example, it is possible that an ocean-river ship could navigate from Camden, Arkansas to Vera Cruz, Mexico without any cargo transfers in route by using the Ouachita, Black, Red and Atchafalaya Rivers and then out into Atchafalaya Bay.[7]

2 Grier, D.V., "Measuring the Service Levels of Inland Waterways," Inland Waterways Journal, TR News, July-August 2002, Vol. 22.

3 USACE Navigation Data Center Official Website, http://www.ndc.iwr.usace.army.mil/wcsc/tributaries.htm

4 USACE Navigation Annex, 2006.

5 Holliday, B., "Navigation Performance Measures Workshop," USACE , May 2004.

6 "19th Annual Report," Inland Waterways Users Board, March 2005.

7 "Waterside Industrial Sites on the Ouachita River in Arkansas," October 1995.

Therefore, a low-use tributary may be significantly contributing to commercial shipping in the overall waterway system. As tributaries are removed from the system, less cargo will travel on the higher use waterways reducing their cost effectiveness and contribution to national and international commerce.[6] This is comparable to the removal of low-use non-hub airports in the national airport system. With the removal of the hubs, the throughput of the larger hubs is dramatically decreased.[6] Major waterways do carry most of the cargo in the system; however, tributaries feed these major waterways. Moreover, the value of tributaries to the community, region and nation should also be determined by taking into account the ancillary benefits such as flood protection, water supply, recreation and hydropower. Thus, strictly focusing on the tonnage or ton-miles does not explain the full economic impact of the tributary.

2.0 Ouachita River Region

The Ouachita River is part of the Ouachita-Black Navigation System. The Ouachita River, along with the Arkansas, Mississippi, Red and White Rivers, is one of Arkansas' five navigable rivers. The Ouachita River originates from Polk County, Arkansas and flows 510 miles in a southerly direction to Jonesville, Louisiana. In Jonesville, it joins with the Tensas and Little rivers to form the Black River.[8] The navigable portion of the Ouachita-Black Navigation System is a 337-mile long waterway[8] with approximately 116 miles of the system located in the state of Arkansas.[8,9] As shown in Figure 1, the navigable section of the Ouachita River in Arkansas passes through five counties: Ashley, Bradley, Calhoun, Ouachita and Union.[7] The Ouachita is also important to Polk, Montgomery, Garland, Hot Spring, Clark and Dallas counties because of its recreational, water supply, hydropower and environmental benefits.

The major cities in Arkansas that are located along the Ouachita River are Arkadelphia, Camden, Crossett, El Dorado, Malvern and Hot Springs. The Ouachita River provides water, recreational opportunities and energy for companies in these cities. The majority of companies along the Ouachita River are located along the section of the river between Camden to the Arkansas-Louisiana border. Significant commodities produced in the Ouachita River region include petroleum and chemical products, lumber, plywood and paper products.[7] The Ouachita has the capability to provide barge service in Arkansas via two public ports (see Figure 2) which are located in Camden (Ouachita County) and Crossett (Ashley County). Both ports are currently being used for receipt and shipment of various bulk materials and general cargo. At the Camden Port, there is a 29,000-square foot warehouse leased by private operators for handling only rail and truck shipments. The Camden Port has a direct connection to the Union Pacific Railroad. The Crossett Port has a docking peer, turning basin, four barge towing system[10] and a 16,000-square foot warehouse available for leasing.[11]

8 USACE Vicksburg District official website, http://www.mvk.usace.army.mil/lakes/ouachitablackriver/main.php?page=mainContent

9 Arkansas Waterways Commission, "Biennial Report January 1, 2003 through December 31, 2004."

10 Crossett Economic Development Foundation official website, http://www.cityofcrossett.net/transportation.html

11 USACE Navigation Data Center, Port Series No. 68, 2002.

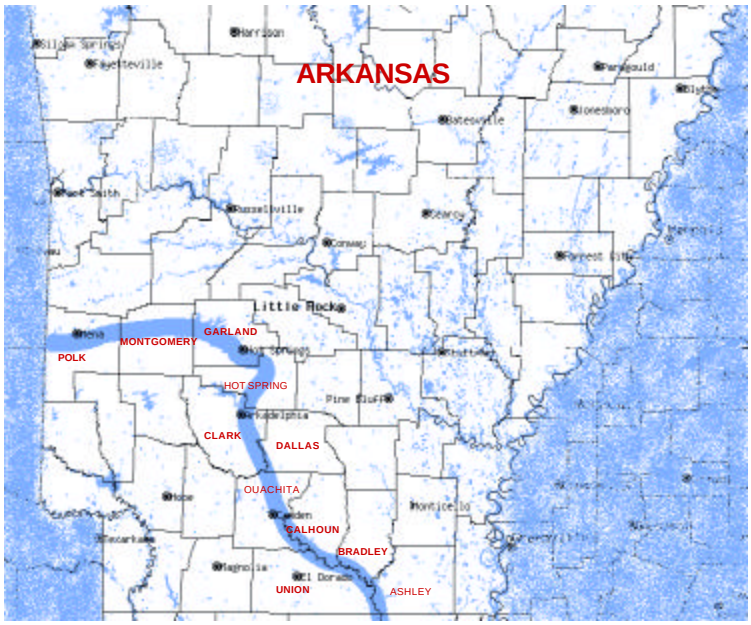

Figure 1. Counties of the Ouachita River Region

Crossett Port is 475 miles from the Port of New Orleans and less than an hour away from the Yellow Ben Port on Mississippi River.[10] In addition to the two public ports on the Ouachita River, there is a private port owned by Cross Oil Refining & Marketing Co, which is used for receipt and shipment of crude oil and lubricating oil.[11] The Ouachita River has international access through the Gulf Intercoastal Waterway and the Gulf of Mexico and is connected to several domestic ports including Brownsville, Kansas City, Chicago, Pittsburgh, Florida and New Orleans.[7]

Figure 2. Arkansas Rivers and Public Ports

The navigable portion of the Ouachita River is formed by four lock and dam systems with a total of $700 million dollars invested in their construction.[9] Two of these multipurpose lock and dams (hydropower, flood control and recreational) are located in the Arkansas portion of the navigation system. The H. K. Thatcher lock and dam system is located near Camden, AR; the Felsenthal lock and dam system is located near Crossett. In addition to these lock and dam systems that are operated by the USACE, there are two other dams in Hot Springs area owned by Entergy Arkansas, Inc. The Remmel Dam was completed in 1924 and creates Lake Catherine; Carpenter Dam was constructed in 1932 and creates Lake Hamilton.[12] Lake Ouachita is also located in Hot Springs vicinity along the Ouachita River and is the largest manmade lake in Arkansas. Moreover, DeGray Lake is a lake on the Caddo River, a tributary of the Ouachita River.

3.0 Water Transportation on the Ouachita River

The inbound and outbound traffic for the counties in the navigable portion of the Ouachita River in Arkansas are given in Tables 1 and 2 respectively.[13] This data was received from the Arkansas State Highway and Transportation Department in 2006. As shown in Table 1, the only Arkansas county to receive freight via the Ouachita River is Union County. Almost 70,000 tons of freight is shipped to Union County via the Ouachita River accounting for 44% of all inbound traffic to the county. The freight shipped via waterborne transportation are primary metal products, chemicals, coal, fabricated metal products, metallic ores, waste or scrap materials and miscellaneous freight shipments. The percentages of freight shipped to Union County via the Ouachita River are shown in Figure 3. Almost 90% of total freight shipped to Union County via the Ouachita River is chemical or allied products originating from Louisiana. Metallic ores is the second major product shipped to the county via water transportation.

