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Assessment of potential irrigation water needs in the Bayou Meto Watershed

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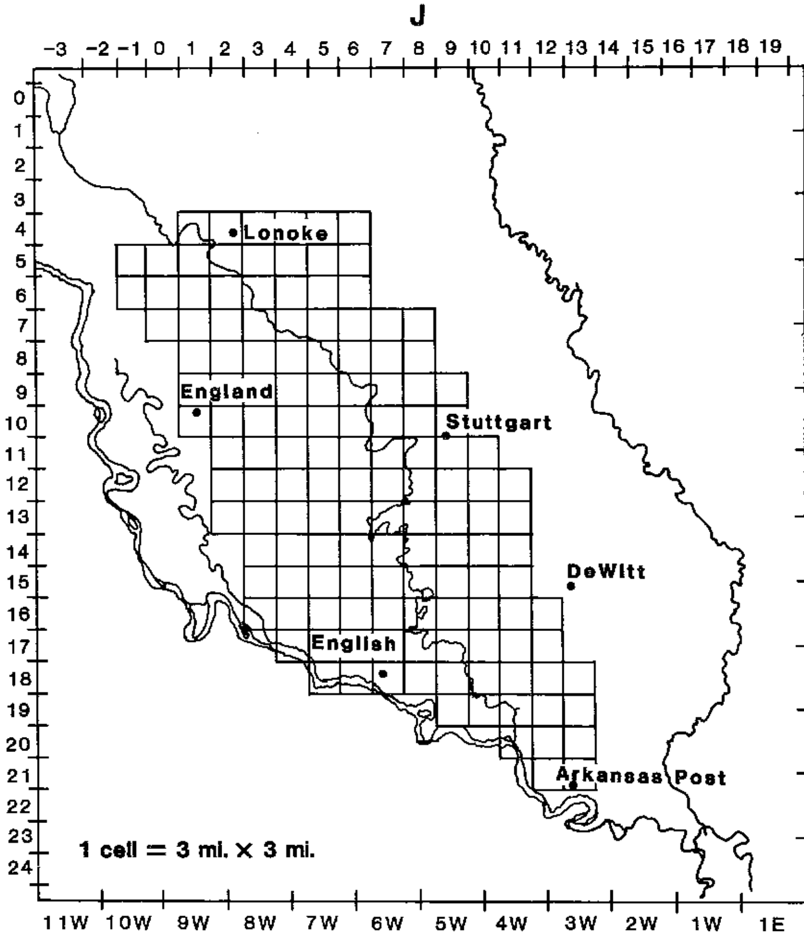
Assessment of Potential Irrigation Needs in the Bayou Meto Watershed



The Bayou Meto watershed.

AGRICULTURAL EXPERIMENT STATION

Division of Agriculture
University of Arkansas, Fayetteville

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CONTENTS

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ASSESSMENT OF POTENTIAL IRRIGATION NEEDS IN THE BAYOU METO WATERSHED

Richard C. Peralta and Paul W. Dutram
Department of Agricultural Engineering

INTRODUCTION

The intensive use of groundwater for agricultural production in the Arkansas Grand Prairie has caused groundwater levels to drop. Supplemental surface water may be needed in the area if current production is to be maintained. The Arkansas River is a potential source of supplemental water. Results of Gilmour et al. (1983) show that quality of Arkansas River water is generally within standards used by the Cooperative Extension Service and that the water can be used for the crops and soils of the Grand Prairie.

The Bayou Meto watershed (Figure 1) encompasses much of the western part of the Grand Prairie. It is the area most likely to receive diverted Arkansas River water. Planning for the conjunctive (coordinated) use of groundwater and surface water to meet needs requires estimating how the potential water needs of this area will be distributed in time and space. One objective of the study was to develop a hypothetical water-intensive cropping pattern for the Bayou Meto watershed. Assignment of crops to specific locations was done primarily on the basis of soil suitability and crop water requirements. A second objective was to determine how the water needs established by the cropping pattern would vary with time during average years. To accomplish this, daily water-balance simulations were developed. The assumptions used in developing the cropping pattern and in estimating water needs ensure that the estimated needs will probably be higher than actual needs. Economic constraints were not considered.

DESCRIPTION OF THE CROPPING PATTERN

Each square mile (2.6 km^2) in the study area was assigned a uniform soil texture. The assigned soil texture was that of the majority of the soils within the square mile. Crop recommendations (Appendix) for each soil texture were obtained from soil surveys (Fielder et al., 1981; Gill et al., 1980; Maxwell et al., 1972). Except for cotton, the crop requiring the greatest amount of water was selected from the list of recommended field crops. (Cotton was excluded due to the historically low cotton acreages in the study area.) This resulted in the selection of either rice or soybeans as the most practical water-intensive field crop for all cropland in the area. A fallow-rice-wheat-soybean two-year rotation was assumed for the land recommended for rice. A soybean-wheat single-year double-cropping system was assumed for areas recommended for soybeans. Another assumption of the model was that land presently used for agricultural reservoirs would be converted to cropland and that the crop grown would be the crop grown in the surrounding area. Figure 2 shows land utilization, including recommended cropping patterns. Urban, open-water and wildlife-management areas were also identified and were not considered for cropland.