It is shown in Table 2 that only counties that shipped products via the Ouachita River are Union and Ashley counties. The products shipped via water transportation are chemicals or allied products, waste or scrap materials, lumber or wood products and metallic ores. Almost 93,000 tons of these products are shipped to Union and Ashley counties via the Ouachita River. The percentages of products shipped to Union County via the Ouachita River are shown in Figure 4. The majority of the products shipped in outbound traffic are lumber or wood products. More than 70% of total freight shipped via the Ouachita River is lumber or wood products sent to the Mid-West Region. Chemical or allied products are the second major product originating from Union County. Georgia Pacific Crossett Paper Operations is the largest employer in Ashley County. However, there are no shipments for pulp, paper or allied products originating from Ashley County via the Ouachita River. Shifting truckloads to bargeloads is an opportunity for a growth at the Crossett Port.

12 Entergy, News release: Entergy hydro license renewed for another 50 years, 2003.

13 Arkansas State Highway and Transportation Department, Freight Goods Movement Database, 2006.

Table 1. Domestic Inbound Traffic on the Ouachita River (tons)[13]

Description	Origination	Destination	Rail	Truckload	Less-Than-Truckload	Private Truck	Air	Water
Primary Metal Products	Deep South Region	Union County	0	410	62	91	0	774
Chemicals or Allied Products	LA part of New Orleans, LA BEA	Union County	0	0	0	0	0	127
Chemicals or Allied Products	Louisiana	Union County	7,200	7,028	29	1755	0	41,405
Chemicals or Allied Products	Mid-West Region	Union County	0	0	0	0	0	224
Chemicals or Allied Products	Mississippi	Union County	0	23	1	4	0	2,916
Chemicals or Allied Products	Phillips County	Union County	27,200	16474	620	6425	0	14,430
Coal	LA part of New Orleans, LA BEA	Union County	0	14151	191	2159	0	2552
Fabricated Metal Products	LA part of New Orleans, LA BEA	Union County	0	0	0	0	0	214
Metallic Ores	Shelby County	Union County	0	558	48	319	0	2,546
Metallic Ores	Tennessee	Union County	0	0	0	0	0	213
Metallic Ores	TX part of Houston, TX BEA	Union County	0	309	212	837	0	1,384
Miscellaneous Freight Shipments	TX part of Houston, TX BEA	Union County	1528	0	0	0	0	529
Waste or Scrap Materials	IL part of Chicago, IL BEA	Union County	0	0	0	0	0	694
Waste or Scrap Materials	Mid-West Region	Union County	0	0	0	0	0	200
Waste or Scrap Materials	Oklahoma	Union County	0	0	0	0	0	322
Waste or Scrap Materials	Prairie Region	Union County	0	0	0	0	0	369
		Total	35,928	38,953	1,163	11,590	0	68,899

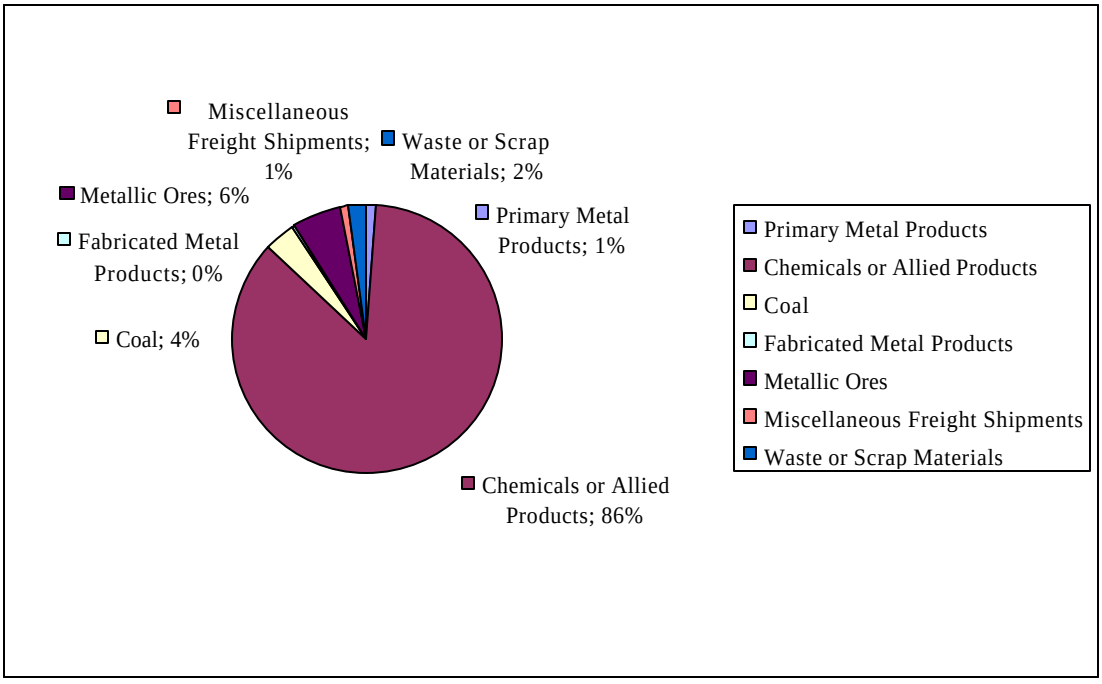

Figure 3. Percentages for Inbound Traffic on the Ouachita River[13]

Table 2. Domestic Outbound Traffic on the Ouachita River (tons)[13]

Description	Origination	Destination	Rail	Truckload	Less-Than-Truckload	Private Truck	Air	Water
Lumber or Wood Products	Union County	Mid-West Region	0	9,460	2,773	2,010	0	67,058
Chemicals or Allied Products	Union County	Mid-West Region	19,020	3,012	50	596	0	8,730
Chemicals or Allied Products	Union County	Mississippi	0	150	76	407	0	725
Chemicals or Allied Products	Union County	Missouri	31,732	0	0	0	0	2,769
Chemicals or Allied Products	Union County	MO part of St. Louis, MO BEA	19,656	601	39	838	0	1,384
Chemicals or Allied Products	Union County	Phillips County	0	365	136	994	0	959
Chemicals or Allied Products	Union County	Prairie Region	0	5,671	1,114	1,249	0	2,504
Chemicals or Allied Products	Union County	Southeast Region	126,788	1,273	129	158	0	4,083
Metallic Ores	Ashley County	Tennessee	0	0	0	0	0	2,355
Metallic Ores	Union County	Tennessee	0	0	0	0	0	2,054
Waste or Scrap Materials	Ashley County	Tennessee	0	0	0	0	0	144
Waste or Scrap Materials	Union County	Deep South Region	0	0	0	0	0	159
Waste or Scrap Materials	Union County	Tennessee	0	0	0	0	0	125
		Total	**197,196**	**20,532**	**4,317**	**6,252**	**0**	**93,049**