The assumptions used in the model reflect the situation for which the potential water needs would be the greatest.

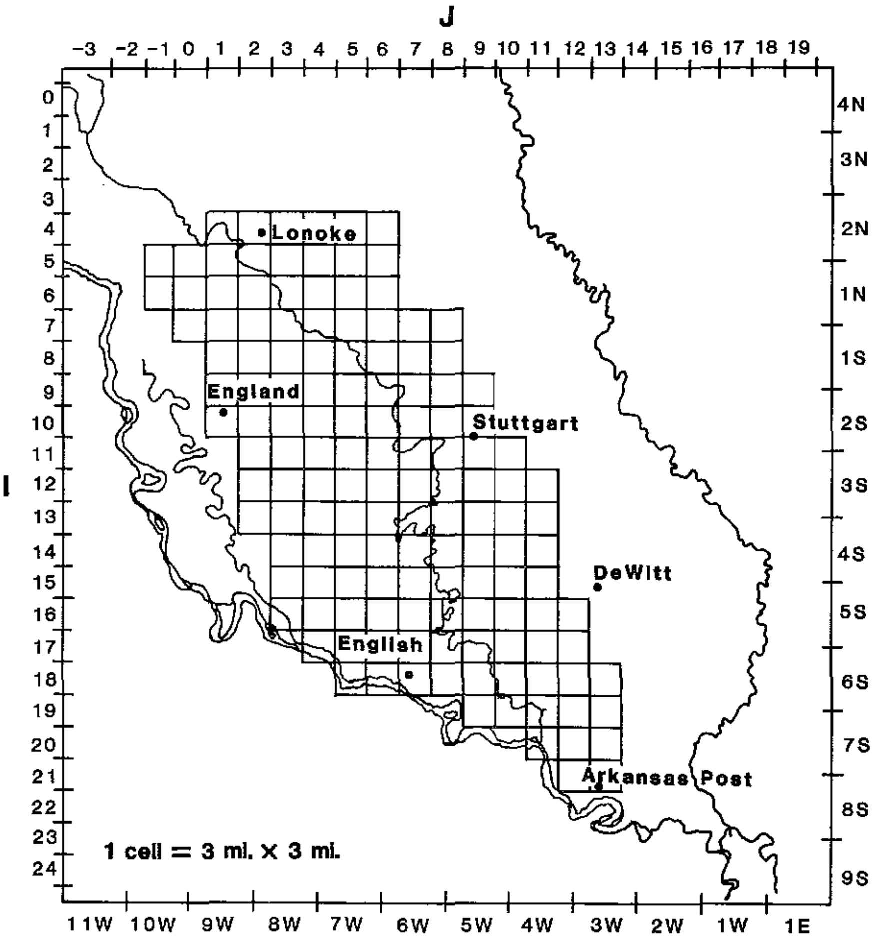

Figure 1. The Bayou Meto watershed.