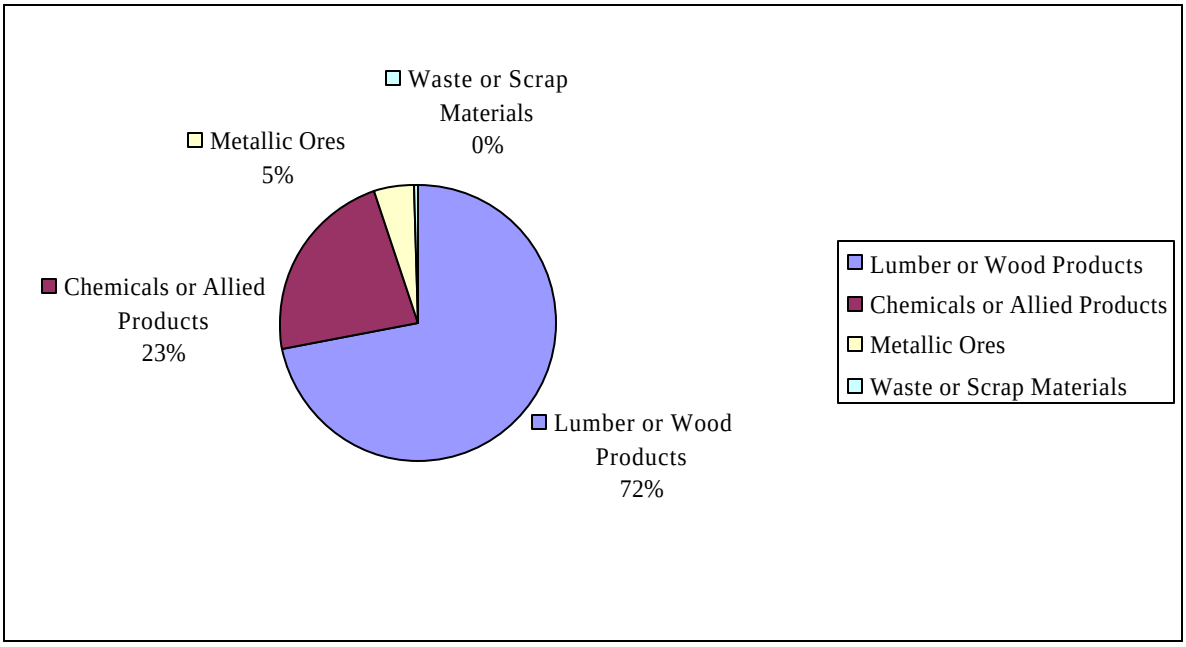

Figure 4. Percentages for Outbound Traffic on the Ouachita River[13]

In Smackover, AR, Cross Oil Refining & Marketing Inc. produces high grade transformer oil, motor oil, hydraulic, ink oils, fuel oil, diesel fuel, naphthenic lubricating oils, naphthas and asphalt.[7, 14] Cross Oil has a private terminal on the Ouachita River completed in 1995. The facility, located approximately six miles north of Smackover at Miller's

14 Personal Communication, BillyNeal and Clark Langley.

Bluff, uses this private terminal for shipments.[15] In 1996, the refinery processed 5,800 barrels of crude oil daily with a peak production of 6,500 barrels.[15] Primarily 75% of crude oil is transported to the company by water transportation at the Cross Ouachita River Terminal. The company received 79 barges of oil in 2003 and 100 barges of oil in 2004 through its terminal.[9] The company would be severely affected from a funding cut for the Ouachita River.[14] Other modes of transportation have been considered and were found to be neither feasible nor reliable. If the company did not use the navigation system for transportation, approximately 100,000 additional tractor-trailers would be on highways for Cross Oil's shipments.[16]

4.0 Ancillary Benefits of the Ouachita River

This study identifies and reports the ancillary benefits of the Ouachita River to the State of Arkansas. A detailed search and review of relevant literature and documentation is conducted for the following areas:

- Recreational and Tourism Benefits
- Water Supply
- Electrical Generation
- Environmental Impacts

Additionally, a questionnaire targeting Ouachita River stakeholders is developed and administered. The literature review and questionnaire responses provide important data and validation for the study.

4.1 Recreational and Tourism Benefits

The Arkansas Department of Economic Development divides the state into eleven regions in regards to tourism activities. The Ouachita River passes through two regions, the Diamond Lakes and Arkansas' South regions.[17] These two regions receive hundreds of thousands of visitors annually as a result of the Ouachita River and its lakes. These visitors are welcomed with various recreational activities such as camping, water sports, observing wildlife, fishing and hunting, sightseeing and hiking. In testimony recorded by the Committee on Agriculture, Forestry and Economic Development, the Arkansas Game and Fish Commission states that changes to lock and dam management could result in the loss of navigation pools and inability to use many of the recreational improvements provided.[18]

4.1.1 Recreational Benefits

Diamond Lakes Region

In Diamond Lakes region (presented in Figure 5), Garland, Hot Spring, Montgomery and Clark counties are benefiting from the recreational and tourism activities of the Ouachita River and its lakes.[17] The lakes of the upper Ouachita River, Lake Catherine, Lake Hamilton and Lake Ouachita, form the "Tri-Lakes Region" in Hot Spring,

15 Waldon, G. (1996). 1990s mark boom time for Smackover's Cross Oil. Arkansas Business. Retrieved March 3, 2006, from ProQuest Direct database.

16 Deere, Stephen. (2004). Cutting funding for river system worries lawmakers. Arkansas D emocrat Gazette. Retrieved March 3, 2006, from ProQuest Direct database.

17 "2006 Economic Report for Arkansas Parks and Recreation," Arkansas Parks and Recreation official website, http://www.arkansas.com/economic_report05/

18 "Summary of Testimony Presented to The Committee on Agriculture, Forestry, and Economic Development of the Arkansas Legislature," April 2004.

Garland and Montgomery counties.[19] De Gray Lake in Clark County is also one of the lakes in the region created by damming of a tributary of the Ouachita River.

Figure 5. Diamond Lakes Region

Lake Hamilton, Lake Catherine and Lake Ouachita are the points of attraction for tourism in this county. Water-skiing, parasailing, recreational boating, swimming, scuba diving, whitewater surfing with kayaks, fishing, shoreline recreation and park-use are very popular activities in the area.[20] The lakes are well-known with fishing opportunities. For example, Lake Ouachita constantly ranks in the top 10 nationally for largemouth bass fishing.[17] Furthermore, there are campsites, resorts and hotels, picnic sites, playgrounds and hiking trails along the lakes' shores in the state parks.[19] There are 21 recreation areas on Lake Ouachita that provide miscellaneous recreation opportunities, including 150 picnic sites, 1,106 campsites, 24 boat ramps and 13 swimming beaches. Similarly, there are 43 sites on Lake Hamilton and 8 sites on Lake Catherine. The state parks also offer lake tours at several times of the year that allow for wildlife observation.[20] The cruises on the lakes provide opportunity to observe wildlife, especially in the Lake Hamilton botanical garden, Garvan Woodland Gardens.[20] In Lake Ouachita, there is a Geo-Float Trail for boaters created by the USACE to observe prominent geologic features on the lake.[20] These three lakes are also very close to the spa city of Hot Springs. Therefore the tourists that visit the thermal springs may also take advantage of the lakes and various recreational opportunities.[21] In 1999, there were approximately 179,800, 145,700 and 1,223,500 visits estimated for Lake Hamilton, Lake Catherine and Lake Ouachita respectively.[22] The visitor

19 Diamond Lakes Tourism Association official website, http://diamondlakes.dina.org/ofcountry.html

20 Arkansas Department of Parks and Tourism official website, http://www.arkansas.com/lakes-rivers/

21 Richardson, J., Richardson, D. (2004) Dive head-first into a variety of water-related activities in Hot Springs, Arkansas. Trailer Life, Vol64. Retrieved March 28, 2006, from the ProQuest Direct database.

22 USACE Value to the Nation Fast Facts for recreation in 1999, http://www.vtn.iwr.usace.army.mil/recreation/state.asp?state=AR

expenditures contribute to the local and national economies by supporting jobs and generating income. The 1999 visits to Lake Ouachita contributed an estimated $12.47 million in total income and 655 jobs to the local community surrounding by the lake.[22]

Clark County is also called the "Two Rivers County" since the Ouachita River and its tributary Caddo River pass through this county. Both rivers are popular sites for water sports and other water-based activities. Each April in Arkadelphia, the Festival of Two Rivers attracts many tourists to the area.[19] There are three recreational areas with baseball fields, boat ramps, picnic areas with paved trails and an amphitheater along the Ouachita River. These recreational areas contribute to growth in the residential areas adjacent to the park sites and to provide recreational facilities and access to the water. There are approximately 1,000 to 2,000 annual visits to the parks.[23] Under USACE management, DeGray Lake has 21 recreation areas that provide various recreation opportunities including 404 picnic sites, 837 camping sites, 23 boat ramps and 15 swimming areas. There are approximately 2,392,600 visits estimated in 1999 contributing with $19.47 million in total income and 1,166 jobs to the local community surrounding by the lake.[22]

In Hot Spring County near Malvern, the Ouachita River Whitewater Park (Millennium Park) is being constructed through support from the U.S. Department of Transportation, Arkansas Game and Fish Commission, Ouachita River Park Commission and Arkansas Canoe Club and should be completed in 2007.[24] A study called the Ouachita River Whitewater Improvements Project funded by the Ouachita River Park Commission was conducted to investigate in-stream enhancement opportunities in the river and consequently provided recreational and economic benefits for Malvern and Hot Spring County.[25] Colorado's Clear Creek Whitewater Park in City of Golden is a noted example that shows the investment return of such a park and its economic benefit to the community. Clear Creek Whitewater Park was completed in 1998 at a construction cost of $175,000. In the following years, the City of Golden doubled the park's size and has attracted many national level competitions. In addition, the park brought more economic return than was estimated at the beginning of the project.[25] It is expected that the Ouachita River Whitewater Park will provide an exciting opportunity to enhance whitewater recreation revenue in the Ouachita River region.

Arkansas' South Region

In Arkansas' South Region (presented in Figure 6), Ashley, Bradley, Calhoun, Ouachita, Dallas and Union counties benefit from the recreational and tourism activities of Ouachita River and its pools. The Ouachita River and its tributary Saline River and the Felsenthal and H.K. Thatcher pools are the points of attraction in the region. There are recreational areas including swimming sites, picnic sites, parks and playgrounds.[26] The Felsenthal National Wildlife Refuge, located in Union, Ashley and Bradley counties, provides recreational opportunities for the public such as

23 Personal Communication, Rick Brumley, Director of Arkadelphia Parks and Recreation Department.

24 Bowers, R., Malvern expecting a rush from white-water park. Arkansas Democrat Gazette, April 2, 2006.

25 Recreation, Engineering and Planning Field Office, Ouachita River Whitewater Improvements Project Conceptual Plan

26 Arkansas' South Tourism Association official website, http://www.arkansassouth.com/outdoors/

fishing, hunting, wildlife observation, camping and wildlife photography.[27] The refuge also serves as an educational venue for environmental investigations and surveying. In 2005, there were 16 recreational areas in the refuge utilized by approximately 500,000 visitors with an economic impact of approximately $13,000,000.[28] The Ouachita River supports all of the tourism industry in the Crossett area with more than 100 recreational facilities.[29] Similarly, the Ouachita River supports the tourism industry in the Camden area with approximately 120,000 visitors in five recreational facilities.[30] The H.K. Thatcher and Felsenthal Lock & Dam pools on the Ouachita River are under control of USACE. Each of them has three access points to the Ouachita River with picnicking, fishing and boating opportunities.[31] In 1999, it was reported that there were 184,400 visits contributing with $2.16 million in total income and 106 jobs in local community surrounding the pool.[19]

Figure 6. Arkansas' South Region

4.1.2 Tourism Benefits

In the 2006 Economic Report for Arkansas Parks and Recreation, recreational expenditures generated by visitors to the State of Arkansas are presented for each county according to information collected from internet and welcome center surveys. These visitors participated in a variety of recreational activities including sightseeing, shopping, attractions, historic sites, museums, live performance, arts/crafts shows, camping, hiking, hunting/fishing, antiques, golf, water sports, festivals, bird watching and sporting events. In order to estimate the revenue generated by the recreational activities related to the Ouachita River and its lakes, a percentage of total values for each county are

27 US Fish & Wildlife Service official website, Felsenthal National Wildlife Refugee, http://www.fws.gov/felsenthal/

28 Personal communication, Jim Johnson.

29 Personal Communication, Mike Smith.

30 Personal Communication, City of Camden Mayor, Chris Claybaker.

31 USACE Vicksburg District official website, Ouachita/Black Waterway, http: //gorp.away.com

estimated. The recreational activities included in the proportion attributed to the Ouachita River are camping, hiking, fishing and hunting, water sports and bird watching. The Economic Report also includes the participation percentage of each activity in each county. The total percentage of activities related to the Ouachita River is calculated as 30%. The resulting total recreational expenditures for the Ouachita Region are shown in Table 3.

Table 3. Recreational Expenditures by County[14]

Counties	Total Travel Expenditures (dollars)	Travel-Generated Payroll (dollars)	Travel-Generated Employment (# of jobs)	Travel-Generated State Tax (dollars)	Travel-Generated Local Tax (dollars)	Total Trip/Visitor (person-trips)
Ashley	$ 22,944,223	$ 4,893,946	328	$ 1,478,643	$ 521,894	114,390
Bradley	$ 7,822,491	$ 1,431,080	82	$ 530,642	$ 239,269	33,409
Calhoun	$ 2,161,584	$ 280,272	11	$ 141,984	$ 81,907	6,438
Clark	$ 42,618,783	$ 9,134,636	591	$ 2,835,408	$ 782,276	213,158
Dallas	$ 10,300,745	$ 1,845,591	111	$ 690,380	$ 269,790	50,209
Garland	$ 508,455,985	$ 104,132,647	7,001	$ 31,217,691	$ 11,581,517	2,400,979
Hot Spring	$ 24,094,371	$ 4,473,803	277	$ 1,581,627	$ 608,264	112,947
Montgomery	$ 21,233,641	$ 3,870,671	241	$ 1,366,213	$ 723,957	90,652
Ouachita	$ 25,430,036	$ 5,426,579	354	$ 1,652,380	$ 511,724	134,412
Polk	$ 16,708,011	$ 3,557,919	237	$ 1,083,117	$ 389,311	77,685
Union	$ 90,163,324	$ 12,155,132	946	$ 4,781,714	$ 1,517,024	392,538
TOTAL	$ 771,933,194	$ 151,202,276	10,179	$ 47,359,799	$ 17,226,933	3,626,817
RELATED TO THE OUACHITA RIVER	$ 230,808,025	$ 45,209,481	3,044	$ 14,160,580	$ 5,150,853	1,084,418

Taken as a whole, the Ouachita River region generated almost $770 million in revenue in 2006 with 3.6 million visitors. However, this includes all types of recreational activities. The impact of the Ouachita River for recreation in the region is nearly $230 million in revenue with over one million visitors. The payroll generated from the recreational activities was nearly $45 million and over three thousand jobs. Recreation related to the Ouachita River and its lakes in these counties generated for almost $14 million in state and $5 million in local tax revenue for the area. Figure 7 presents a comparison of the travel expenditures among the counties in the Ouachita River region.