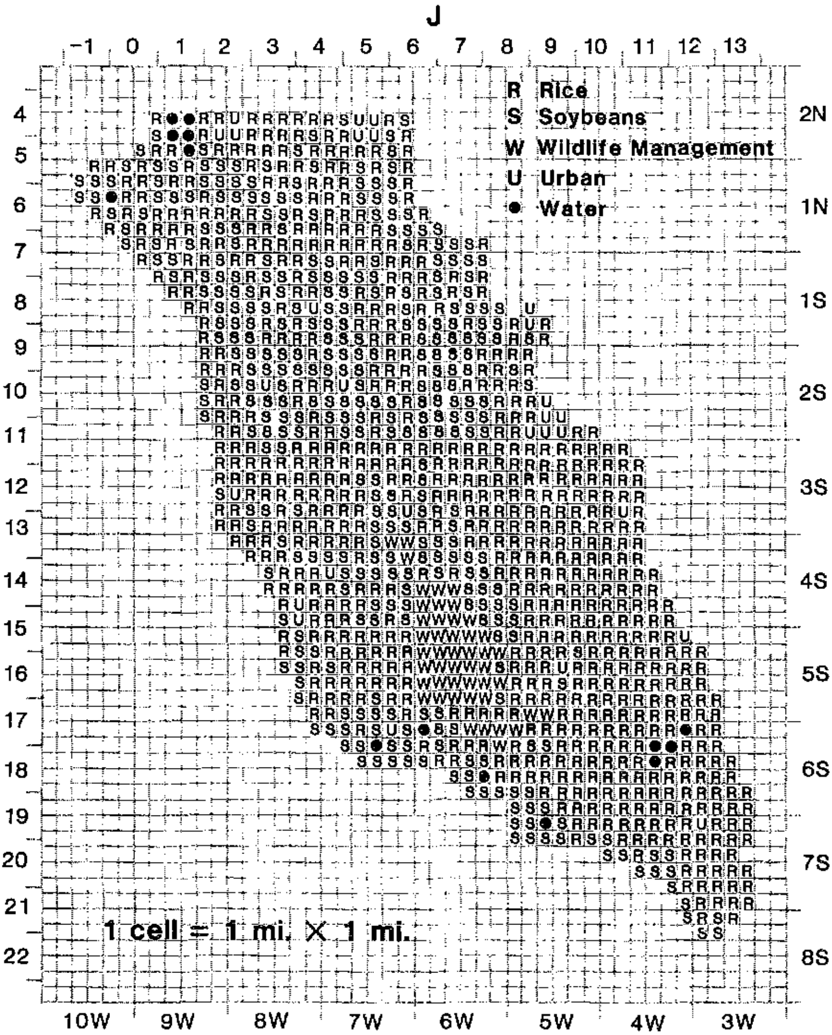

Figure 2. A hypothetical water-intensive cropping pattern for the Bayou Meto watershed.

DETERMINATION OF WATER NEEDS

Water-management practices for crops vary within the study area. Representative practices were incorporated into algorithms that simulate daily water balances for the area's indicated acreages of rice, soybeans and wheat. The models were based on an available moisture content of 2 inches per foot (16.7 cm/m) at field capacity, an average value for the clays and silt loams in the area. The estimated irrigation needs resulting from simulating 15 seasons are shown in Table 1 for each of the crops.

The daily water balance for rice is represented by the following equation:

$$\text{Flood level} = \text{Initial flood level} + \text{Precipitation} + \text{Irrigation} - \text{Evapotranspiration} - \text{Runoff} - \text{Seepage}.$$

The assumptions used in the rice water-balance simulation were as follows. The average irrigation period extended from June 1 to Sept. 1. The initial irrigation required 5 inches (12.7 cm) of water, one of which was needed to saturate the root zone and four of which remained above the soil. If the depth of flood dropped through evapotranspiration to less than 2 inches (5 cm), the field was flooded to a 4-inch depth. If rainfall caused the water depth to exceed 6 inches, the levees were drained to prevent damage caused by overflow, and the field was reflooded to a 4-inch depth on the following day. The amount of leakage through the levees was included in the estimate of seepage, and water was rarely lost at the end of the field due to overfilling. As a result, an irrigation efficiency of 100 percent was used for a contoured-levee irrigation system for flood-irrigated rice, and the annual pumping requirement of 23.8 inches (60.5 cm) was identical to the irrigation requirements. This compares well with the average long-term demand of 21 or 22 inches assumed by Engler et al. (1945) and with the 24-inch demand commonly estimated for the Grand Prairie.

The daily water balance for soybeans and wheat is represented by the following equation:

$$\text{Soil moisture} = \text{Initial soil moisture} + \text{Precipitation} + \text{Irrigation} - \text{Evapotranspiration} - \text{Runoff}.$$

The assumptions used in the soybean water-balance simulation were as follows. The average irrigation period extended from June 1 to Sept. 10. The root zone was 2.5 feet (0.76 m) deep, and the soil was at field capacity (5 inches of available moisture) on the date of emergence (June 1). The fields were irrigated with 1.25 inches (3.2 cm) whenever evapotranspiration caused the available soil moisture to drop to 2.5 inches. Rainfall could replenish the soil moisture up to the amount of deficit in the root zone, but no more than 1.25 inches was allowed in any one day. Precipitation greater than 1.25 inches was lost as runoff. With these assumptions, the model predicted an annual irrigation requirement of 4.3 inches (10.9 cm). This is close to the 3- to 4-inch need expected in the Grand Prairie (T. C. Keisling, personal communication).

Additional assumptions of the soybean model were that approximately 60 percent of the soybean acreage in the study was furrow-irrigated at a system efficiency of 55

Table 1. Estimates of Irrigation Requirements for the Bayou Meto Watershed

Month	Precipitation	Evapotranspiration[2]	Runoff[3]	Seepage[4]	Change in Soil Moisture[5]	Irrigation Required[6]	Efficiency of Irrigation System	Pumping Required[7]	Irrigation Period[8]
	inches						%	inches	
					Rice				
June	3.7	6.5	1.8	1.6	---	11.2*	100	11.2*	
July	3.4	7.6	0.4	1.7	---	6.3	100	6.3	
August	3.4	6.9	1.1	1.7	---	6.3	100	6.3	
Seasonal	10.5	21.0	3.3	5.0	---	23.8*	100	23.8*	6/1 - 9/1
					Soybeans				
June	3.7	2.4	2.2	---	-0.9	0.0	61.6	0.0	
July	3.4	4.6	0.7	---	-0.6	1.3	61.6	2.1	
August	3.4	5.1	1.0	---	0.0	2.7	61.6	4.4	
September	1.1	0.9	0.2	---	0.3	0.3	61.6	0.5	
Seasonal	11.6	13.0	4.1	---	-1.2	4.3	61.6	7.0	6/1 - 9/9
					Wheat				
April	4.8	4.6	2.2	---	-1.1	0.9	82	1.1	
May	4.4	4.4	1.9	---	-0.4	1.5	82	1.8	
Seasonal	9.2	9.0	4.1	---	-1.5	2.4	82	2.9	4/1 - 5/25

[1]Evaporation and precipitation data were taken from NOAA records (1965-80) for Stuttgart 9ESE, Arkansas (rice and soybeans: 1965-79; wheat: 1965-80, excluding 1977).

[2]Evapotranspiration was calculated as follows: 0.80 x pan evaporation x crop coefficient. The crop coefficient for rice was obtained from James A. Ferguson, Univ. of Arkansas, Fayetteville; crop coefficients for soybeans and wheat were modified from values reported in Stegman et al. (1977).

[3]Runoff was determined by the computer model. For rice, whenever the flood exceeds 6 inches, the levees are drained to prevent overflow damage (J. A. Ferguson, personal communication); therefore, the amount of runoff is equal to the amount of impounded water on a rice field flooded with more than 6 inches of water. For soybeans and wheat, runoff is equal to the amount of moisture that at any time exceeds the moisture at field capacity; if during a single application of moisture, the amount of moisture added exceeds the maximum intake of the soil, runoff is equal to that amount that is in excess of the maximum intake.

[4]The 5.0-inch value for seasonal seepage was obtained from J. A. Ferguson; the computer model apportioned this quantity over the time period involved.

[5]The change in soil moisture was determined by the computer model.

[6]Rice: irrigation requirement = evapotranspiration + runoff + seepage - precipitation.
Soybeans and wheat: irrigation requirement = evapotranspiration + runoff + change in soil moisture - precipitation.

[7]Pumping required = irrigation required ÷ irrigation-system efficiency.

[8]Bobby A. Huey of the Rice Research and Extension Center, Stuttgart, Ark., provided the irrigation period for rice; H. Don Scott and Fred C. Collins, both of the Univ. of Arkansas, Fayetteville, provided the irrigation periods for soybeans and wheat, respectively.

*Includes 5-inch irrigation (1 inch for saturation and 4 inches for cover flood).

percent and that approximately 40 percent was flood-irrigated (in contour levees) at a system efficiency of 75 percent, giving a weighted efficiency of 62 percent. The resulting pumping requirement is 7.0 inches (17.8 cm) for an average season (Table 1).

If instead of the assumed 5 inches of available moisture only 2.5 inches were available in the 2.5-foot root zone on the date of emergence, correspondingly more irrigation water could be required.

The assumptions used in the wheat water-balance simulation were as follows. The average irrigation period extended from April 1 to May 25. The root zone was 2 feet (0.6 m) deep, and the soil was at field capacity (4 inches of available moisture) on April 1. A maximum daily soil intake of 0.75 inches (1.9 cm) of water was used for irrigation or precipitation events. (This differs from the 1.25 inches used for the soybean simulation because of different soil surface conditions during the cropping periods.) Excess water applied to the wheat fields was lost as runoff. The irrigation system was a center-pivot sprinkler system with an 82 percent efficiency. With these assumptions, the model predicted a pumping requirement of 2.9 inches (7.4 cm). Again, if the root zone were not initially at field capacity, irrigation needs could be greater.

POTENTIAL IRRIGATION NEEDS OF THE BAYOU METO WATERSHED

Figure 3 shows the potential amount of land that could be used for rice and soybean production in each cell of the Bayou Meto watershed. The monthly irrigation need was computed for each cell. For rice, the water need for N_r rice acres in a cell was determined by summing the monthly rice, soybean and wheat needs (in acre-feet per acre) and multiplying by $N_r/2$. This calculation reflects the fact that in a two-year rotation, half the "rice" land would be in rice and the other half would be in wheat and soybeans. The water need for N_s soybean acres was determined by multiplying N_s by either the soybean or wheat water needs, depending on the month. The average monthly irrigation needs for each of the cells are shown in Figures 4-9. The sum of the values in all the cells is the total potential average irrigation requirement for the month.