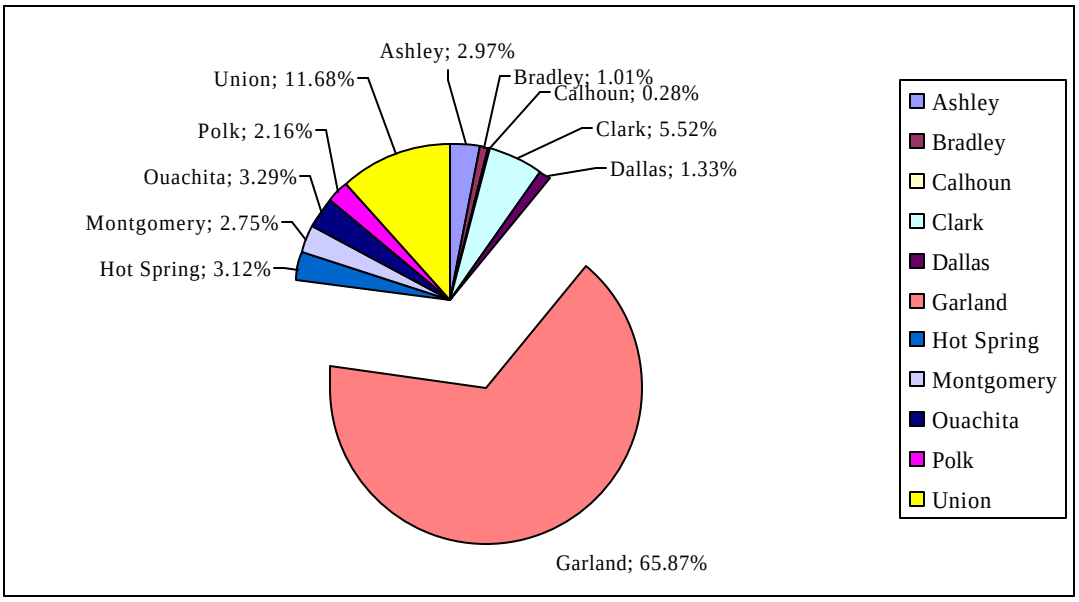

Figure 7. Travel Expenditures in the Ouachita River Region

4.2 Water Supply

The Ouachita River is the primary water supply for many municipalities and industrial facilities in the Ouachita River region. In total, between 34.5 and 38.5 million gallons per day is withdrawn from the Ouachita River to satisfy municipal and industrial requirements in the area as seen in Table 4. A decrease in the minimum water level could result in the inability to satisfy current demand.

Table 4. Ouachita River Water Usage

Ouachita Water Usage	Million Gallons per Day (mgd)
Union County Alternative Water Source	8 - 12
Georgia Pacific Crossett Operations	20
Camden Water Utilities	3
North Garland County Regional Water District	1
Ouachita River Water District	2.5
Total	**34.5 – 38.5**

Union County

In Union County, the Ouachita River is an alternative water source for the primary water supply, the Sparta Aquifer.[32] The Sparta Aquifer is a groundwater reserve for southeastern Arkansas and northern Louisiana that provided industrial process water and drinking water for seven cities, 29 rural water associations and 11 major

32 Johnson, S., Ouachita River Alternative Water Supply Project. Union County Water Conservation Board, 2005.

industries in Union County [33] until the aquifer faced critical levels of depletion due to increased growth of the area. To avoid irreparable damage in the aquifer, Union County chose to construct infrastructure to use the Ouachita River as an alternative source for industrial facilities.[31] The Ouachita River Alternative Water Supply Project cost Union Power Partners approximately $52 million dollars and the Union County area approximately $14 million dollars.[29,34] The Ouachita River Alternative Water Supply project has a daily capacity of 50 million gallons per day with a peak capacity of 65 million gallons per day.[29,31] The project consists of an intake infrastructure and pump station at the Ouachita River, a clarification facility and a storage tank located approximately nine miles from the Ouachita River. Approximately 20.3 miles of pipeline connects the infrastructure to transport clarified river water to four Union County industrial customers. This water is used by the Union Power Station combined-cycle natural gas-fired power plant.[35] The power plant, owned by Entegra, was developed and built on a parallel path with the water supply project. In 2003, the power plant was fully operational and uses the clarified water to create steam for electricity generation and cooling tower purposes.[32] Between December 2004 and October 2005, three of the county's largest industrial companies, Lion Oil, El Dorado Chemical and Chemtura Central Plant (formerly Great Lakes Chemical) began to draw raw water from the Ouachita River for use in their facilities.[31,32] These three companies use the water for either or both process or cooling purposes. Current customer daily average water consumption is between 8 and 12 million gallons per day with a peak between 16 and 21 million gallons per day.[32]

Union County was among five counties declared the first Critical Groundwater Area by the Arkansas Soil and Water Commission in January 1996. As a result of the Ouachita River Alternative Water Supply project and the three industries' conversion since October 2005, the Sparta Aquifer well levels in Union County are rising for the first time in 60 years.[35] Considering Union County's future economic development needs, the project has an excess capacity of 10 million gallons per day and is also expandable to provide an additional 19 million gallons per day. The project and its impacts are being studied through an EPA grant and in collaboration with the U.S. Geological Survey and Union County Conservation District, since it is the only project of its kind in the State of Arkansas and one of the few in the country.

Ouachita County

The Camden Water Utilities draws approximately 900 million gallons of water annually from the Ouachita River.[36] Moreover, the Ouachita River is the water source of the city for municipal usages including drinking water as well as commercial and industrial use.[30]

Ashley County

The Georgia-Pacific plant in Crossett depends on the Felsenthal Lock and Dam system on the Ouachita River for their water supply. The plant draws water from the Saline River which is a tributary in the southwest portion of

33 Union County Conservation District. Sparta Aquifer Recovery Study, http://argis.ualr.edu /website/unionCoGraph/spartaHistory.asp

34 Reynolds, R., Oligschlaeger, D. (2006). Project Restores Vital Water Supply Resource. Waterworld. Retrieved May 30, 2006, from http://ww.pennnet.com

35 Personal Communication, Sherrel Johnson.

36 James Tilley, Manager of Camden Water Utilities, Testimony to the Committee on Agriculture, Forestry, and Economic Development.

Arkansas and empties into the Ouachita River in Felsenthal National Wildlife Refuge.[37] Without the lock and dam system, the plant would not be able to pull enough water out of the Saline River to support their production operations. Approximately 20 million gallons of water is drawn daily to support the operations in the facility.[29] In addition, the plant also handles wastewater treatment and discharge for itself and the City of Crossett, treating approximately 40 million gallons per day.[38]

Garland County

Lake Ouachita is one of two water supply projects located on the Ouachita River that is managed by the USACE. The water supply agreement is with the North Garland County Regional Water District, which has a right to utilize 1,575 acre-feet of storage space. For this right, the District is repaying the Federal Government $112,900 plus the associated yearly operation and maintenance expenses. This storage space provides approximately 1 million gallons of water per day.[39] Entergy Arkansas, Inc. operates a natural gas-fired steam electric power plant on Lake Catherine. The plant is designed to withdraw up to 256,000 gallons per minute when all four units are operating.[40]

Clark County

The second water supply project of the USACE is DeGray Lake, located on Caddo River, one of the tributaries of the Ouachita River.[41] At DeGray Lake, there are three water supply agreements with the Ouachita River Water District. These agreements were signed in September 1992 (1,573 acre-feet), July 1998 (787 acre-feet) and May 2001 (1,573 acre-feet) for a total of 3,933 acre-feet in present use storage space for which the District is repaying $131,100 plus the annual operation and maintenance expense. The total output of the three agreements is estimated to produce approximately 2.5 million gallons of water for daily use by municipalities and industries in the area.[39]

4.3 Electrical Generation

The Ouachita River is an important source for generating electricity in Hot Spring, Garland, Union and Ouachita counties. The Ouachita River is used to generate hydroelectricity in addition to cooling operations.

On the Ouachita River, there are two hydroelectric facilities owned and operated by Entergy Arkansas, Inc., Remmel Dam located in Hot Spring County and Carpenter Dam located in Garland County.[12, 28] Therefore, the two hydroelectric stations have an annual capacity of approximately 188,000 megawatt hours (MWh) which is a sufficient amount of power for more than 50,000 houses.[12,39]

The Union Power Station, owned and operated by Entegra, in Union County is the largest combined-cycle natural gas-fired power plant in the country. Its four 500 MW generating blocks are designed to start-up and shut-down

37 http://www.answers.com/topic/saline-river-1

38 ORVA, Georgia-Pacific Crossett Paper Operations.

39 Hillyer, T. M., Water Supply Database 2004 Survey. Alexandria, VA: U.S. Army Corps of Engineers Institute for Water Resources, 2005.

40 Personal Communication, Bobby Pharr.

41 http://www.southwestpaddler.com/ouachitariver

independently of each other depending on demand. Depending on demand, the plant can generate anywhere from 250 to 2205 MW at any given time. The station uses the Ouachita River for creating steam to generate electricity and moreover for cooling tower purposes.[35]

The John L. McClellan Generating Station located in Camden (Ouachita County) is owned and operated by Arkansas Electric Cooperatives. It is a 134 megawatt steam electric generating plant. This station utilizes a regenerative steam cycle system with water serving as the working fluid. The station uses water from the Ouachita River for fluid cooling purposes.[42]

4.4 Environmental Impacts

The Ouachita River is also important to the environment in the region by accommodating a wide range of species. There are various lakes and pools in the Ouachita River region that provide habitat for various kinds of plants and animals.

The Felsenthal National Wildlife Refuge, covering 65,000 acres in Ashley, Bradley and Union counties, is the world's largest green-tree reservoir. The refuge comprises the 15,000-acre Felsenthal Pool on the Ouachita River that is approximately 36,000 acres during winter season.[27] The objective of the refuge is to provide and enhance a reliable environment for migratory waterfowl and other birds.[27] The refuge offers a habitat for almost 100 kinds of birds and many more species during the migration season.[27] Furthermore, it provides habitat and protection for endangered species such as the red-cockaded woodpecker, threatened American alligator and bald eagle.[27] Since the refuge has a capability of 36,000 acres during winter flooding, it has become an important habitat for waterfowl with the uttermost population over 300,000 birds in recent years.[43] In 1998, the Arkansas Game and Fish Commission transferred many American black bears, the only kind of bears in Arkansas, from White River refuge into the Felsenthal National Wildlife Refuge for habitat recovery. Although the habitat recovery of American black bears in Arkansas is improving, there is still a threat to bears' long term future in Arkansas and in other parts of the U.S.[44]

The lakes on the Ouachita River offer a broad environment for many kinds of fish ranging from sunfish, bass, crappie, catfish, walleye, pickerel and trout.[45] Lake Ouachita is ranked tenth in the nation for striped bass and largemouth bass fishing.[20] Dr. Henry W. Robison from Southern Arkansas University states that there is an undescribed type of darter in the scientific literature that exists only in the upper Ouachita River, above Lake Ouachita and below Remmel Dam.

42 ADEQ (Arkansas Department of Environmental Quality) Operating Air Permit

43 Northern Prairie Wildlife Research Center, USGS. (2006). Bird Checklists of the United States: Felsenthal National Wildlife Refuge. Retrieved in June 21, 2006 from http://www.npwrc.usgs.gov/resource/birds/chekbird/r4/felsenth.htm

44 http://www.birdinginarkansas.com/wildlife/bear.asp

45 Entergy-AP&L. (2003). A Guide to Lakes Hamilton and Catherine. Retrieved in February 17, 2006 from http://www.hotspringsar.com/info/lakes/lakes.htm

The Comprehensive Wildlife Conservation Strategy (CWCS) Species Team formed a list of species of greatest conservation need for Arkansas by analyzing the existing lists of rare, declining or imperiled species kept by the Arkansas Game and Fish Commission and the Arkansas Natural Heritage Commission.[46] As stated by CWCS report, the species of special concern in the Ouachita River region are certain types of fish, crayfish and mussels. The species (shown in Table 5) are ranked in three categories according to their condition of population:

- Critically imperiled - at highest risk of extinction due to extreme rarity or steep population declines.
- Imperiled - at high risk of extinction due to restricted range, few populations or steep population declines
- Vulnerable - at moderate risk of extinction due to a restricted range, few populations, recent and widespread declines.[46]

Some of these live only in the Ouachita River or its associated lakes.

Table 5. Endangered Species in the Ouachita River Region[46]

		In Nation	In Arkansas
Aquatic Fish	Alabama Shad	Vulnerable	Critically Impreriled
	Pale Back Darter	Imperiled	Imperiled
	Kiamichi Shiner	Vulnerable	Imperiled
	Pepper Shiner	Vulnerable	Imperiled
	Ouachita Madtom	Imperiled	Imperiled
	Caddo Madtom	Critically imperiled	Critically Impreriled
	Paddlefish	Apparently secure	Imperiled
Crayfish	Crayfish (Orconectes menae)	Vulnerable	Vulnerable
	Crayfish (Fallicambarus harpi)	Critically imperiled	Critically imperiled
	Crayfish (Fallicambarus jeanae)	Imperiled	Imperiled
	Crayfish (Procambarus reimeri)	Critically imperiled	Critically imperiled
Mussels	Ouachita Rock Pocketbook	Critically imperiled	Critically imperiled
	Spectaclecase	Imperiled	Critically imperiled

5.0 Ouachita-Black Navigation System

As previously mentioned, the navigable portion of the Ouachita-Black Navigation System is a 337-mile long waterway.[8] In Louisiana, the Ouachita-Black Navigation System meets with the Red River to form the Atchafalaya River then which connects with the Mississippi River.[7,8] The System has access to international transportation through Atchafalaya or Mississippi rivers which provide access to the Gulf Intercoastal Waterway and the Gulf of Mexico.[7] This waterway system is presented in Figure 8. Mileage on the Ouachita-Black Navigation System is measured upstream beginning with Mile 0 at its joining point with the Red River. The Tensas River and Little River join into the Ouachita River at Mile 41 (at Jonesville, Louisiana) and from there downstream at Mile 0 forms the Black River. The Arkansas-Louisiana border meets with the Ouachita River at Mile 221 and the navigation starts at Mile 337 in Camden, Arkansas.