Table 2 shows the potential irrigation requirements for both average and dry seasons, and it shows the volume of discharge at Murray Dam. Also, the table shows the potential requirements expressed as a percentage of the discharge. In average years, a sufficient volume of water would be physically available to meet average potential irrigation needs in the Bayou Meto watershed. Determination of the volume of water that could legally be diverted from the Arkansas River is not within the scope of this report.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			0.75 0.25	1.50 0	3.00 0	2.25 0.75	0.50 0.50	0.65 0.75							
5	1.45 1.00	3.00 2.75	3.50 3.00	3.25 4.25	7.00 2.00	6.75 2.25	4.50 3.50	1.50 1.50							
6	0.50 2.90	5.50 3.00	5.75 3.25	3.75 5.25	3.00 6.00	7.25 1.75	3.50 5.50	1.80 3.45							
7		1.85 1.75	4.75 4.00	4.50 4.50	6.50 2.50	5.75 3.25	6.50 2.50	5.25 3.70	0.85 5.60	0.15 0.40					
8			3.50 1.25	1.00 8.00	3.75 5.25	2.00 6.00	5.50 3.50	5.00 4.00	2.90 5.75	0.50 1.75					
9			0.85 0	3.50 5.50	3.25 5.75	2.75 6.25	4.00 5.00	4.50 4.50	1.25 7.75	5.50 3.25	0.50 0.50				
10			0.25 0.35	5.50 3.00	1.25 6.75	3.50 5.00	2.75 5.75	4.25 4.75	1.75 7.25	7.25 1.75	0.85 0.50				
11				7.00 0.50	2.75 6.25	7.00 2.00	6.00 3.00	4.50 4.50	4.50 4.50	7.75 0.75	4.75 0	4.15 0			
12				5.00 1.20	8.00 1.00	8.75 0.25	4.75 0	4.75 3.75	8.50 0.50	9.00 0	9.00 0	9.00 0	2.70 0		
13				2.85 0.75	6.25 2.75	7.25 1.65	4.25 4.25	1.75 4.75	4.50 4.50	8.75 0.25	9.00 0	8.75 0	2.90 0		
14					4.90 1.00	5.25 2.50	3.75 5.25	1.50 4.75	1.00 5.75	5.50 3.50	9.00 0	9.00 0	5.50 0		
15					2.00 1.75	7.00 1.25	6.25 2.75	2.75 1.75	0 1.25	2.00 5.75	8.75 0.25	8.75 0.25	8.95 0		
16					0.50 1.40	6.00 2.85	8.50 0.50	4.50 0	0 0	4.50 1.50	6.75 1.25	8.75 0.25	9.00 0	7.00 0	
17						3.25 3.00	2.00 6.00	2.25 4.50	3.75 2.25	4.50 0.75	6.75 0.75	9.00 0	8.25 0	6.65 0	
18							0 1.50	0.80 1.75	2.50 3.15	5.75 1.40	8.00 1.00	9.00 0	7.25 0	8.75 0	3.60 0
19											3.25 3.25	7.70 0.15	9.00 0	8.00 0	6.00 0
20													1.50 2.25	7.75 1.25	4.90 0
21	Each cell is 3 mi. x 3 mi.													3.75 2.45	3.35 0.55

Figure 3. Potential rice and soybean land (sq. mi.) in each cell of the Bayou Meto watershed. (Note: The upper number in each cell is for rice; the lower number is for soybeans.)

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			37	44	88	110	44	63							
5	101	249	279	345	323	330	338	132							
6	185	338	360	418	440	316	426	255							
7		157	374	396	338	360	338	371	354	28					
8			176	499	418	411	367	382	423	117					
9			25	426	433	448	411	396	492	352	44				
10			28	338	433	396	418	404	477	316	54				
11				235	448	323	352	396	396	271	139	122			
12				217	293	271	139	360	279	264	264	264	79		
13				128	345	316	374	330	396	271	264	257	85		
14					203	301	418	323	367	367	264	264	161		
15					161	279	345	183	73	396	271	271	263		
16					97	343	279	132	0	220	271	271	264	205	
17						271	411	330	242	176	242	264	242	195	
18							88	126	258	251	293	264	213	257	106
19											286	235	264	235	176
20													176	301	144
21	Each cell is 3 mi. x 3 mi.													254	131

Figure 4. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, April.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			60	72	144	180	72	103							
5	166	408	456	564	528	540	552	216							
6	302	552	588	684	720	516	696	418							
7		257	612	648	552	588	552	607	578	46					
8			288	816	684	672	600	624	691	192					
9			41	696	708	732	672	648	804	576	72				
10			46	552	708	648	684	660	780	516	89				
11				384	732	528	576	648	648	444	228	199			
12				355	480	444	228	588	456	432	432	432	130		
13				209	564	516	612	540	648	444	432	420	139		
14					331	492	684	528	600	600	432	432	264		
15					264	456	564	300	120	648	444	444	430		
16					158	562	456	216	0	360	444	444	432	336	
17						444	672	540	396	288	396	432	396	319	
18							144	206	422	410	480	432	348	420	173
19											468	384	432	384	288
20													288	492	235
21	Each cell is 3 mi. x 3 mi.													415	214

Figure 5. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, May.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			224	448	896	672	149	194							
5	433	896	1,045	971	2,091	2,016	1,344	448							
6	149	1,643	1,718	1,120	896	2,166	1,045	538							
7		533	1,419	1,344	1,942	1,718	1,942	1,568	254	45					
8			1,045	299	1,120	597	1,643	1,493	866	149					
9			254	1,045	971	821	1,195	1,344	373	1,643	149				
10			75	1,643	373	1,045	821	1,269	523	2,166	254				
11				2,091	821	2,091	1,792	1,344	2,315	1,419	1,240				
12				1,493	2,390	2,614	1,419	1,419	2,549	2,688	2,688	2,688	806		
13				851	1,867	2,166	1,269	523	1,344	2,614	2,688	2,614	866		
14					1,464	1,568	1,120	448	299	1,643	2,688	2,688	1,643		
15					597	2,091	1,867	821	0	597	2,614	2,614	2,673		
16					149	1,792	2,539	1,344	0	1,344	2,016	2,614	2,688	2,091	
17						971	597	672	1,120	1,344	2,016	2,688	2,464	1,986	
18							0	239	747	1,718	2,390	2,688	2,166	2,614	1,075
19											971	2,300	2,688	2,390	1,792
20													448	2,315	1,464
21	Each cell is 3 mi. x 3 mi.													1,120	1,001

Figure 6. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, June.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			199	338	677	596	171	235							
5	444	999	1,141	1,232	1,814	1,787	1,426	514							
6	453	1,593	1,678	1,462	1,381	1,841	1,435	811							
7		623	1,541	1,543	1,760	1,678	1,760	1,618	849	81					
8			936	1,164	1,462	1,155	1,651	1,597	1,329	318					
9			192	1,435	1,408	1,354	1,489	1,543	1,191	1,622	171				
10			97	1,593	1,074	1,376	1,295	1,516	1,245	1,841	250				
11				1,638	1,354	1,814	1,705	1,543	1,543	1,836	1,072	936			
12				1,269	1,922	2,003	1,072	1,511	1,976	2,030	2,030	2,030	609		
13				731	1,733	1,841	1,457	952	1,543	2,003	2,030	1,974	654		
14					1,223	1,478	1,462	896	900	1,651	2,030	2,030	1,241		
15					656	1,726	1,733	826	147	1,126	2,003	2,003	2,019		
16					277	1,688	1,976	1,015	0	1,191	1,669	2,003	2,030	1,579	
17						1,085	1,155	1,035	1,110	1,103	1,611	2,030	1,861	1,500	
18							176	386	933	1,461	1,922	2,030	1,636	1,974	812
19											1,114	1,755	2,030	1,805	1,354
20													602	1,895	1,105
21	Each cell is 3 mi. x 3 mi.													1,133	820

Figure 7. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, July.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			270	426	851	810	256	356							
5	641	1,482	1,681	1,897	2,444	2,431	2,079	769							
6	807	2,248	2,376	2,268	2,227	2,458	2,254	1,302							
7		926	2,265	2,308	2,417	2,376	2,417	2,338	1,525	134					
8			1,280	2,118	2,268	1,943	2,363	2,336	2,141	543					
9			241	2,254	2,240	2,213	2,281	2,308	2,132	2,306	256				
10			151	2,248	1,902	2,139	2,099	2,295	2,159	2,458	356				
11				2,101	2,213	2,444	2,390	2,308	2,308	2,371	1,348	1,177			
12				1,694	2,499	2,540	1,348	2,207	2,526	2,553	2,553	2,553	766		
13				981	2,404	2,458	2,180	1,586	2,308	2,540	2,553	2,482	823		
14					1,619	2,063	2,268	1,515	1,602	2,363	2,553	2,553	1,560		
15					969	2,273	2,404	1,181	287	1,886	2,540	2,540	2,539		
16					463	2,356	2,526	1,277	0	1,621	2,202	2,540	2,553	1,986	
17						1,610	1,943	1,670	1,580	1,449	2,087	2,553	2,341	1,887	
18							344	628	1,432	1,952	2,499	2,553	2,057	2,482	1,021
19											1,667	2,219	2,553	2,270	1,702
20													941	2,485	1,390
21	Each cell is 3 mi. x 3 mi.													1,626	1,077

Figure 8. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, August.

	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13
4			17	22	43	52	21	29							
5	48	117	130	160	154	157	158	62							
6	85	159	170	194	203	151	197	118							
7		73	175	185	160	170	160	174	162	13					
8			84	228	194	189	173	179	195	54					
9			12	197	200	206	191	185	225	166	21				
10			13	159	198	184	193	188	219	151	26				
11				114	206	154	166	185	185	132	68	60			
12				104	142	133	68	169	136	130	130	130	39		
13				61	163	151	175	152	185	133	130	126	42		
14					97	142	194	148	168	173	130	130	79		
15					76	134	163	86	33	182	133	133	129		
16					45	162	136	65	0	105	131	133	130	101	
17						127	189	153	114	85	117	130	119	96	
18							40	58	120	120	142	130	104	126	52
19											134	115	130	115	86
20													82	145	71
21	Each cell is 3 mi. x 3 mi.													119	63

Figure 9. Potential irrigation requirement (acre-feet) for the Bayou Meto watershed, Sept. 1-9.