46 Arkansas Wildlife Action Plan official website, http://www.wildlifearkansas.com/materials/updates/03SGCN.pdf

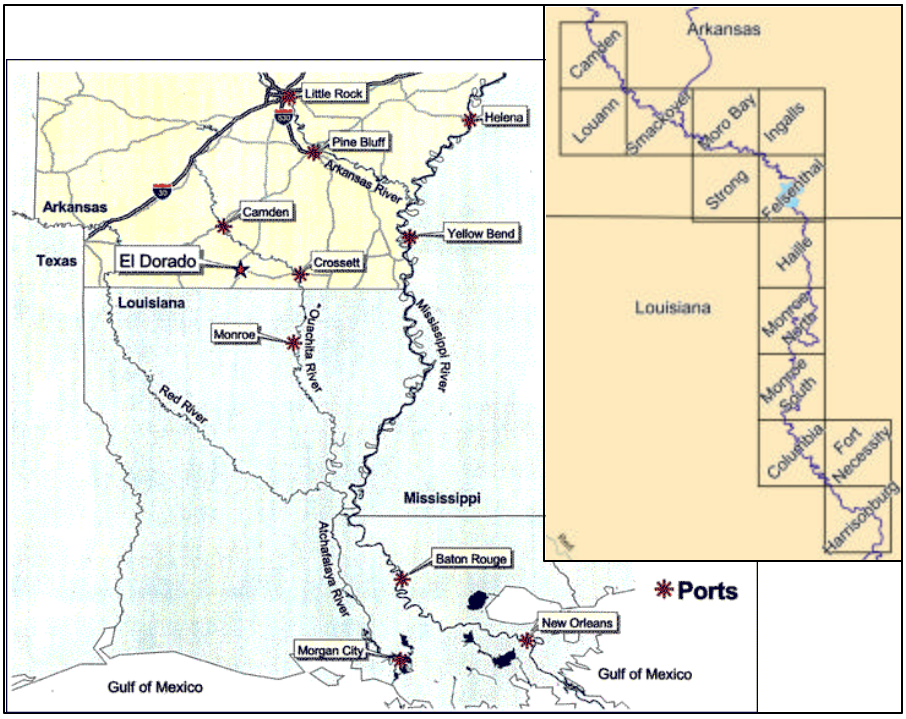

Figure 8. The Ouachita-Black Navigation System

As shown in Table 6, the annual tonnage shipped on the Ouachita-Black Navigation System has been greater than one million tons for the past five years.[47] Between 2001 and 2005, the annual tonnage shipped varied from a low of 1,393,000 tons (2002) to a high of 2,197,000 tons (2003) with an average of 1,690,000 tons. The most dramatic increase (almost 57%) in the annual tonnage shipped occurred from 2002 to 2003. While the Ouachita-Black Navigation System has consistently exceeded the USACE's high-use minimum threshold for tons of cargo moving annually (1 million tons), it falls short of the second metric with less than 1 billion ton-miles of commercial cargo annually.

Table 6. Ouachita-Black Navigation System Shipment Quantities for 2001-2005[47]

Ouachita-Black Navigation System Shipment Quantities		
Year	**Tons (Million)**	**Ton-miles (Billion)**
2001	1.575	0.212
2002	1.393	0.190
2003	2.197	0.268
2004	1.808	0.276
2005	1.688	0.253

47 Waterborne Commerce of the United States. 2001-2005. Part 2– Waterways and Harbors: Gulf Coast, Mississippi River System, and Antilles. Department of the Army Corps of Engineers, Institute for Water Resources. IWR-WCUS-05-2.

Table 7 presents a summary of the System's annual shipments (in thousand tons) for 2001-2005 with respect to major commodity group.[47] Companies are consistently utilizing the Ouachita-Black Navigation System to transport petroleum products, chemicals, crude materials, manufactured goods and food and farm products. The majority of the commodities shipped via the Ouachita-Black Navigation System are petroleum products (52%), followed by crude materials (24%).

Table 7. Ouachita-Black Navigation System Shipments by Commodity Group for 2001-2005[47]

Commodity Group	*Thousand Tons*					
	2001	**2002**	**2003**	**2004**	**2005**	**Average**
Petroleum Products	866	554	991	1,073	1,066	910
Chemicals	202	160	192	210	188	190
Crude Materials	277	401	730	406	304	424
Primary Manufactured Goods	2	4	3	0	0	2
Food and Farm Products	228	274	280	120	130	206
Total	**1,575**	**1,393**	**2,197**	**1,808**	**1,688**	**1,732**

The 2005 commodity shipments for the Ouachita-Black Navigation System are displayed in Figure 9.[47] Commodity movement on the river in 2005 is dominated by petroleum products which make up 63% of the tonnage. As detailed in Table 8, the majority of these products are shipped inbound in the form of crude petroleum, gasoline and distillate fuel oil. As shown in Figure 9, crude materials account for 18%, food and farm products account for another 8% and chemicals account for the remaining 12%. In terms of tons, the next largest group after petroleum products is crude materials. Limestone has the largest percentage (94%) among crude materials shipped.

Among all commodities shipped on the Ouachita-Black Navigation System in 2005, inbound cargo accounts for 77%. The major inbound commodity is gasoline with 24% of the total annual shipment followed by limestone (22%) and crude petroleum (18%). The major outbound commodity is food and farm products making up 97%. Petroleum products generate the remaining 3% of outbound shipments. Furthermore, all of food and farm products are shipped outbound.

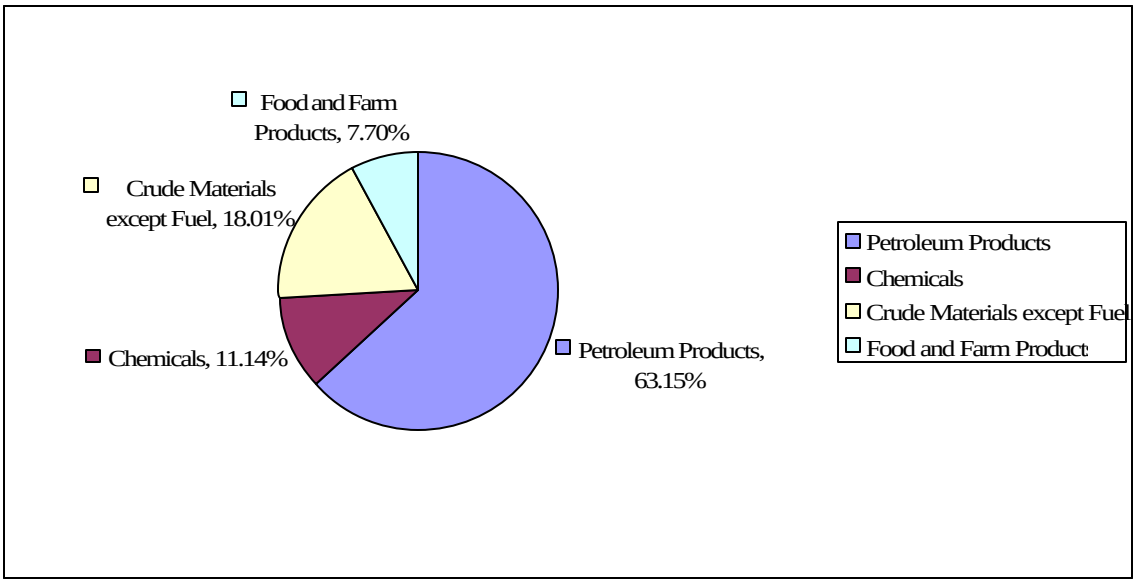

Figure 9. Major Commodities Shipped on the Ouachita-Black Navigation System in 2005

Table 8. Detailed Commodities Shipped on the Ouachita-Black Navigation System in 2005[47]