Table 2. Potential Irrigation Requirements of the Bayou Meto Watershed and Volume of Discharge at Murray Dam

Month	Irrigation Requirement	Volume of Discharge at Murray Dam[1]	Irrigation Requirement as a Percentage of Discharge
	acre-feet	acre-feet	
		Average Climatological Conditions	
April	37,900	4,272,000	0.9
May	62,000	4,269,000	1.4
June	195,000	3,819,000	5.1
July	185,000	1,838,000	10.1
Aug.	259,000	795,000	32.5
Sept. 1-9	17,800	292,000	6.1
		Dry Climatological Conditions	
April	62,000	3,405,000	1.8
May	190,000	3,177,000	6.0
June	214,000	1,975,000	10.8
July	473,000	814,000	58.1
Aug.	533,000	341,000	156
Sept. 1-9	69,000	109,000	63.3

[1]Volume of discharge for average conditions is the average monthly discharge from 1970 to 1979; for dry conditions, volume of discharge is the monthly discharge for 1980. *Source: Water Resources Data for Arkansas* (USGS, 1970-80).

In dry years such as 1980, for which precipitation was only 18 percent of the average during the soybean season, a sufficient volume of water would not always be available to meet the potential irrigation needs. Using the system efficiencies listed in Table 1, the simulation indicated that for this situation, the pumping requirements would be 33.9 inches (86.1 cm) for rice, 20.3 inches (51.6 cm) for soybeans and 7.3 inches (18.5 cm) for wheat.

As shown in Table 2, discharge in dry years would be less than demand during some months. Such cases demonstrate the need for coordinating the use of surface water and groundwater and for ensuring that adequate groundwater reserves are available for use during time of drought.

SUMMARY AND CONCLUSIONS

The purpose of this report was to estimate the irrigation water that may potentially be required in the Bayou Meto watershed. To accomplish this, a cropping pattern with intensive water needs was developed. The cropping pattern consists of a fallow-rice-wheat-soybean double-cropping two-year rotation for soils recommended for rice, and a wheat-soybean double-cropping single-year rotation for soils recommended for soybeans but not for rice.

Daily water-balance simulation programs for rice, soybeans and wheat irrigated under Grand Prairie conditions were used to determine irrigation needs for each crop. Climatological conditions for the simulation program were based on 15 years of climatological data from Stuttgart, Ark. Average monthly and seasonal irrigation needs for these crops that take into account the assumed system efficiencies are presented. The seasonal needs were 23.8, 7.0 and 2.9 inches (60.5, 17.8 and 7.4 cm) for rice, soybeans and wheat, respectively. The monthly water needs, which were calculated from these seasonal needs, were compared with the monthly discharge of the Arkansas River at Murray Dam, near Little Rock. In average years, the discharge of the Arkansas River would be adequate to supply the potential irrigation needs of the study area. The topic of legal availability of that water was not addressed.

The programs were also used to estimate irrigation needs in a dry season. The resulting needs were compared with records of the 1980 discharge of the Arkansas River. During August, under 1980 climatological conditions, potential water needs exceeded discharge. This illustrates the possible desirability of developing conjunctive water-management strategies, wherein the use of groundwater and surface water is coordinated.

The adequacy of the water quality of the Arkansas River for irrigation in the Bayou Meto watershed was not addressed. It is expected, however, that monitoring of the soil and water would accompany the use of Arkansas River water for irrigation.

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APPENDIX

CROP RECOMMENDATIONS FOR SOILS OF THE BAYOU METO WATERSHED

Source: Fielder et al., 1981; Gill et al., 1980; Maxwell et al., 1972.

Note: County numbers indicate different local conditions for a particular soil in that county.

Acadia silty clay loam—woodland
Amagon silt loam—rice
Amagon silt loam, heavy substratum—rice
Amy silt loam (Lonoke and Prairie Co.)—soybeans
Amy silt loam (Jefferson Co.)—pasture

Amy soils—no capability
Amy—urban land complex—no capability
Calhoun silt loam—rice
Calloway silt loam (Lonoke and Prairie Co. and #5 in Jefferson Co.)—soybeans
Calloway silt loam (Arkansas Co. and #4 in Jefferson Co.)—rice

Calloway—urban land complex—no capability
Caspiana silt loam—soybeans
Commerce silt loam—soybeans
Commerce silt loam (frequently flooded)—soybeans
Coushatta silt loam—soybeans