		2005 *(thousand tons)*			
Commodity	**Description**	**Grand Total**	**Inbound**	**Outbound**	**Through**
Petroleum Products		1,066	805	4	257
2100	Crude Petroleum	248	244	4	-
2211	Gasoline	447	315	-	133
2330	Distillate Fuel Oil	320	196	-	124
2340	Residual Fuel Oil	50	50	-	-
Chemicals		188	188	-	-
3110	Nitrogenous fertilizer	3	3	-	-
3273	Ammonia	55	55	-	-
3274	Sodium Hydroxide	130	130	-	-
Crude Materials except Fuel		304	304	-	-
4322	Limestone	286	286	-	-
4331	Sand & Gravel	6	6	-	-
4335	Waterway improvement materials	11	11	-	-
Food and Farm Products		130	-	130	-
6241	Wheat	14	-	14	-
6344	Corn	39	-	39	-
6447	Sorghum Grains	53	-	53	-
6522	Soybeans	22	-	22	-
Tons All Traffic		**1,688**	**1,297**	**134**	**257**
Thousand Ton-Miles		**253,052**	**233,178**	**5,998**	**13,876**

There are four locks on the Ouachita-Black Navigation System that are owned and controlled by the USACE. The Felsenthal and Thatcher locks are located in Arkansas; the Columbia and Jonesville locks are located in Louisiana.[7] Analysis of data from the USACE's Lock Performance Monitoring System provides vessel movements and characteristics, as well as barge trips and tonnage on the Ouachita-Black Navigation System for 2004 and 2005 in Table 9.[48] Vessels on the Ouachita-Black Navigation System are categorized into three groups: recreational, commercial and other. The total number of vessels in locks increased 13% from 2004 to 2005. Vessel movement on the locks is dominated by recreational vessels. In 2005, the number of recreational vessels is increased by 25%, while the number of commercial vessels is decreased by 5% and the number of other vessels is increased by 18%. When overall vessel movement on the four locks is considered, the number of vessels on the Felsenthal and Thatcher locks is greater than the Jonesville and Columbia locks.

Table 9. 2004-2005 Lock Statistics for the Ouachita-Black Navigation System[48]

		Vessels				Barges			Tonnage
Jonesville		**Recreational**	**Commercial**	**Other**	**Total**	**Loaded**	**Empty**	**Total**	**ktons**
Lock and Dam	2004	93	1008	11	1112	826	805	1631	1744
	2005	233	943	10	1186	834	810	1644	1665
	% Change	150.54%	-6.45%	-9.09%	6.65%	0.97%	0.62%	0.80%	-4.53%
Columbia		**Recreational**	**Commercial**	**Other**	**Total**	**Loaded**	**Empty**	**Total**	**ktons**
Lock and Dam	2004	142	754	6	902	616	584	1200	1230
	2005	467	716	8	1191	574	572	1146	1148
	% Change	228.87%	-5.04%	33.33%	32.04%	-6.82%	-2.05%	-4.50%	-6.67%
Felsenthal		**Recreational**	**Commercial**	**Other**	**Total**	**Loaded**	**Empty**	**Total**	**ktons**
Lock and Dam	2004	1188	193	2	1383	151	146	297	251
	2005	1613	194	4	1811	160	157	317	259
	% Change	35.77%	0.52%	100.00%	30.95%	5.96%	7.53%	6.73%	3.19%
Thatcher		**Recreational**	**Commercial**	**Other**	**Total**	**Loaded**	**Empty**	**Total**	**ktons**
Lock and Dam	2004	1791	188	3	1982	147	144	291	248
	2005	1702	191	4	1897	159	157	316	257
	% Change	-4.97%	1.60%	33.33%	-4.29%	8.16%	9.03%	8.59%	3.63%

6.0 Summary

The Ouachita River provides waterborne transportation access to the region including Ashley, Bradley, Calhoun, Ouachita and Union counties in the State of Arkansas. It has the capability to provide barge service via two public ports, located in Camden (Ouachita County) and Crossett (Ashley County). In addition, there is a private port owned by Cross Oil Refining & Marketing Co, which is used for receipt and shipment of crude oil and lubricating oil.[10] Almost 70,000 tons of freight is shipped to Union County via the Ouachita River accounting for 44% of all inbound traffic to the county. Almost 93,000 tons of freight is shipped to Union and Ashley counties via the Ouachita River accounting for 28% of all outbound traffic to the area. Georgia Pacific Crossett Paper Operations is the largest employer in Ashley County. However, there are no shipments for pulp, paper or allied products originating from

48 USACE Navigation Data Center, Lock Performance Monitoring System Summary byDivision/District, January-December 2004 and 2005.

Ashley County via the Ouachita River. Shifting truckloads to bargeloads is an opportunity for a growth at the Crossett Port. Cross Oil received 79 barges of oil in 2003 and 100 barges of oil in 2004 through its terminal and has found that other modes of transportation are neither economically feasible nor reliable.

In addition, waterborne transportation on the Ouachita River contributes to the region through ancillary benefits including recreational benefits, water supply, electrical generation and environmental effects. The impact of the Ouachita River for recreation in the region is nearly $230 million in revenue with over one million visitors. The payroll generated from the recreational activities is nearly $45 million and 3,044 jobs with almost $14 million in state and $5 million in local tax revenue for the region. The Ouachita River provides on average 36.5 million gallons of daily water supply to municipal and industrial requirements in the area. On the Ouachita River, there are two hydroelectric facilities owned and operated by Entergy Arkansas, Inc.. Union Power Station, owned and operated by Entegra, uses the Ouachita River for creating steam to generate electricity and for cooling tower purposes. Moreover, the John L. McClellan Generating Station uses water from the Ouachita River for fluid cooling purposes.[42] The Felsenthal National Wildlife Refuge, covering 65,000 acres in Ashley, Bradley and Union counties, is the world's largest green-tree reservoir. The refuge comprises the 15,000-acre Felsenthal Pool on the Ouachita River that is approximately 36,000 acres during winter season. The refuge offers a habitat for almost 100 kinds of birds and many more species during the migration season, American black bears, the only kind of bears in Arkansas. Additionally, there is an undescribed kind of darter in the scientific literature that exists only in the upper Ouachita River, above Lake Ouachita and below Remmel Dam.

The need for a revision of performance metric has been argued by the USACE and others since the current metric penalizes most tributaries in regards to O&M funding. A recent study suggests measuring the contribution of waterways to the overall system in terms of system ton-miles. After detecting every commercial-cargo carrying vessel that uses a particular waterway, system ton-miles are calculated for that particular waterway by multiplying the total trip-miles for each single vessel and the total tonnage. System ton-miles denote the total distance from origin to destination. Cargo that originates from or is destined for a given tributary can be counted toward that tributary's system ton-miles. Therefore, many tributaries that were very marginal contributors become much more valuable. For example, the Red River accounted for 335.5 million ton-miles in 1999 (current metric). However, if the total ton-miles for cargo from origin to destination are computed for the Red River, it accounts for 2.4 billion system ton-miles (proposed metric). The system ton-mile metric exposes the importance of tributaries. Furthermore, it explains the systemwide traffic far better than the ton-miles on the tributary. For example, the average ton-miles between 1995 and 1999 for the Ouachita-Black Navigation System is 0.20 billion. However, if the average system ton-miles is calculated, this 0.20 billion ton-miles expands to 0.73 billion system ton-miles. In conclusion, the contribution of tributaries to the nation is underestimated by the measure of performance of ton-miles and the funding decisions should consider ancillary benefits such as recreation, water supply, electrical generation and environmental benefits.