Coushatta soils (occasionally flooded)—soybeans
Coushatta—urban land complex—no capability
Crevasse loamy fine sand—small grain
Crevasse soils (frequently flooded)—soybeans
Crowley silt loam—rice

Crowley and Stuttgart silt loams—rice
Desha clay—rice
Desha clay (occasionally flooded)—soybeans
Dubbs silt loam (0 - 1% and 1 - 3% slope)—soybeans
Enders stony fine sandy loam (8 - 15% slope)—woodland

Falaya silt loam (quick drainage)—soybeans
Grenada silt loam—soybeans
Grenada silt loam (0 - 1% slope)—rice
Grenada silt loam (1 - 3% slope)—rice
Grenada silt loam (3 - 8% slope) (Arkansas Co.)—small grain

Grenada silt loam (3 - 8% slope) (Jefferson Co.)—corn
Grenada—urban land complex—no capability
Grenada—urban land complex (3 - 8% slope)—no capability
Hebert silt loam (Jefferson Co.)—rice
Hebert silt loam (Arkansas, Lonoke and Prairie Co.)—soybeans

Henry silt loam—rice
Henry—urban land complex—no capability
Jackport silty clay loam (#12)—rice
Jackport silty clay loam (#13)—soybeans
Keo silt loam—soybeans

Kobel silty clay loam (#16)—rice
Kobel silty clay loam (#17)—soybeans
Leadvale silt loam—soybeans
Leadvale silt loam (3 - 8% slope)—soybeans
Linker-Enders—Mountainburg Complex (12 - 25% slope)—woodland

Loring silt loam—soybeans
Loring silt loam (1 - 3% slope)—soybeans
Loring silt loam (3 - 8% slope) (Arkansas Co.)—small grain
Loring silt loam (3 - 8% slope) (Lonoke and Prairie Co.)—soybeans
Loring silt loam (8 - 12% slope)—small grain

Loring—McKamie Complex (8 - 20% slope)—pasture
McGehee silt loam—rice
McGehee silt loam (flooded)—soybeans
McKamie silt loam (0 - 1% slope)—rice
McKamie silt loam (1 - 3% slope)—soybeans

Miller silty clay—soybeans
Moreland silty clay—rice
Muskogee silt loam (3 - 8% slope)—soybeans
Norwood silt loam—soybeans
Norwood silty clay loam (gently undulating)—soybeans

Oaklimeter silt loam—soybeans
Oklared fine sandy loam (flooded)—soybeans
Ouachita soils (frequently flooded)—no capability
Perry clay—rice
Perry clay (occasionally flooded)—soybeans

Perry silty clay (Arkansas Co. and #27 in Lonoke and Prairie Co.)—rice
Perry silty clay (#28 in Lonoke Co. and Prairie Co.)—soybeans

Pheba silt loam—soybeans
Pheba—urban land complex—no capability
Portland clay—rice

Portland clay (occasionally flooded)—rice
Portland silty clay—rice
Portland silty clay loam (hard to farm)—no capability
Portland—urban land complex—no capability
Rilla silt loam—soybeans

Rilla silt loam (undulating)—soybeans
Roxana silt loam—soybeans
Roxana silt loam (occasionally flooded)—soybeans
Roxana—urban land complex—no capability
Ruston fine sandy loam—soybeans

Sacul fine sandy loam—soybeans
Sacul fine sandy loam (3 - 8% slope)—pasture
Savannah fine sandy loam—soybeans
Savannah fine sandy loam (3 - 8% slope)—soybeans
Savannah—urban land complex—no capability

Savannah—urban land complex (3 - 8% slope)—no capability
Sawyer silt loam—soybeans
Sawyer silt loam (3 - 8% slope) (Jefferson Co.)—soybeans
Sawyer silt loam (3 - 8% slope) (Lonoke and Prairie Co.)—pasture
Sharkey clay—woodland

Smithdale fine sandy loam (3 - 8% slope)—soybeans
Smithdale fine sandy loam (8 - 12% slope)—no capability
Smithdale sandy loam (5 - 8% slope)—pasture
Stuttgart silt loam (#35 in Lonoke Co. and Prairie Co.)—rice
Stuttgart silt loam (#36 in Lonoke Co. and Prairie Co.)—soybeans

Stuttgart silt loam (0 - 1% slope)—rice
Stuttgart silt loam (1 - 3% slope)—soybeans
Stuttgart silt loam (3 - 8% slope)—small grain
Taft silt loam—soybeans
Tichnor silt loam (Arkansas Co.)—rice

Tichnor silt loam (Lonoke and Prairie Co.)—soybeans
Wabbaseka—Latiainer complex (undulating)—soybeans
Wabbaseka—Latiainer complex (occasionally flooded)—soybeans
Yorktown silty clay (Jefferson Co.)—no capability
Yorktown silty clay (Lonoke and Prairie Co.)—woodland